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CYBERBLITZ

RSET
RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY

RAJAGIRI VALLEY, KAKKANAD, KOCHI 682039, KERALA, INDIA

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Department Vision

To become a Centre of Excellence in Computer Science & Engineering, moulding professionals catering to the research and professional needs of national and international organizations.

Department Mission

To inspire and nurture students, with up-to-date knowledge in Computer Science & Engineering, ethics, team spirits, leadership abilities, innovation and creativity to come out with solutions meeting the societal needs.

Programme Educational Objectives (PEO)

PEO 1: Graduates shall have up-to-date knowledge in Computer Science & Engineering along with interdisciplinary and broad knowledge on mathematics, science, management and allied engineering to become computer professionals, scientists and researchers.
PEO 2: Graduates shall excel in analysing, designing and solving engineering problems and have life-long learning skills, to develop computer applications and systems, resulting in the betterment of the society.
PEO 3: Graduates shall nurture team spirit, ethics, social values, skills on communication and leadership, enabling them to become leaders, entrepreneurs and social reformers.

Programme Outcomes(PO)

a. An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems.

b. An ability to identify, analyze, formulate and solve technical problems by applying principles of computing and mathematics relevant to the problem.

c. An ability to define the computing requirements for a technical problem and to design, implement and evaluate a computer-based system, process or program to meet desired needs.

d. An ability to learn current techniques, skills and modern engineering tools necessary for computing practice.

e. An ability to carry out experiments, analyse results and to make necessary conclusions.

f. An ability to take up multidisciplinary projects and to carry out it as per industry standards.

g. An ability to take up research problems and apply computer science principles to solve them leading to publications.

h. An ability to understand and apply engineering solutions in a global and social context.

i. An ability to understand and practice professional, ethical, legal, and social responsibilities as a matured citizen.

j. An ability to communicate effectively, both written and oral, with a range of audiences.

k. An ability to engage in life-long learning and to engage in continuing professional development.

l. An ability to cultivate team spirit and to develop leadership skills thereby moulding future entrepreneurs.

From HODs DESK

This is a humble attempt from the Department of Computer Science &Engineering, RSET, towards articulating its ideas and envisaging possibilities for prospering in the modern world.

One cannot imagine a world without computers, for it has become such an inevitable part of everyday life. Well, it has taken decades to come to this stage of growth, immense work behind it from Mathematicians, technicians, scientists from various streams and committed engineers in the development of this branch of engineering.

Allen Turing who was heading a team of Mathematicians to crack cipher codes for the Allied force had made the first Mathematical model of the present day computers. Binary arithmetic and Boolean algebra paved the path for its theoretical developments. Switches, relays, transistors, shift registers, and other technological invents had made the hardware implementation. Integrated chips had made it more compact and powerful. Computer Networking had made this world revolutionized by its accessibility to communication and information, and made the world seemingly smaller and smaller as each day is dawn. The cell phone has made mobile computing an everyday reality. The developments in RDBMS have helped to automate almost every possible system in the world. Data warehousing and Mining has made executive decisions quicker and more meaningful. To be short, computers rule the world.

'A man, a plan, a canal, Panama.' is a famous palindrome. There are men and women, there are fertile plans, and let us all pray for the 'Panama 'a reality. May the articles pave the path for it.

Ajith.S
Head of the Department,
Computer Science& Engineering.

Chiranjoy Chattopadhyay, Ph.D. Scholar, Visualization and Perception Lab, Dept of CSE, IIT Madras, Chennai-36

Brief Bio of the author:

Chiranjoy Chattopadhyay was born in Durgapur, West Bengal. He received the B.E. degree from the Department of Information Technology, University Institute of Technology, Burdwan in 2001, the M.Tech degree in the area of Information Technology from Jadavpur University, Kolkata, in 2007. He has worked as a Software Engineer in TCS, Chennai from 2007 to 2009. Since 2009, he has been pursuing the Ph.D. degree from the Visualization and Perception Laboratory, Department of Computer and Science Engineering, Indian Institute of Technology Madras, Chennai. He has published papers in international and national journals and conferences. His current research interests include visual perception, computer vision, digital image processing and pattern recognition, computer graphics.

Introduction and scope of visualization

The evolution of print technology helped us to present information in a human readable format in an efficient way. It took a long time to comprehend the human perception and present the content appropriately in a printed form. On the other hand, the revolution of digital media has happened rapidly. A high quality visualization system requires sufficient luminance and contrast, no flicker, minimized effect of spatial sampling, perceptually lossless image compression, convincing impression of depth, effective use of color etc. To deliver high quality visualization, knowledge of human perception is necessary. Understanding the process of perception of color, texture and motion cues in human brain helps us to capture, compress and display information effectively.

Introduction

Immanuel Kant, the German philosopher and the central figure of modern philosophy proposed that our knowledge of the outside world depends on our modes of perception. With five sensory organs, which has specialized cellular structure and links with the central nervous system, helps us to perceive the outside world. Among them, eye is the organ of vision and we spend most of our resources for that. The visual quality of any object has a great impact on drawing our attention towards it.

The phrase “a picture is worth a thousand words” is well known to all of us which emphasizes the fact that visual information has a large impact on human perception system and cognition. Figure 1 gives a chronological depiction of the important milestones in the field of computer graphics and visualization. Since its birth around 1960, it has been a journey that crossed childhood, adolescence, and now attained its maturity. With the increase in demands from the market, graphics hardware is now become more versatile and more affordable each year. Now days, many popular software also require those hardware to give a better user experience.

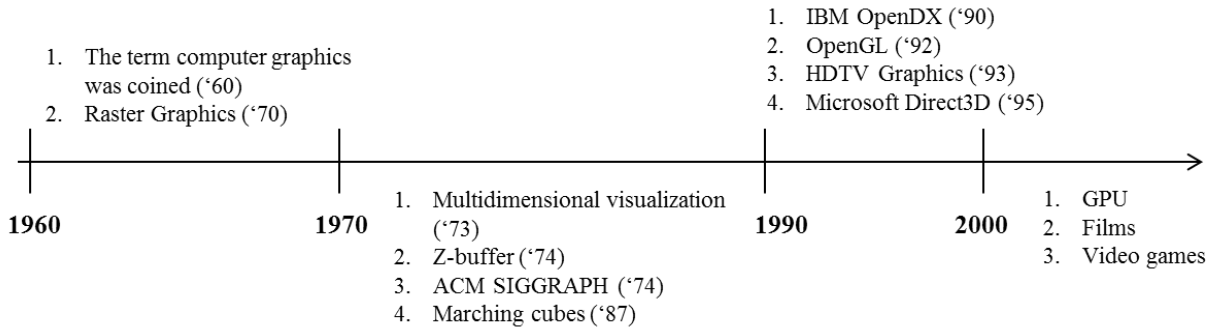


Figure 1: Significant Milestones in Computer Graphics and Visualization

Some Important Terminologies

Computer graphics connects the human visual perception channel by synthesizing digitally the outside world. This helps in communicating the information to humans at a high rate. A combination of basic drawing shapes e.g. lines, circles, combined with specific rules (layout) and manipulation operations (transformation) to construct meaningful entities, constitutes a three-dimensional scene or a two-dimensional drawing. Computer graphics encompasses *algorithms* that generate (render), from a scene or drawing, a raster image that can be depicted on a display device. On the other hand, the aim of *visualization* is to exploit visual presentation in order to increase the human understanding of large data sets and the underlying physical phenomena or computational processes. At a high level of abstraction, we could say that visualization is a function that converts a data set to a displayable model.

An important concept that binds both graphics and visualization is *modeling*. It includes techniques for the demonstrations of graphical objects. Another important idea in graphics is the notion of the *graphics pipeline.* A pipeline is a sequence of stages that create a digital image out of a model or scene. The term graphics pipeline refers to the classic sequence of steps used to produce a digital image from geometric data that does not consider the interplay of light between objects of the scene. Efficiency is central to computer graphics, especially so when direct user interaction is involved. As a large number of primitives are, in general, invisible from a specific viewpoint, it is pointless to try to render them, as they are not going to appear in the final image. The process of removing such parts of the scene is referred to as *culling*. Understanding of these concepts will help an aspiring student to have a foundation in the field of computer graphics.

Another important aspect of computer graphics and visualization is implementation of graphics algorithms. Standard 3D APIs such as OpenGL and Direct3D focused on displaying surfaces as polygons, and the hardware graphics pipeline was optimized for this task. The core elements of a 3D graphics accelerator expanded to include more complex mathematical operations on matrices and vectors of floating-point data, as well as bitmap addressing, management, and paging functionality. Modern geometry processing, rasterization, and texturing units have

multiple parallel stages. Ideas pioneered in the1980s for introducing parallelism to graphics algorithms have found their way to3D graphics accelerators.

Applications

The distinction between applications of computer graphics and applications of visualization tends to be blurred. Also application domains overlap and they are so numerous that giving an exhaustive list would be tedious. A glimpse of important applications follows:

- Special effects for films and advertisement
- Scientific exploration
- Interactive simulation
- Computer games
- Computer aided geometric design and solid modeling
- Graphical user interface
- Computer art

Conclusion

The rapid expansion of the computer graphics and visualization fields have led to increased specialization among researchers. The field of Computer graphics and visualization has lots of challenges that in turn open up a lot of research opportunities. Readers are requested to keep an eye on important international conferences like SIGGRAPH, Eurographics etc. There are international and national conferences organized by IUPRAI like ICVGIP and NCVPRIPG, which gives opportunity for Indian students to attend, publish and build network with researchers of other universities working in the field of computer graphics and visualization.

References

[1] “Graphics and Visualization, Principles and Algorithms”, T. Theoharis, G. Papaioannou, N. Platis, N. Patrikalakis, A K Peters, Ltd.Wellesley, Massachusetts.
[2] “Color Theory and Modeling For Computer Graphics, Visualization, And Multimedia Applications”, HaimLevkowitz, kluwer academic publishers.

Staff corner

Be yourself

Once a king came to the garden and saw fading and dying trees, bushes, and flowers. An oak said that he dies because it can't be as high as a pine. Applying to a pine tree, the king found her falling down because it can't give grapes like a grapevine. And grapevine was dying because she couldn't blossom like a rose. Soon he found a single plant, pleasing heart, bloomy and fresh. After questioning, he received the following answer:

I think it's a natural event, because when you planted me, you wanted to get a joy. If you would like to grow an oak, grapes or rose, you would put them. So I think that I can't be anything else than what I am. And I try to develop my best qualities.

Look at yourself. You can only be yourself. It is impossible for you to become someone else. You can joy and blossom or you can fade if you do not accept yourself.

Jomina John
Asst. Professor
DCS, RSET

Live in the hearts

A student once asked God "What surprises you most about mankind"?
God replied
"They lose their health to make money and then they lose their money to restore their health.
By thinking seriously about the future, they forget the present such that they live neither for the present nor for their future.
They live as if they will never die and they die as if they have never lived.
Its time mankind realizes the fact that those who live for others only can live even after death".
The analogy is loud and clear when we live for others; we live in their hearts forever.

Dhanya P.M
Asst Professor,
DCS, RSET

The Web

If u log on to the web today
If you log on to the web today,
You're sure of a big surprise
If you log on to the web today,
You would better begin to get wise
for every site that ever there was,
will gather your data simply because
On the web today, Conception of privacy is only for thick hicks.
Clueless newbies are having lovely time today.
Watch them, totally unawares,
as their bank A/c's are slipping away.
See them joyfully point and click,
falling for every Marketer's trick.
If you log on to the web today,
You won't be going alone.
If you log on to the web today,
Google will track you all around and home.
For every large company ever there was,
Desires your data, simple because
Pimping your data is a profitable slick trick.
So, if you log on to the web today,
don't ever put your info and fall for a quick trick.

Jincy J Fernandez
Assistant Professor,
DCS, RSET

PUT THE GLASS DOWN TODAY!

There was once a very wise teacher, whose words of wisdom students would come from far and wide to hear. One day as usual, many students began to gather in the teaching room. They came in and sat down very quietly, looking to the front with keen anticipation, ready to hear what the teacher had to say.

Eventually the teacher came in and sat down in front of the students. The room was so quiet you could hear a pin drop. On one side of the teacher was a large filled glass jar. She held it up for all to see and asked one of his new students to stand.
Teacher: "How much do you think this glass weighs"
Student: "125 grams!"
Teacher:"I really don't know unless I weigh it, but my question is what would happen if I held it up like it for a few minutes?"
Student: "Nothing"
Teacher: "Ok what would happen if I held it up like this for an hour?"
Student: "Your arm would begin to ache"
Teacher: "You're right, now what would happen if I held it for a day?"
Student: 'You might have severe muscle stress and paralyses
Teacher: Very good But during all this did the weight of the glass change"
Student: 'No'
Teacher: "Then what caused the arm ache and muscle stress?"
Student: 'I don't know'
Teacher:"what should I do now to come out of pain?"
Student:"Put the glass down!"
Teacher:"Exactly and do you know why I am asking this questions to you"
Student: "No teacher"
Teacher: I want all of you to recognize that Life's problems are something like this .Hold it for a few minutes in your head and they seem ok. Think of them for a long time and they begin to ache. Hold it even longer and they begin to paralyze you. You will not be able to do anything. It's important to think of challenges or problems in your life, but even more important is to 'PUT THEM DOWN' at the end of every day before you go to sleep. That way, you are not stressed, you wake up every day fresh and strong and can handle any issue, any challenge that comes your way. So, when you start your day today, remember friend to 'PUT THE GLASS DOWN TODAY!'

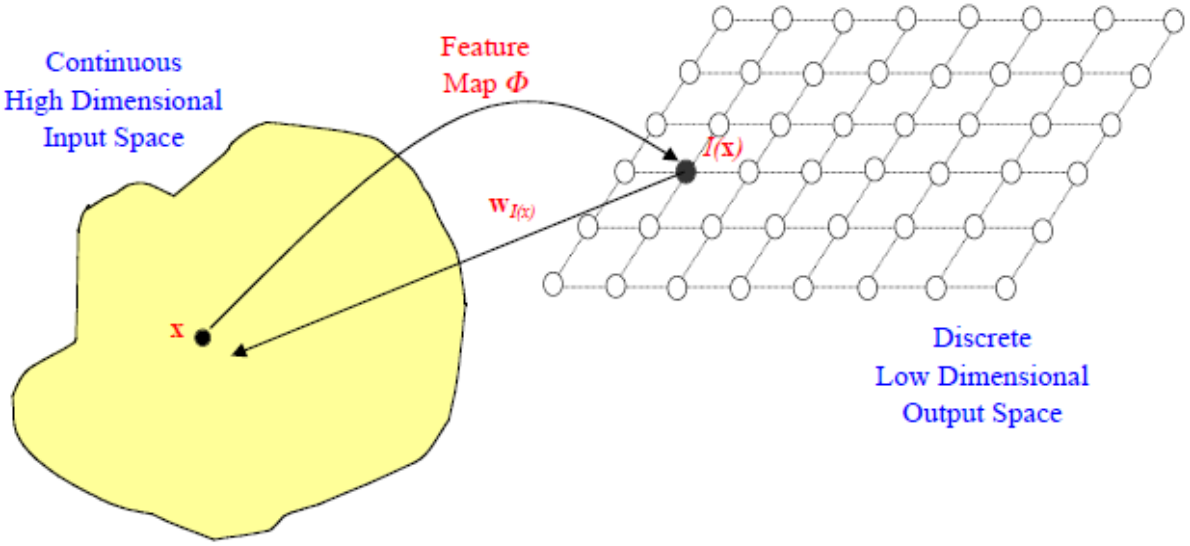
Diya Thomas
Assistant Professor,
DCS, RSET

Self-Organizing Map

The Self-Organizing Map is one of the most popular neural network models. It is an unsupervised training model, in which the networks learn to form their own classifications of the training data without external help. There is competitive learning, in which the output neurons compete amongst themselves to be activated, with the result that only one is activated at any one time. This activated neuron is called a winning neuron.

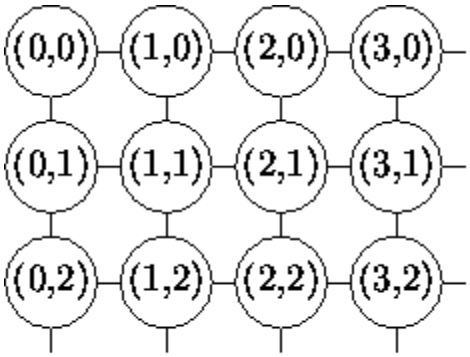
Organization of the Mapping

We have points **x** in the input space mapping to points $I(\mathbf{x})$ in the output space:

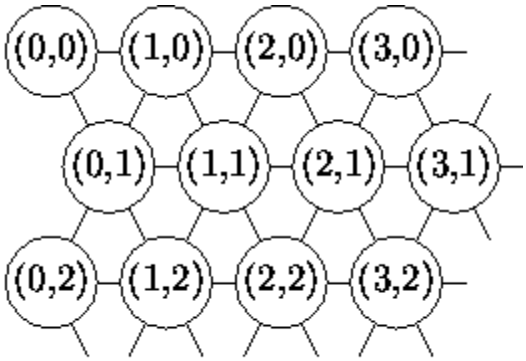


Each point I in the output space will map to a corresponding point $\mathbf{w}(I)$ in the input space.

The neurons in the computational layer can be either connected in rectangular fashion or hexagonal fashion

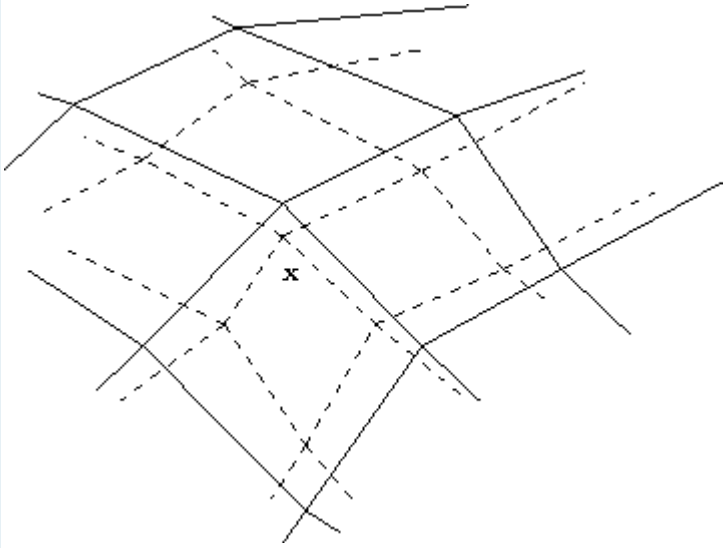


Rectangular



Hexagonal

The training consists of choosing a winner unit by the means of a similarity measure and updating the values of codebook vectors in the neighborhood of the winner unit. This process is repeated a number of times.



Each winning neuron moves towards the data point by a certain amount, and its neighboring neuron(s) move by smaller amounts .Eventually the whole output grid unravels itself to represent the input space.

Dhanya P.M
Assistant Professor
DCS, RSET

Image Mining

Advances in image acquisition and storage technology have led to tremendous growth in very large and detailed image databases. A vast amount of image data such as satellite images, medical images, and digital photographs are generated every day. The World Wide Web is regarded as the largest global image repository. An increasing proportion of the contents in digital libraries are images. These images, if analyzed, can reveal useful information to the human users. For example, in the field of archaeology, many photographs of various archeological sites have been captured and stored as digital images. These images, once mined, may reveal interesting patterns that could shed some lights on the behavior of the people living at that period of time. It is thus becoming an emerging research field in geosciences because of the increasing amount of data which lead to new promising applications. For example, the use of very high resolution satellite images now enables the observation of small objects, while the use of very high temporal resolution images enables monitoring of changes at high frequency.

Colour, texture and shape of an image have been primitive image descriptors in Content Based Image Retrieval (CBIR) system. Primitive features of an image are used to identify and retrieve closely matched images from an image database. It is very difficult to extract images manually from image database because they are very large.

Image mining is the process of searching and discovering valuable information and knowledge in large volumes of data. It is a technique which handles the mining of information, image data association, or additional patterns not unambiguously stored in the images. It utilizes methods from computer vision, image processing, image retrieval, data mining, machine learning, database, and artificial intelligence. Rule mining has been implemented to huge image databases. There are two most significant techniques. The first technique is to mine from huge amount of images alone and the second technique is to mine from the integrated collections of images and related alphanumeric data.

The main intention of image mining is to produce all considerable patterns without any information of the image content, the patterns types are different. They could be classification patterns, description patterns, correlation patterns, temporal patterns and spatial patterns. Image mining handles with all features of huge image databases which comprises of indexing methods, image storages, and image retrieval, all regarding in an image mining system.

Clearly, image mining is different from low-level computer vision and image processing techniques. This is because the focus of image mining is in the extraction of patterns from a large collection of images, whereas the focus of computer vision and image processing techniques is in understanding and/or extracting specific features from a single image.

Image mining systems that can automatically extract semantically meaningful information (knowledge) from image data are increasingly in demand. The fundamental challenge in image mining is to determine how low-level, pixel representation contained in a raw image or image sequence can be efficiently and effectively processed to identify high-level spatial objects and relationships. In other words, image mining deals with the extraction of implicit knowledge, image data relationship, or other patterns not explicitly stored in the image databases.

An image database containing raw image data cannot be directly used for mining purposes. Raw image data has to be first processed to generate the information usable for high-level mining modules. An image mining system is often complicated because it requires the application of an aggregation of techniques ranging from image retrieval and indexing schemes to data mining and pattern recognition. A good image mining system is expected to provide users with an effective access into the image repository and generation of knowledge and patterns underneath the images.

Jincy J Fernandez
Assistant Professor
DCS, RSET

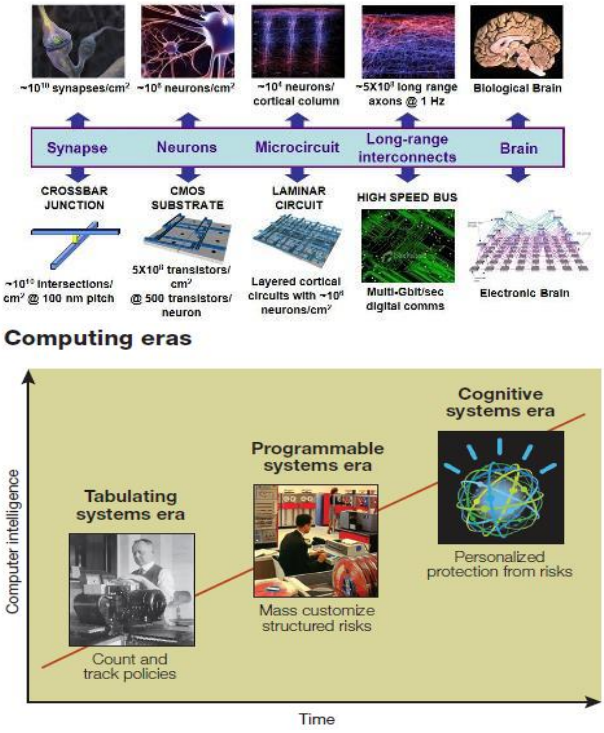
Cognitive Computing

It's amazing when you look back over the 60+ years of the computing revolution and see how far we have come in such a relatively short time. The first electronic programmable computers, built in the 1940s, were essentially really fast electronic calculators. Then came the mainframe, the PC, the Internet and social networking. Today, we're entering the era of cognitive computing–machines that help us think.

Cognitive computing is a branch of computer science that seeks to create computers that process data in ways that are more similar to how an organic brain processes data. It's more of an umbrella term than a specific technology, touching on topics like machine learning, artificial intelligence, and computational creativity.

Broadly speaking, these systems are better than traditional computing at the things that organic brains excel at. Chief among those things is that they can learn, enabling them to figure out how to perform tasks that are far too complicated for a human developer to model on their own, like language processing or image

recognition. Cognitive computing systems like Watson that specializes in understanding natural human language and provides specific answers to complex questions at rapid speeds.

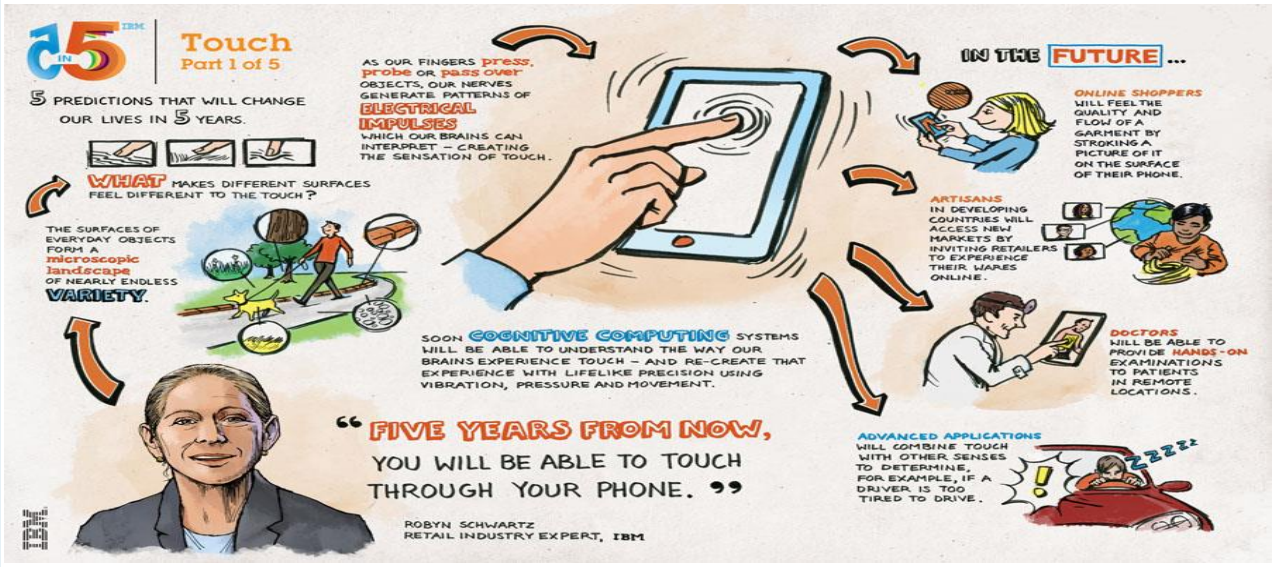


This type of computing integrates technology and biology in an attempt to re-engineer the brain, one of the most efficient and effective computers on Earth. Cognitive computing has its roots in the 1950s, when computer companies first began to develop intelligent computer systems. Most of these systems were limited, however, because they could not learn from their experiences. Early artificial intelligence could be taught a set of parameters, but was not capable of making decisions for itself or intelligently analyzing a situation and coming up with a solution. However, with major advances in cognitive science, researchers interested in computer intelligence became enthused. Deeper biological understanding of how the brain worked allowed scientists to build computer systems modeled after the mind, and most importantly to build a computer that could integrate past experiences into its system. Cognitive computing was reborn, with researchers at the turn of the 21st century developing computers which operated at a higher rate of speed than the human brain did.

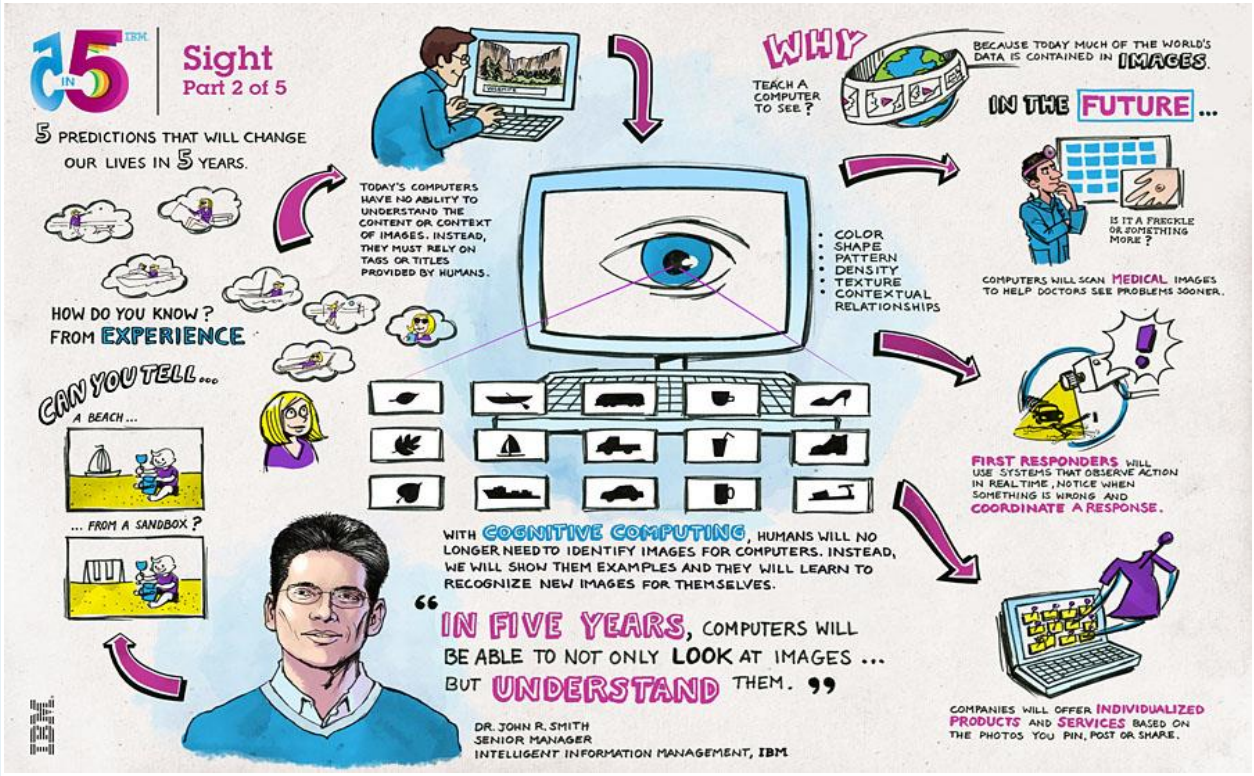
The cognitive computing prototype chips are made up of a "neurosynaptic core," which encompass of computational circuits (the neurons), memory (the synapses), and communication lines (the axons). New chips are designed to behave fundamentally like our own brains, being able process sensory input in a vastly parallel fashion, create correlations, learn from experience, and adapt its processing dynamically.

Cognitive computers will mimic the senses:

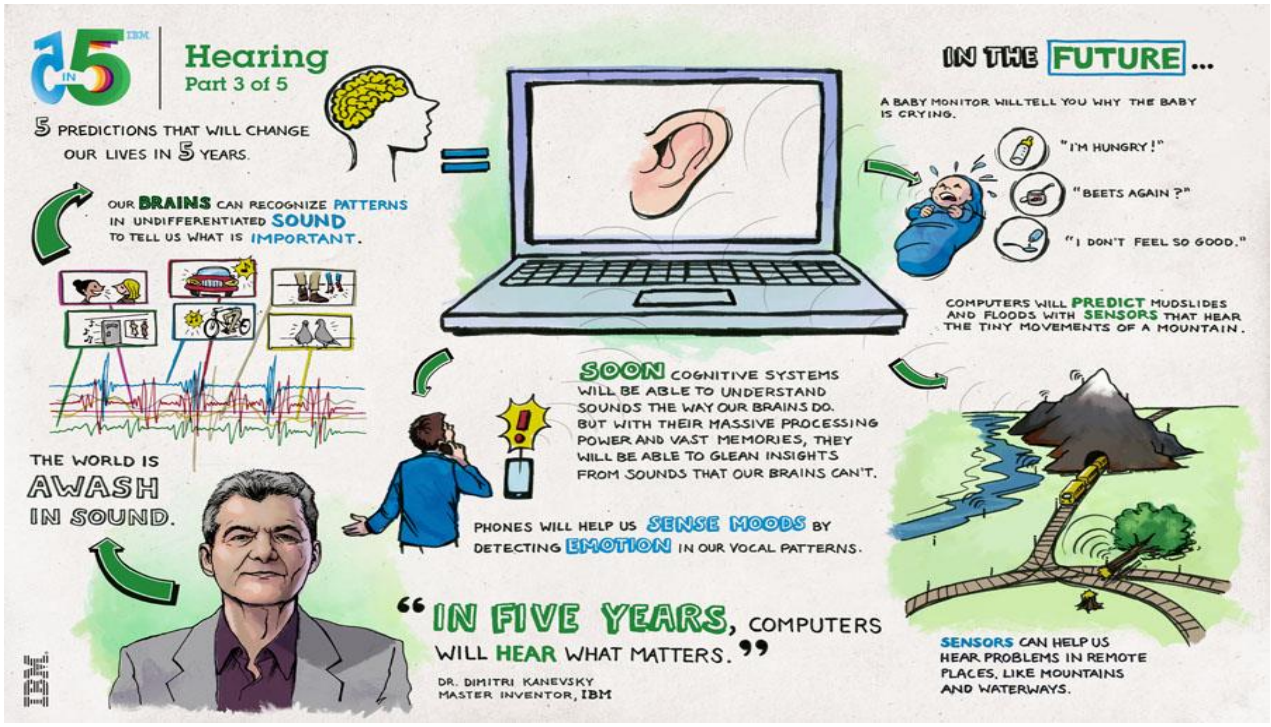
Touch: You will be able to reach out and touch through your phone



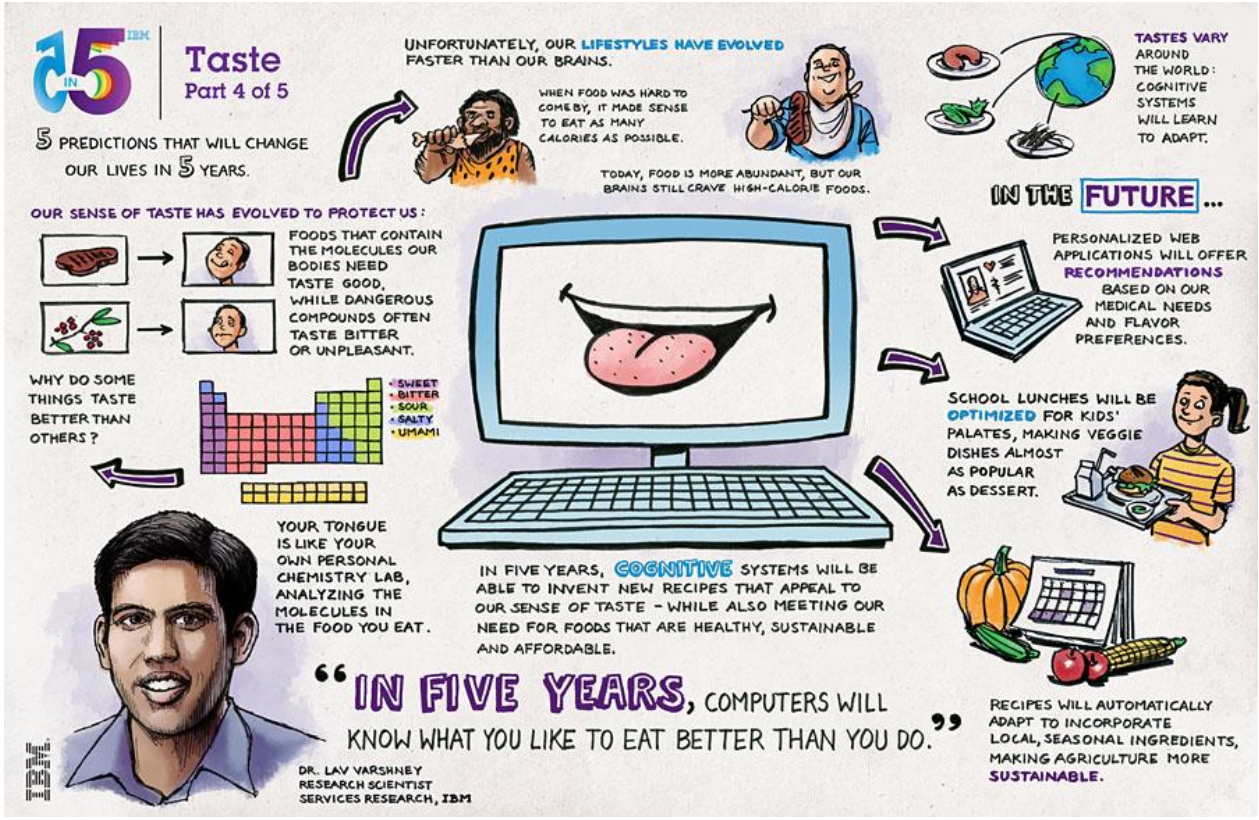
Sight: A pixel will be worth a thousand words



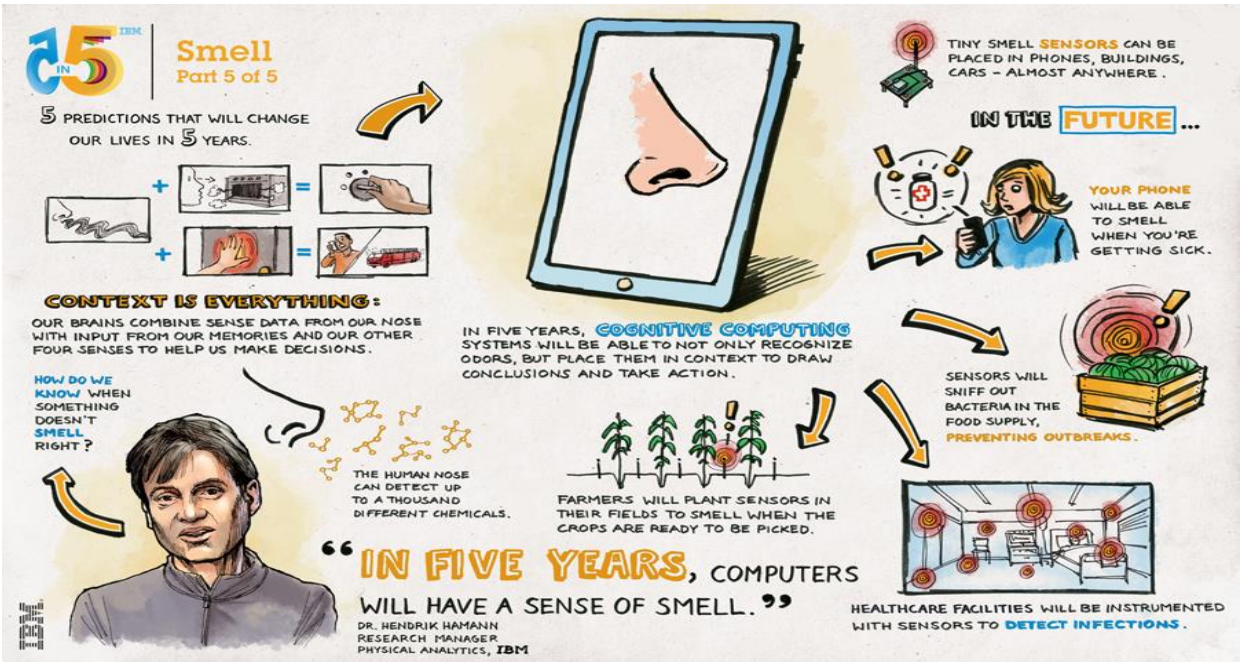
Hearing: Computers will hear what matters



Taste: Digital taste buds will help you to eat healthier



Smell: Computers will have a sense of smell



It's no surprise that the future of computing will be far more sophisticated. In the next five years computers will be able to be more aware of the world around them, and will be able to understand it. Cognitive computing - which involves machines experiencing the world more like a human would. That alone would change how data is being perceived. Not just in bits, but a way where it's being taken to the next level of understanding - like how us humans do it.

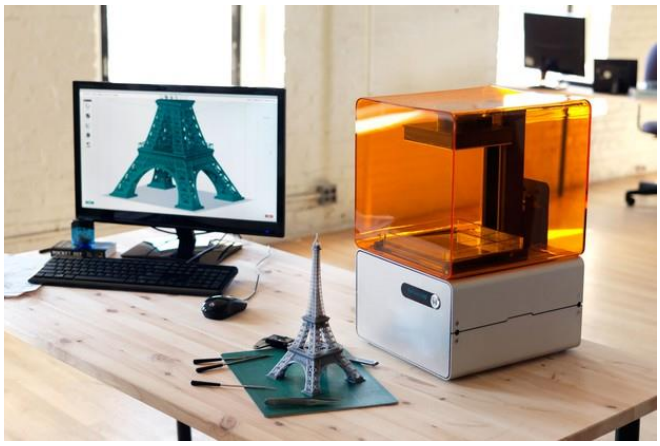
It is purportedly the next wave of computing, infinitely more powerful and long-lasting than any other computing wave we have seen. It changes the way we interact with computers, the reason we use computers, and also the way we program computers.

Diya Thomas
Assistant Professor,
DCS, RSET

Students Corner

DAWN OF A REVOLUTION

3D Printing Technology



Form 1': A $350 consumer 3D printer

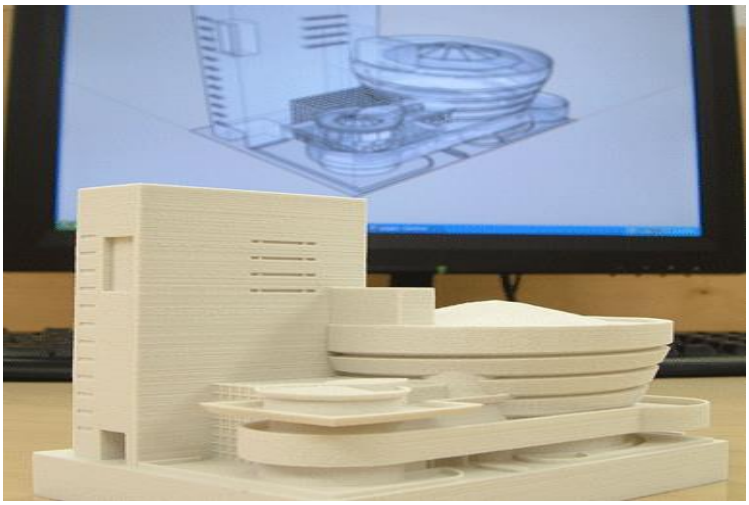
The 3D printing technology made its way to the technological world in the year 1986, but did not gain importance until 1990. It was not that popular outside the world of engineering, architecture and manufacturing. In recent years 3D printers have become cheaper to produce and are available in the consumer market. Several models are now available for sale, as well as designs for products.

3D printing is also known as desktop fabrication; it can form any material that can be obtained as a powder. 3D printers deposit material layer by layer to create a solid object. As the objects are constructed in layers from the ground up, the process is also known as additive manufacturing. Plastic is currently the most common "ink," but others in use include ceramics, metal, sand, sugar and chocolate. For creating an object, you need a digital 3D-model. You can scan a set of 3D images, or draw it using computer-assisted design or CAD software. You can also download them from internet. The process of "printing" a three-dimensional object layer-by-layer with equipment is quite similar with that of ink-jet printers.

One of the most important applications of 3D printing is in the medical industry. Medicine will forever be changed as new bio-printers actually print human tissue for both pharmaceutical testing and eventually entire organs and bones.3D printing makes it possible to make a part from scratch in just hours. It allows designers and developers to go from flat screen to exact part.

Architecture and construction are changing as well. Now, 3D-printed models of complex architectural drawings are created quickly and inexpensively, rather than the expensive and time-consuming process of handcrafting models out of cardboard. And experimental, massive 3D printers are printing concrete structures, with the goal of someday creating entire buildings with a 3D printer.

Art is already forever changed. Digital artists are creating magnificent pieces that seem almost impossible to have been made by traditional methods. From sculptures to light fixtures, beautiful objects no longer need to be handcrafted, just designed on a computer.



And there are developments where you least expects them: for example, archeologists can 3D scan priceless and delicate artifacts and then print copies of them so they can handle them without fear of breakage. Replicas can be easily made and distributed to other research facilities or museums. It has been used to create a full-size reproduction of King Tutankhamun's mummy and to repair Rodin's sculpture, The Thinker.

A Cube 3D Home Printer

3D printing is going to impact so many industries, such as automotive, medical, business & industrial equipment, education, architecture, and consumer-product

industries. Experts predict 3D printers will be common in homes in coming years. It will change the world as we know it, before you know it.

B.Bijai Chandra
S1-S2 D

MEDICAL MIRROR

While it can't tell you if you're the fairest of them all, the Medical Mirror can tell you your heart rate, which is probably more valuable in the long run anyway. A webcam behind the mirror captures variations in reflected light on your face, and an algorithm translates that to heartbeats.

One night in late 2009, Ming-Zher Poh and his roommate, Dan McDuff, asked some friends to sit in front of a laptop. Poh, an electrical- and medical-engineering graduate student at the Massachusetts Institute of Technology, was trying to transform the computer's webcam into a heart-rate monitor. He hoped that his software would allow doctors to check the vital signs of burn victims or babies without attaching uncomfortable clips, and that it would make it easier for adults to track their cardiovascular health over time. That night, the program wasn't working in real time, but its measurements were near perfect. "Right away I knew we had something special," Poh says.

A year and a half later, a large framed mirror embedded with a more refined version of Poh's system sits in the MIT Media Lab. Behind the two-way glass, a webcam-equipped monitor is wired to a laptop. Stand before the mirror, and the otherwise blank monitor projects your heart rate on top of your reflection.

When your heart beats, it sends a pulse of blood through your blood vessels. Blood absorbs light, so when more of it travels through the vessels, less of the light hitting your skin is reflected. A webcam can pick up those small fluctuations in reflected light, Poh says, and a computer program can translate that data into a heart-rate reading.

Working

The webcam in a monitor behind the two-way mirror captures the changes in the light reflected off the subject's face when the heart beats. The computer translates the light data into a heart rate reading.

Researchers had tracked this effect with a high-resolution camera, but Poh wanted to use a simple webcam so that nearly every computer and smartphone could double as a heart-rate monitor. To make that possible, he developed an algorithm that could pick out the heart rate's light pattern from all the other reflected light captured by a webcam. With help from McDuff, a grad student at the MIT Media Lab, Poh wrote code to process the data in real time, allowing the laptop to generate an instant heart-rate reading.

Poh plans to try to bring the mirror to market after he finishes his Ph.D. later this year. He says the system could be used to measure other vitals as well, including respiratory rate and blood-oxygen saturation, which should broaden its appeal. "This shows your inner health," he says. "Maybe as people use it, they'll say, 'This is part of my identity. It's not just how I look on the outside.'"

Jincy Johnson
S1S2 A

Battle of binaries...

Furious fingers attack systematically,
The square, black keys tremble as
each press akin to a bullet wound
There is fire but not any smoke.
The hallowed war heroes of the past
a distant memory, like each key press.
No more is blood spilt on the grounds,
but partly do the Gods bless?
It all begins with a tiny worm,
Not the kind that squirms in the mud.
Each one unique, a signature
of its bespectacled programmer.

Information is what it seeks,
"Not much of a war", says the purist.
But isn't that of most worth, as
College kid turns terrorist.

Technology often surprises,
Connect across borders overseas.
Is this really progress, as we
Commence the battle of binaries.

Aravind.P
S4 CSE

Responsive Web Design

Once upon a time, mobile phone was just a wireless device used to call others. Then gradually it was improvised with many applications making it much more than a calling device. And nowadays, it is like a mini PC with the use of smart phones. Thanks to it, users could have a full web experience on their phones.

But there was one problem. Till then, all web pages were designed for a 1024x768 resolution screen. Hence, a person viewing a webpage on mobile phone had to go through a tedious process of navigating up and down, sideways, zooming in and out to understand the whole concept on a small screen that is initially designed for a much larger. And making your site work for a few popular devices might require multiple mobile versions of your site like creating a different version of a website that targets each individual device. It is not a practical way forward. This can quickly become both a development and maintenance nightmare. And the solution to that nightmare is Responsive Web design!

What is responsive web design? According to Wikipedia, it is a web design approach aimed at crafting sites to provide an optimal viewing experience—easy reading and navigation with a minimum of resizing, panning, and scrolling—across a wide range of devices (from mobile phones to desktop computer monitors). In short, responsive web design is the art of designing websites for a multitude of screen sizes and devices, so that there is an optimal experience for every user at every possible size.

Responsive web design is at its best when it's device agnostic; where you're not aiming to design for particular resolutions or sizes, such as for iPhone or iPad sizes only. Instead you should be aiming to design with the content and design in mind and how this content flows and adapts to the various environments it might be seen or used in.

Responsive web design is becoming a standard practice in web development. It's hard to talk about responsive web design without mentioning its creator, Ethan Marcotte. The concept really took off after Ethan Marcotte published his famous article -Responsive web design. It is an approach to scale and fit the UI of app views to the variety of devices and browsers. It also includes design considerations for where to put each page element when

the screen is in landscape mode or portrait mode. Essentially, you need to design a different view for landscape and portrait views, and optionally provide different interfaces for desktop, smartphone, tablet and even for smart TVs.

Responsive web design works on three main aspects. It relies on the concept of fluid elements that enable content to adjust according screen size. Images are also flexible. They resize themselves to fit the screen perfectly. Responsive web design uses CSS media queries to serve different style properties depending on the screen size, orientation, resolution, colour capability and other characteristics of the user's device.

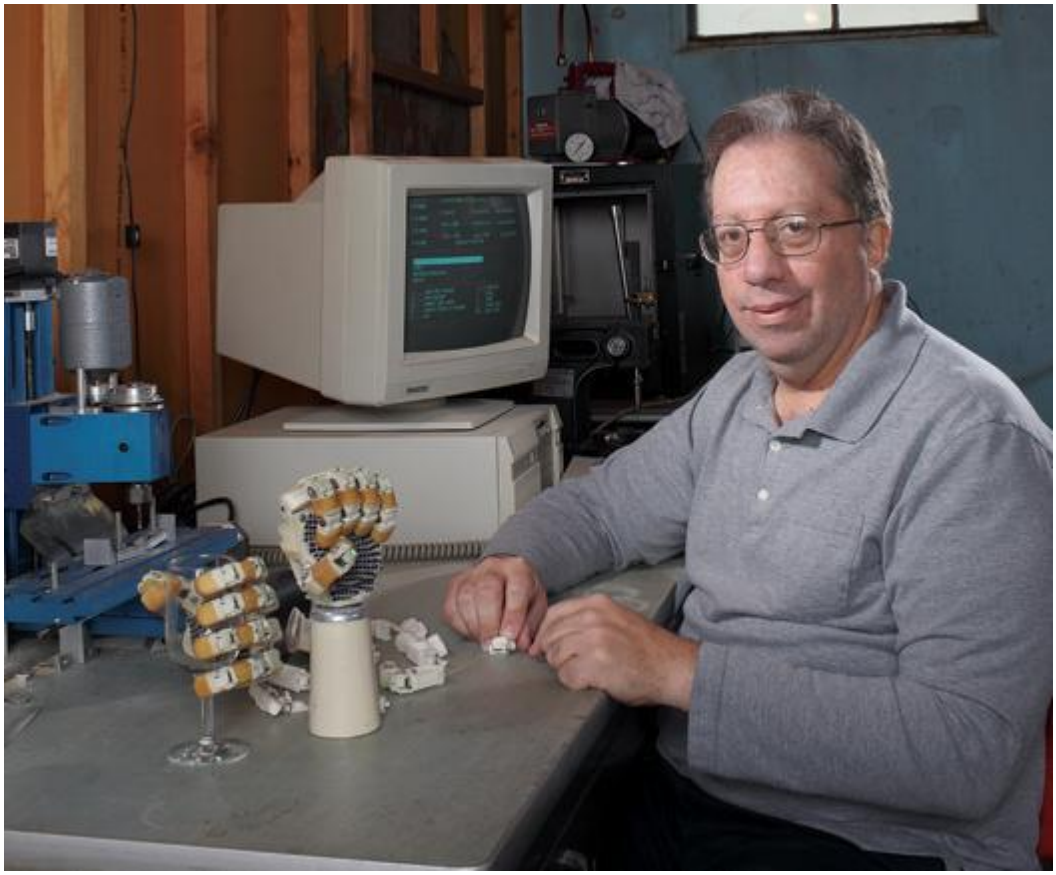
Responsive web design is becoming the de-facto standard in web and mobile web UI design. Users expect the UI to adapt to their devices, and failing to do that will result in fewer users. Due to the application of responsive web pages in mobile phones, tablets, etc, the sales of desktops and laptops have gradually gone down.

In this new age of Web design and development, we have vast number of devices available now, and there will be far too many in the future to continue adjusting and creating custom solutions for each screen size, device and advancement in technology. Responsive Web Design and the techniques discussed above are not the final answer to the ever-changing mobile world. It is rather a mere concept that when implemented correctly can improve the user experience. With responsive web design, we can create custom solutions for a wider range of devices. Through Responsive web design we are able to support all resolutions and also create websites that are future-ready right now. Well, with giving users the best web experience on any device, it has definitely started a new era in the world of web development.

Teenu Thomas Thaliath
S4 CSE

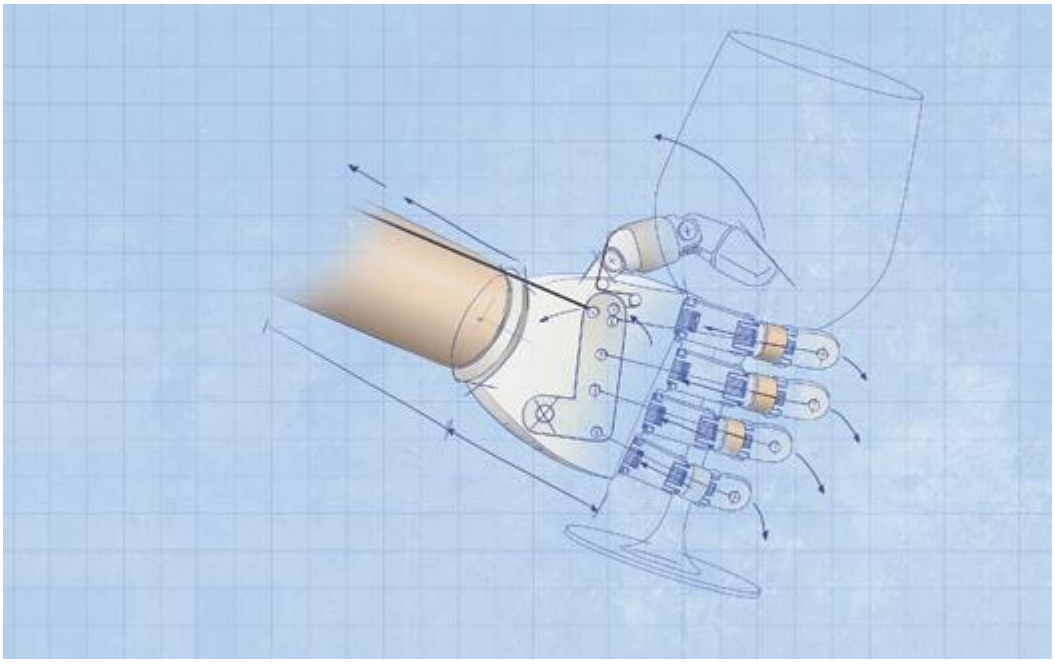
THE STARK HAND

Created by Mark Stark, The Stark Hand prototype provides an ingenious, comfortable, and very inexpensive alternative to the hook his friend Dave Vogt had worn all his life.



Prosthetic hands typically come in three varieties: purely cosmetic models; hooks and other low-cost mechanical appendages that provide a limited range of motion; and electronic versions that better mimic natural hand movements yet can cost tens of thousands of dollars. Mark Stark's prosthetic incorporates the best elements of each. Although it's minimalist plastic assembly is nearly as light and inexpensive as a common steel hook, it looks and moves like a high-end electronic hand.

Stark, who makes his living designing valves for dryers and other appliances, got into prosthetics in part to help his friend, Dave Vogt, who was born without a left hand. Stark's creation is electronics-free, but its fingers each have three knuckles (two on the thumb) that bend separately to conform to anything the wearer grasps, including irregularly shaped objects that a hook can't hold. Hooks attach to a socket at the end of an amputee's arm and are operated by a cable that runs up to a shoulder harness. When the wearer shrugs his shoulders, the cable pulls the hook open; when he relaxes, the cable slackens and the hook closes. The Stark Hand screws into the same socket-and-cable system but adds a lever on the palm that connects to five more cables, each running up the back of a finger. A shoulder movement triggers the lever to tug all five fingers open at once, and the individual cables let each finger rebound on its own. Springs in each joint contract until each finger comes to rest on an object, so some fingertips can curl around, say, a wineglass stem while others grasp the cup. The springs exert a level of pressure gentle enough to hold an egg but strong enough that you can lift a chair.



Working

The prosthetic hand attaches to a cable that runs from a shoulder harness worn by an amputee. A lever on the palm opens all five fingers at once, and separate cables in each finger and springs at each knuckle allow the fingers to close individually and bend around objects with a secure grip.

In 2004, Stark constructed a proof-of-concept from hardware-store supplies and gave it to Vogt to try out. Within an hour, Vogt caught a ball left-handed for the first time in his life. Since then, he has helped Stark test and improve four more prototypes. Stark designed stronger, compact springs, re-engineered the fingers into a few easy-to-manufacture shapes, and set the thumb at a new angle to better replicate a real thumb. He also strengthened the joints in the hand against side impacts after Vogt broke a prosthetic knuckle when he hit something while swinging around on the dance floor.

Vogt now wears the hand everywhere except to his job as a machinist, where he has to do heavy lifting for which a hook still works better. A more durable production version, which will use tougher plastics and sleeker parts, could be on the way as early as this winter. Edison Nation, a company that helps inventors develop their ideas, recently selected Stark's hand for commercial development and is now in talks to license it to a major prosthetics manufacturer.

Aysha Basheer
S4 CSE

A faster Internet

Computer-designed algorithms for controlling network congestion yield transmission rates two to three times as high as those designed by humans. TCP, the transmission control protocol, is one of the core protocols governing the Internet: If counted as a computer program, it's the most widely used program in the world.

One of TCP's main functions is to prevent network congestion by regulating the rate at which computers send data. In the last 25 years, engineers have made steady improvements to TCP's congestion-control algorithms, resulting in several competing versions of the protocol.

At the annual conference of the Association for Computing Machinery's Special Interest Group on Data Communication, researchers from MIT's Computer Science and Artificial Intelligence Laboratory and Centre for Wireless Networks and Mobile Computing presented a computer system, dubbed Remy that automatically generates TCP congestion-control algorithms. In the researchers' simulations, algorithms produced by Remy significantly outperformed algorithms devised by human engineers!

"I think people can think about what happens to one or two connections in a network and design around that," says HariBalakrishnan, the Fujitsu Professor in Electrical Engineering and Computer Science, who co-authored the new paper with graduate student Keith Winstein. "When you have even a handful of connections, or more, and a slightly more complicated network, where the workload is not a constant — a single file being sent, or 10 files being sent — that's very hard for human beings to reason about. And computers seem to be a lot better about navigating that search space."

What is Remy?

Remy is a machine-learning system, meaning that it arrives at its output by trying lots of different possibilities, and exploring further variations on those that seem to work best. Users specify certain characteristics of the network, such as whether the bandwidth across links fluctuates or the number of users' changes, and by how much. They also provide a "traffic profile" that might describe, say, the percentage of users who are browsing static Web pages or using high-bandwidth applications like videoconferencing.

Winstein and Balakrishnan developed a clever algorithm that can concentrate Remy's analyses on cases in which small variations in network conditions produce large variations in performance, while spending much less time on cases where network behavior is more predictable. They also designed Remy to evaluate possible indicators of network congestion that human engineers have not considered. Typically, TCP congestion-control algorithms look at two main factors: whether individual data packets arrive at their intended destination and, if they do, how long it takes for acknowledgments to arrive. But as it turns out, the ratio between the rates

at which packets are sent and received is a rich signal that can dictate a wide range of different behaviors on the sending computer's end.

Indeed, where a typical TCP congestion-control algorithm might consist of a handful of rules — if the percentage of dropped packets crosses some threshold, it cuts the transmission rate in half — the algorithms that Remy produces can have more than 150 distinct rules.

"It doesn't resemble anything in the 30-year history of TCP," Winstein says. "Traditionally, TCP has relatively simple endpoint rules but complex behavior when you actually use it. With Remy, the opposite is true. We think that's better, because computers are good at dealing with complexity. It's the behavior you want to be simple." Why the algorithms Remy produces work as well as they do is one of the topics the researchers hope to explore going forward.

In tests that simulated a high-speed, wired network with consistent transmission rates across physical links, Remy's algorithms roughly doubled network throughput when compared to Compound TCP and TCP Cubic, while reducing delay by two-thirds. In another set of tests, which simulated Verizon's cellular data network, the gains were smaller but still significant: a 20 to 30 percent improvement in throughput, and a 25 to 40 percent reduction in delay.

"I am thrilled by the approach," says Victor Bahl, research manager of the Mobility and Networking Group at Microsoft Research. "When you can constrain the problem domain and define precisely what you want out of the protocol, I can believe that their system is better than a human."

Bahl cautions that "when the protocol has to do many things for many people or many devices, then it's not clear whether this is the optimal method." But he adds that it could very well be that, in the future, networked computers will adopt different congestion-control policies depending on the types of applications they're running. "I could see that that's where this thing would excel," he says.

Jesni Elizabeth George
S6 CSE

Terms and Conditions? I accept them!

It is the important small print setting out our contractual rights, but latest research reveals just 7% of Internet users read the online terms and conditions when signing up for products and services. The research, commissioned by investment specialist Skandia, exposes how easy it is for people booking and paying for goods and services online to click the terms and conditions box without actually reading them in full.

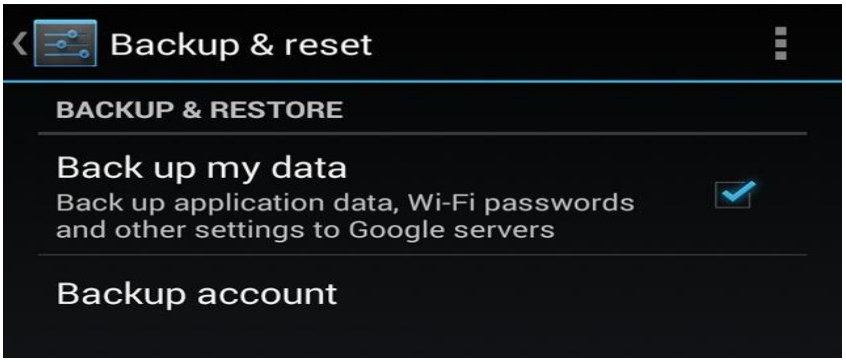
Nearly six in 10 (58%) adults said they would rather read an instruction manual or their utility or credit card bill than go through online terms, and more than one in 10 (12%) would rather read the phone book. Meanwhile, 43% of those who don't

always read the terms and conditions say they are boring or difficult to understand. But by failing to check the small print they are in the dark about their rights, until something goes wrong.

Just over a fifth (21%) of people surveyed said they had suffered as a result of ticking the terms and conditions box without having done their homework. One in 10 found themselves locked into a longer contract than expected because they signed up without reading the small print, and one in 20 lost money by not being able to cancel or amend hotel or holiday bookings.
But blindly accepting them… is it always safe? **NO**
There are a lot of examples of issues caused by not reading them, one of which is related to Google! (Yes, Google)
People sending email to any of Google's 425 million Gmail users have no "reasonable expectation" that their communications are confidential, the internet giant has said in a court filing.
Consumer Watchdog, the advocacy group that uncovered the filing, called the revelation a "stunning admission." It comes as Google and its peers are under pressure to explain their role in the National Security Agency's (NSA) mass surveillance of US citizens and foreign nationals.
"Google has finally admitted they don't respect privacy," said John Simpson, Consumer Watchdog's privacy project director. "People should take them at their word; if you care about your email correspondents' privacy, don't use Gmail."

A law-suit, filed in May, claims Google "unlawfully opens up, reads, and acquires the content of people's private email messages". It quotes Eric Schmidt, Google's executive chairman: "Google policy is to get right up to the creepy line and not cross it."
The suit claims: "Unbeknown to millions of people, on a daily basis and for years, Google has systematically and intentionally crossed the 'creepy line' to read private email messages containing information you don't want anyone to know, and to acquire, collect, or mine valuable information from that mail."

Simpson, a long-term Google critic, said: "Google's brief uses a wrong-headed analogy; sending an email is like giving a letter to the Post Office. I expect the Post Office to deliver the letter based on the address written on the envelope. I don't expect the mail carrier to open my letter and read it.
"Similarly, when I send an email, I expect it to be delivered to the intended recipient with a Gmail account based on the email address; why would I expect its content will be intercepted by Google and read?"
Another example also relates to Google again, Google Knows the Wi-Fi Passwords of All Android Users:



A new privacy fuss that caused chaos in Google's Android mobile OS, with security boffins claiming that the software's backup tools mean that a copy of everyone's Wi-Fi password history is now saved to Google's servers. The key issue is that Google's not only storing passwords, but it's doing so in a manner that means it can read them if it wants to, as illustrated by the way new Android devices can pull in all your old passwords and settings from its servers once you provide your phone with a Gmail address and password.
So, now what do you think? Are they safe?

- Sarath S Menon
S6 CSE

How will IoT change our world?

The Internet of Things (IoT) represents a new construct in an ICT world. Within our view of the third platform, the IoT is at the heart of it. It is increasingly clear that the future of IT will be driven by four pillars- mobile broadband, social business, big data/analytics and cloud services. This will result in millions of applications available with billions of users. The pinnacle of this next technology platform is that we will move toward a future where there are "trillions of things" that could be connected to the Internet and thus drive consumer behavior and increasingly intelligent industry solutions that can operate either autonomously or non-autonomously. IoT will be critical to the success of the third Platform as these connected "things" will shape business processes and the increasingly connected consumer.

New proposition

It is the new proposition that is occupying the collective mind of consumers, IT vendors and partners and service providers, as it represents huge potential for new streams of revenue and new customers. IDC defines IoT as a network connecting (either wired or wireless) devices or "things" that is characterized by autonomous provisioning, management and monitoring. It is estimated that the installed base of IoT will be approximately 212 billion in 2020. This will include 30 billion "connected

(autonomous) things" in 2020 and is largely driven by intelligent systems that will be installed and collecting data- across both consumer and enterprise applications. The IoT opens up many IT vendors to the consumer market, providing Business to Business to Consumer (B2B2C) services to connect and run homes and automobiles- all the places that electronic devices will have a networking capability.

The momentum of the IoT is driven by several factors. It is without a doubt that business and consumer demand exists and will continue to expand for IoT solutions. IDC expects the current IoT use cases are just the tip of the iceberg. Other enablers to the rise of IoT include:

Ongoing development of smart cities/cars/houses:

There are developments happening in many industries to find a way to diversify products and services. For smart cities, municipalities are looking for ways to become more efficient and IoT solutions provide several options to save money improve productivity and better serve their constituents.

Enhance connectivity infrastructure:

With the recent wave of network enhancements, connectivity is becoming increasingly ubiquitous-whether using personal area networks, local area networks such as WiFi or wide area networks such as cellular, in addition to fixed connectivity. This anyway, anytime ability to connect anything is helping to make IoT a reality.

Connected culture:

Globally, individuals are developing a high affinity for full-time connectivity, which makes consumer IoT a compelling proposition. IDC believes that IoT applications usage and adoption by the public sector can have a profound impact that can span a variety of domains: public security, defense, transport and healthcare.

In these areas, connected objects can provide real-time updates for situational awareness that can help act and react at the operational level, help monitor the status or behavior of people and assets to make management decisions and support very fine-grained, sensor-driven analytics that help with planning decisions.

Aswathi Anna Mathew
S6 CSE

Ninja Sphere: A one-stop intelligent Internet of Things platform for the home

Wouldn't it be nice to have a digital house elf that handles the operation of all your various electronic devices? That's what the Ninja Sphere aims to be, a one stop intelligent hub designed to add your various household devices to the Internet of Things. Like other home automation systems, such as Revolv, Ninja Sphere can monitor and allow the remote control of connected devices, but offers expanded capabilities with its gesture control interface and the ability to map the location of devices in the home in real time.

Ninja Sphere was created by Sydney-based Company, Ninja Blocks, which released its namesake product in 2011. Not unlike Twine, Ninja Blocks are wireless sensors that connect to a home network and allow electronic devices to be controlled remotely or triggered automatically in response to environmental factors. Ninja Sphere takes things further, with the system consisting of a sleek dome-like unit called a Spheramid, which features an LED matrix that can display information.

Depending on the size of the house, multiple Spheramids can be placed around the home and act as gateways to the "Ninja Sphere," a wireless network that consists of the Spheramids and all the devices connected to them. While the Spheramids act as a gateway to the Ninja Sphere, additional gateways can be located around the home in the form of "waypoints." These are small USB devices that act as additional nodes and, by analyzing their overlapping Bluetooth low energy (BLE) signals, allow the system to construct a digital 3D model of the environment. This lets the system locate where various devices are within the house and recognize when something is out of place.

In addition to smartphone or smartwatch control, users can operate their various devices by simply gesturing at the Spheramid gateway. With a few hand swipes, you can check things like how much energy you've used, or turn the heating, lighting or sound system up or down.

The information and operations available will naturally depend on the devices and sensors connected to the Ninja Sphere system, which currently supports Bluetooth, BLE, Wi-Fi, Zigbee Light Link and HA, Philips Hue,Belkin WeMo, openHAB, and ODB2 connectors, just to name a few. However, the system is open source, meaning that third party developers are free to write drivers to connect a device to the system.

Moreover, the system is able to monitor any object within the environment once a Bluetooth-enabled smart tag has been attached to it. It's also possible to set rules in place so that Ninja Sphere does things automatically in response to predefined triggers, such as turn on the lights when you walk in, switch the heater on when you're on your way home, or send a text message asking whether you'd like to activate cameras in the area when some valuables are on the move.

A.Roopa
S6 CSE

3D PRINTING- THE FUTURE OF MANUFACTURING?

What is a 3D printer?

A machine reminiscent of the Star Trek Replicator, something magical that can create objects out of thin air. It can print in plastic, metal, nylon, and over a hundred other materials. It can print manufacturing prototypes, end user products, quasi-legal guns, aircraft engine parts and even human organs using a person's own cells.

We live in an age that is witness to what many are calling the Third Industrial Revolution. 3D printing, more professionally called additive manufacturing, moves us away from the Henry Ford era mass production line, and will bring us to a new reality of customizable, one-off production.

3D printers use a variety of very different types of additive manufacturing technologies, but they all share one core thing in common: they create a three dimensional object by building it layer by successive layer, until the entire object is complete. It's much like printing in two dimensions on a sheet of paper, but with an added third dimension: the z axis.

Each of these printed layers is a thinly-sliced, horizontal cross-section of the eventual object. Imagine a multi-layer cake, with the baker laying down each layer one at a time until the entire cake is formed. 3D printing is somewhat similar, but just a bit more precise than 3D baking.

In the 2D world, a sheet of printed paper output from a printer is designed in the computer in a program such as Microsoft Word. The file, the Word document, contains the instructions that tell the printer what to do.

In the 3D world, 3D printers also need to have instructions for what to print. It needs a file as well. The file, a Computer Aided Design (CAD) file, is created with the use of a 3D modeling program, either from scratch or beginning with a 3D model created by a 3D scanner. Either way, the program creates a file that is sent to the 3D printer. Along the way, software slices the design into hundreds, or more likely thousands, of horizontal layers. These layers will be printed one atop the other until the 3D object is done.

Commercial 3D printers

While most people have yet to even hear the term 3D printing, the process has been in use for decades. Manufacturers have long used the printers in the design process to create prototypes for traditional manufacturing. But until the last few years, the equipment has been expensive and slow.

Now, fast 3D printers can be had for tens of thousands of dollars, and end up saving the companies many times that amount in the prototyping process. For example, Nike uses 3D printers to create multi-colored prototypes of shoes. They used to spend thousands of dollars on a prototype and wait weeks for it. Now, the cost is only in the hundreds of dollars, and changes can be made instantly on the computer and the prototype reprinted on the same day.

Some companies are using 3D printers for short run or custom manufacturing, where the printed objects are not prototypes, but the actual end user product. As the speeds of 3D printing go up and the prices come down, look for more and more of this. And expect more availability of personally customized products.

Personal 3D Printers

So far we've only talked about commercial 3D printers. There is a whole other world of 3D printers: personal and DIY hobbyist models. And they are getting cheap, with prices typically in the range of $300 – $2,000.

The RepRap open source project really ignited this hobbyist market in the same way the Apple I microcomputer ignited the hobbyist desktop computer market in the late 1970s. For about a thousand dollars, people have been able to buy the RepRap kit and put together their own personal 3D printer, complete with any customizations they were capable of making. And what's more, these printers print most of the parts for more printers. RepRap is short for replicating rapid prototyper, so complete self-replication, including electronic circuit boards, is the goal.

If you don't have your very own 3D printer, not to worry, there are 3D printing service bureaus like Shapeways and Ponoko that can very inexpensively print and deliver an object from a digital file that you simply upload to their user-friendly website. It's almost as easy as ordering a custom t-shirt from Cafepress or Zazzle.

Even if you don't design your own 3D model, you can still print some very cool pieces. There are model repositories such as Thingiverse, 3D Parts Database, and 3D Warehouse that have model files you can download for free.

What do all these people print? It's limitless. Some print things like jewelry, some print replacement parts for appliances such as their dishwasher, some invent all sorts of original things, some create art, and some make toys for their kids. With the many types of metal, plastic, glass, and other materials available (even gold and silver), just about anything can be printed.

3D Printing Methods

The first commercially available 3D printer (not called a 3D printer back then) used the stereolithography (SLA) method. This was invented in 1986 by Charles Hull. A SLA 3D printer works by concentrating a beam of ultraviolet light focused onto the

surface of a vat filled with liquid photocurable resin. The UV laser beam draws out the 3D model one thin layer at a time, hardening that —slice of the eventual 3D model as the light hits the resin. Slice after slice is created, with each one bonded to the other, and next thing you know you have a full, extremely high-resolution three dimensional model lifted out of the vat. Unused resin is reusable for the next job.

Fused Deposition Modeling (FDM)

With FDM, the object is produced by extruding a stream of melted thermoplastic material to form layers. Each layer stacks on top of and fuses with the previous layer as the material hardens almost immediately after leaving the extrusion nozzle. It is one of the less expensive 3D printing methods. Most FDM printers print with ABS plastic (think Lego), as well as PLA (Polylactic acid), a biodegradable polymer, which is produced from organic material.

The actual term —Fused Deposition Modeling and its abbreviation —FDM are trademarked by Stratasys. RepRap uses a similar process, but has called it —Fused Filament Fabrication (FFF), so as to not step on the trademark. With FFF, the material is fed via filament from a spool of the material.

Selective Laser Sintering (SLS)

The 1980s were big for inventing 3D printing technologies. Not only were SLA and FDM invented and patented then, but so was Selective Laser Sintering (SLS), by Carl Deckard and colleagues at the University of Texas in Austin. SLS works similarly to SLA, but instead of liquid photopolymer in a vat, you'll find powdered materials, such as polystyrene, ceramics, glass, nylon, and metals including steel, titanium, aluminum, and silver. When the laser hits the powder, the powder is fused at that point (sintered). All unsintered powder remains as is, and becomes a support structure for the object. The lack of necessity for any support structure with SLS is an advantage over FDM/FFF and SLA — there's none to remove after the model is complete, and no extra waste was created. All unused powder can be used for the next printing.

PolyJet photopolymer

Objet (acquired by Stratasys) developed this technology: much like a traditional inkjet printer deposits ink, a photopolymer liquid is precisely jetted out and then hardened with a UV light. The layers are stacked successively. The technology allows for various materials and colors to be incorporated into single prints, and at high resolutions.

Syringe Extrusion

Almost any material that has a creamy viscosity can be used in 3D printers equipped with syringe extruders. This includes materials like clay, cement, silicone, and Play-Doh. Certain foods like chocolate, frosting, and cheese can also be printed with these systems. The syringe may or may not need to be heated, depending on the

material; chocolate may need to be kept warm while silicone can be kept at room temperature.

Other Methods

There are other variants of these technologies. For example there is Selective Laser Melting (SLM), which is like SLS but it fully melts the powder rather than just fusing the powder granules at a lower temperature. This is similar to Electron Beam Melting (EBM) which uses an electron beam instead of a UV laser. And then there is a completely different technology called Laminated Object Manufacturing (LOM), where layers of adhesive-coated paper, plastic, or metal laminates are successively glued together and cut to shape with a knife or laser cutter.

The Future of 3D Printing

This is a disruptive technology of mammoth proportions, with effects on energy use, waste, customization, product availability, art, medicine, construction, the sciences, and of course manufacturing. It will change the world as we know it, before you know it.

Sarath S Menon
S6 CSE

BEST ENTREPRENEUR

In June 1999, the world of music lovers witnessed a revolutionary service that enabled the users to download and share music for free, thus, quenching the desire of many for music. Napster, was co-founded by one the greatest internet entrepreneurs, Sean Parker. Though it did not rise to its potential glory because of the resistance from the recording industries, Napster has been called the fastest growing business of all time making Sean Parker an icon of innovative thinking and in the forefront of start-ups. He is also the founding president of the immensely popular social networking site, Facebook.

Parker was born in Virginia to Diane Parker and Bruce Parker. He was raised listening to his father's advice to take risks at a young age. He first learnt to program on an Atari 800 at the age of 7. He used to hack the networks of several MNCs for which he was convicted with criminal charges. His profound skill-set in programming, caught the eyes of many and he was soon recruited by the CIA. By the time he was in high school he started earning $80,000 per annum through various projects. So, he was able to convince his parents to allow him to skip college and move directly to entrepreneurship.

To this day, he has been continuing in his journey of self-study. He realized that it is not knowledge which gets you further; rather it is the use of knowledge and your understanding of it. The lack of college education has never stood in the way of his growth.

At the age of 15, he met Shawn Fanning, an adept hacker just like him. Together, they started the free file-sharing service- Napster, which had tens of millions of users within its first year. The recording companies however, immediately identified Napster as a huge threat to their industry and took the necessary action to shut down the service. Parker then launched Plaxo, an online address book and social networking service that integrated with Microsoft Outlook. Plaxo was one of the first products to build virality into its launch, and that earned it 20 million users.

He later worked with Mark Zuckerberg, on a then developing project called 'The Facebook'. He played a vital role in the growth of the company's investments and future projects. This landed him the position as the first president of Facebook at the age of 24. He helped it become the market phenomenon that it remains even today. After exiting Facebook, he worked at identifying potential projects, which led him to bring the Swedish music platform, Spotify to the United States. Later, along with Shawn Fanning, he went on to create a new live video site called Airtime.

He treaded several unconventional paths in order to bring himself to a position of great power. Though, his unethical behaviour ultimately resulted in him being ousted by his business partners, the life of Sean Parker must serve as a reminder to follow your passion and do what you know you were meant to do, no matter what.

Namitha Elizabeth John
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Google Compute Engine

When Larry Page and Sergey Brin began work on a project called BackRub, they probably didn't envision the enormous corporation that would grow out of their early efforts. This project evolved into Google, a juggernaut of a company that competes on a global scale with other mega corporations. While the company has products ranging from Web-based e-mail to collaborative office applications, its corporate mission has remained the same. Google intends "to organize the world's information and make it universally accessible and useful". Google's search engine is the oldest and likely most famous tool in the company's arsenal. But the engineers at Google view organizing the world's information as a job too complex for just a search engine. The company designs tools and services that relate to its mission, sometimes in ways that aren't obvious at first glance. One major focus for the company is cloud computing.

Google isn't alone in offering cloud computing services. Companies like Apple and Microsoft offer products that either directly involve cloud computing services or rely

on them in some way. Amazon, the online retail giant, has a thriving cloud storage business. That doesn't mean Amazon has a warehouse filled with fluffy, white clouds. It means the company rents out storage space within its massive data centers. If you are running a company that wants to offer a Web site or service to customers, you may consider using a company like Amazon to host your data.

After an 18-month preview period, Google's Compute Engine (GCE) is finally ready for prime time. Google has operated its App Engine platform-as-a-service since 2008, but it's a latecomer to cloud infrastructure. It originally introduced Google Compute Engine in June 2012, long after Amazon released its Elastic Cloud Compute (EC2) service in August 2006. Amazon Web Services is the unquestioned leader in cloud computing in terms of overall market share, towering over competing vendors like Google, Microsoft (Azure), and IBM (SoftLayer).

Every Google Compute Engine instance starts with a disk resource. Depending on the selected machine type, the instance may start with scratch disk space, persistent disk space, or both. Scratch disk space is space tied to the life of an instance. If the instance is terminated for any reason, all scratch disk data is lost. In contrast, persistent disks live beyond the life of an instance. They can be attached at boot time, or attached and detached from a running instance on demand. Persistent disks can also be attached in read-only mode to multiple instances at once. Persistent disks offer additional features over scratch disks, such as persistent disk snapshots, booting from a persistent disk, and migrating persistent disks across zones. Google Cloud Platform gives developers the flexibility to architect applications with both managed and unmanaged services that run on Google's infrastructure. Today, Google Compute Engine is Generally Available (GA), offering virtual machines that are performant, scalable, reliable, and offer industry-leading security features like encryption of data at rest. Compute Engine is available with 24/7 support and a 99.95% monthly SLA for your mission-critical workloads. They are also introducing several new features and lower prices for persistent disks and popular compute instances.

Expanded operating system support

During Preview, Compute Engine supported two of the most popular Linux distributions, Debian and Centos, customized with a Google-built kernel. This gave developers a familiar environment to build on, but some software that required specific kernels or loadable modules (e.g. some file systems) were not supported. Now you can run any out-of-the-box Linux distribution (including SELinux and CoreOS) as well as any kernel or software you like, including Docker, FOG, xfs and aufs. They are also announcing support for SUSE and Red Hat Enterprise Linux

Transparent maintenance with live migration and automatic restart

You now get all the benefits of regular updates and proactive maintenance without the downtime and reboots typically required. Furthermore, in the event of a failure, they will automatically restart your VMs and get them back online in minutes. They

have already rolled out this feature to US zones, with others to follow in the coming months.

New 16-core instances

Developers have asked for instances with even greater computational power and memory for applications that range from silicon simulation to running high-scale NoSQL databases. To serve their needs, they launching three new instance types in Limited Preview with up to 16 cores and 104 gigabytes of RAM. They are available in the familiar standard, high-memory and high-CPU shapes.

Faster, cheaper Persistent Disks

There Persistent Disk service offers customers strong, consistent performance along with much higher durability than local disks. Even dropping the price of Persistent Disk by 60% per Gigabyte and dropping I/O charges so that customers get a predictable, low price for their block storage device. I/O available to a volume scales linearly with size, and the largest Persistent Disk volumes have up to 700% higher peak I/O capability.

Customers and partners using Compute Engine

In the past few months, customers like Snapchat, Cooladata, Mendelics, Evite and Wix have built complex systems on Compute Engine and partners like SaltStack, Wowza, Rightscale, Qubole, Red Hat, SUSE, and Scalr have joined Cloud Platform Partner Program, with new integrations with Compute Engine.

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Steve Jobs: The Perfectionist

Steve Jobs's defining quality was perfectionism. The development of the Macintosh, for instance, took more than three years, because of Jobs's obsession with detail. He nixed the idea of an internal fan, because he thought it was noisy and clumsy. And he wanted his engineers to redesign the Mac's motherboard, just because it looked inelegant. At next, the company Jobs started after being nudged out of Apple, in 1985, he drove his hardware team crazy in order to make a computer that was a sleek, gorgeous magnesium cube. After his return to Apple, in 1997, he got personally involved with things like how many screws there were in a laptop case. It took six months until he was happy with the way that scroll bars in OS X worked. Jobs believed that, for an

object to resonate with consumers, every piece of it had to be right, even the ones you couldn't see.

This perfectionism obviously had a lot to do with Apple's success. It explains why Apple products have typically had a feeling of integrity, in the original sense of the word; they feel whole, rather than simply like collections of parts. But Jobs's perfectionism came at a price, too. It could be literally expensive: back in the eighties, Jobs insisted that in magazine ads and on packages the Apple logo be printed in six colors, not four, which was thirty to forty per cent more expensive. And there were more important costs: Jobs's vision required Apple to control every part of the user experience, and to make everything it possibly could itself. Its hardware was proprietary: the company had its own Mac factory and favored unique cables, disk drives, and power cords, rather than standardized ones. Its software was proprietary, too: if you wanted to run Apple software, you needed to own an Apple computer. This made Apple's computers more expensive than the competition. It also made them hard to customize, which businesses didn't like. So, while Apple changed the world of computing in the eighties, with machines that were more user-friendly and powerful than your typical I.B.M. clone, most users never touched a Macintosh. They ended up with P.C.s instead.

Perfectionism is the disease that plagued Jobs. It pushed him not only to make the iDevices we cherish, but to make unreasonable decisions. At times this constant striving for perfection demonstrated an almost endearing Larry David-esque neuroticism. "He sits in a restaurant and sends his food back three times. He arrives at his hotel suite in New York for press interviews and decides, at 10 P.M., that the piano needs to be repositioned," writes Gladwell.

There's no doubt that Apple's success in the past decade depended on Jobs's uncanny ability to introduce products that captured the zeitgeist. But what turned Apple into the most valuable company on the planet was that Jobs did more than just create cool new devices. Rather, he presided over the creation of new market ecosystems, with those devices at their heart.

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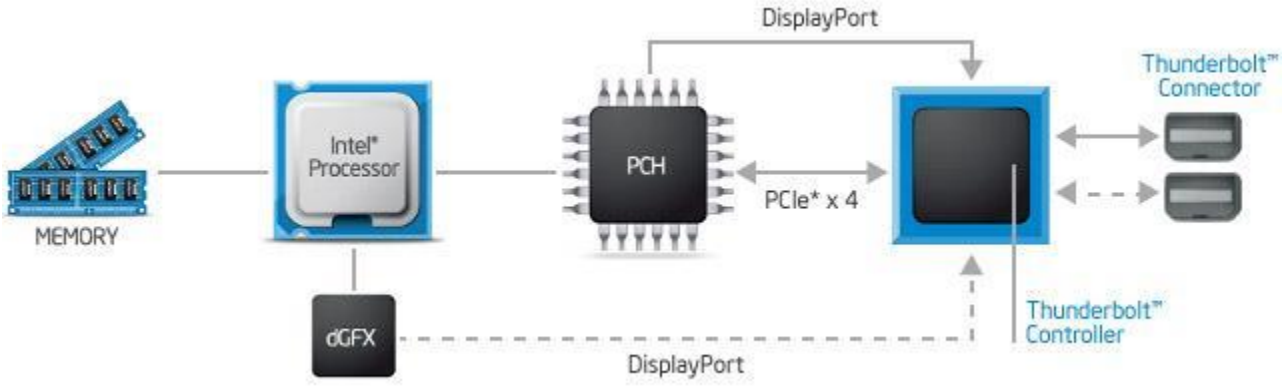
Thunderbolt Technology

The fastest connection to your PC

Transforming device interconnectivity, Thunderbolt technology is a dual protocol I/O innovation that dramatically increases transfer performance with bi-directional 10 Gbps speed, and offers daisy chaining to multiple devices, providing flexibility and simplicity for innovative, thin system designs like laptops and Ultrabooks.

Rethink I/O transfer

Enhancing performance with innovative design, Thunderbolt technology combines PCI Express and Display Port I/O protocols onto a single highly-efficient metaprotocol. Single cable transmission along with traffic routing management intelligent hardware controllers are like PCI deliver off-the-shelf connectivity to nearly any technology imaginable. And Display Port meets industry needs by supporting multiple HD displays and up to eight channels of HD audio.



As the building block to Thunderbolt technology, Thunderbolt controllers contain a high performance cross bar Thunderbolt protocol switch, a PCI Express switch, and one or more Thunderbolt ports, Display Ports, and PCI Express protocol adapter ports. By integrating all the features necessary to implement Thunderbolt into a single chip, the host-side controller enables system vendors to easily incorporate Thunderbolt technology into their designs.

Changing the PC industry

Leveraging the I/O protocols on a single transport enables engineers to innovate new system design configurations, allowing for standalone performance expansion technologies that use existing native device drivers. Thunderbolt technology also enables the introduction of thinner and lighter laptops without sacrificing I/O performance, and extends to reach other I/O technologies by using PCI e-based adapters, making gigabit Ethernet, FireWire, or eSATA easy to create.

Thunderbolt 2

The computing industry is on board with Intel's Thunderbolt technology, and adoption of the technology in 2013 is growing, especially among video makers creating the richest content. Already a standard feature of Mac computers, it's now included on PCs and motherboards, as well as many peripheral devices; in addition, hundreds of companies are developing Thunderbolt technology-enabled products.

In April 2013, Intel announced plans for the Thunderbolt controller, an important advancement in I/O technology. Doubling the bandwidth to run at 20 Gbps, Thunderbolt technology enables simultaneous 4K video file transfer and display for eye-popping video and data capability. The result is great news for an industry on the cusp of widespread adoption of 4K video technologies.

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IMAGE STEGANOGRAPHY

History

Steganographic techniques have been used for ages and they date back to ancient Greece. The first use of steganography is reported by Herodotus, the so-called father of history, who mentioned that in ancient Greek, hidden text was written on wax tablets. When Demeratus wanted to notify Sparta that the king of Persia, Xerxes, intended to invade Greece, he wrote this message on a tablet and covered it with wax. To recover the message the other people in Sparta simply had to scrape the wax off the tablet. Aeneas the Tactician mentions in his documents a lot of other steganographic schemes. Secret letters can be hidden in the messengers' shoe soles or women's ear rings, secret text could be written on wood tables and then whitewashed or one could use pigeons to carry secret notes. Aeneas also suggested some schemes which are very similar to those. One of these suggested techniques included hiding text by making very small holes below or above letters or by changing the heights of letter-strokes in a cover text. Another ingenious method was to shave the head of a messenger and to paint the secret letters on the messenger's head.

What is steganography?

Steganography, comes from the Greek words stegos, meaning roof or covered and graphia which means writing, is the art and science of hiding the fact that communication is taking place. Using steganography, you can embed a secret message inside a piece of unsuspicious information and send it without anyone knowing the existence of the secret image. The aim of steganographic communication back then and now, in modern applications, is the same: to hide secret data (a steganogram) in an innocently looking cover and send it to the proper recipient who is aware of the information hiding procedure. In an ideal situation, the existence of hidden communication cannot be detected by third parties. Steganography and cryptography are closely related. Cryptography scrambles messages so they cannot be understood. Steganography on the other hand, will hide the message so there is no knowledge of the existence of the message in the first place.

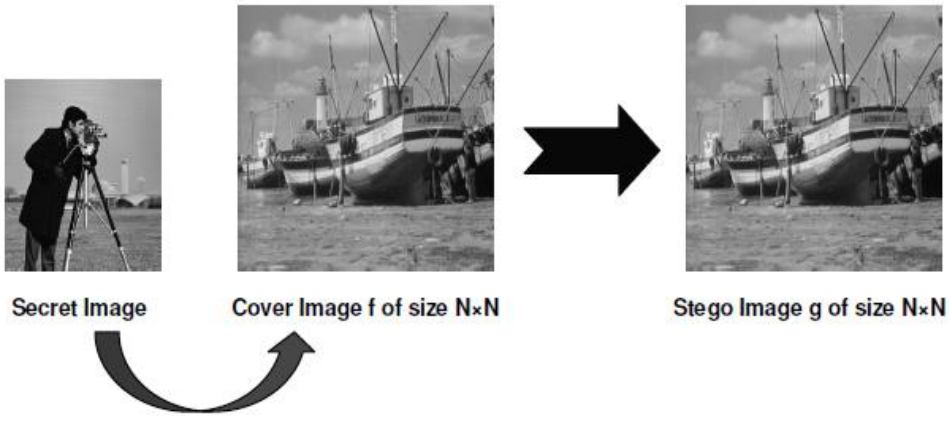

FIGURE. 1: The block diagram of a simple steganographic system

Image steganography using DWT and Huffman coding

Image steganography can be done in many ways. One of the latest techniques is described here. Image steganogrpahy using Huffman code and DWT is an advanced image steganography technique. The basic idea to hide information using DWT is to alter the magnitude of the DWT coefficients of three sub-bands, HH, HL, and LH of cover image. DWT is used to transform original image (cover image) from spatial domain to frequency domain. Firstly, two dimensional Discrete Wavelet Transform (single level 2-D Haar DWT) is performed on a gray level cover image and Huffman encoding is performed on the secret image before embedding. Then the secret image is grouped into 3 bit blocks and these blocks are used to replace the last 3 bits of the selected sub band of the DWT transformed image. Then IDWT is performed in order to obtain the stego-image. The stego-image is extracted by performing DWT and decoding the bits using Huffman tree.

Stegnanalysis

Steganalysis is a relatively new research discipline with few articles appearing before the late-1990s. Steganalysis is the process of detecting steganography by looking at variances between bit patterns and unusually large file sizes. It is the art of discovering and rendering useless covert messages. The goal of steganalysis is to identify suspected information streams, determine whether or not they have hidden messages encoded into them, and, if possible, recover the hidden information. Unlike cryptanalysis, where it is evident that intercepted encrypted data contains a message, steganalysis generally starts with several suspect information streams but uncertainty whether any of these contain hidden message. The steganalyst starts by reducing the set of suspect information streams to a subset of most likely altered information streams. This is usually done with statistical analysis using advanced statistics techniques

Conclusion

Steganography, especially combined with cryptography, is a powerful tool which enables people to communicate with one another without any possible eavesdroppers even knowing there is a form of communication in the first place. The methods used in the science of steganography have advanced a lot over the past centuries, especially with the rise of computer era. Although the techniques are still not used very often, the possibilities are endless. Many different techniques exist and continue to be developed, while the ways of detecting hidden messages also advance quickly. The experimental results show that the above mentioned algorithm has a high capacity and a good invisibility. Moreover PSNR of cover image with stego-image shows the better results in comparison with other existing steganography approaches. Furthermore, satisfactory security is maintained since the secret message/image cannot be extracted without knowing decoding rules and Huffman table.

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CANCER GENE IDENTIFICATION USING GRAPH CENTRALITY

Cancer is one of the most wide-spread and feared diseases in the contemporary world. It is caused by a combination of our genes, lifestyle and environment. There are over 200 types of cancer and it is estimated that about 9 million new cancer cases are diagnosed every year and over 4.5 million people die from cancer each year in the world.

Cancer is the result of changes (mutations) in genes that control cell growth and death. Cells with such mutations may begin to grow in an uncontrolled way, forming tumours. These tumours may later develop into cancer. Cancer can sometimes be induced due to some mutations, inherited from the older generations. Inherited gene mutations that make a cancer more likely to develop are sometimes called cancer susceptibility genes. But inheriting a cancer susceptibility gene doesn't mean a person has cancer but that they are at increased risk of developing certain types of cancer.

Having an inherited cancer susceptibility gene means that a person has a significantly increased risk of developing certain cancers compared to other people in the population. But in most cases, people who inherit a cancer susceptibility gene won't definitely get cancer. So you don't inherit cancer from someone in your family, but you might inherit an increased risk of developing a certain type of cancer. This type of increased risk is sometimes also called a predisposition or susceptibility.

This risk factor can be further increased by a combination of lifestyle and environmental risk factors. The most common carcinogens present in the environment are pollutants, smoke etc. from industries and vehicles, some types of viral infections (such as human papillomavirus or HPV), specific chemicals (such as benzene), and radiation (including ultraviolet radiation from sunlight). The risk factors that are lifestyle oriented are the use of tobacco and alcohol, excess intake of junk food, lack of exercise, being overweight etc.

Cancer gene identification using graph centrality is a new and developing approach towards this aspect of cancer treatment. The technique makes use of the protein-protein interactions (PPI) in a human body to identify the presence of cancer susceptible genes that might be present there. It has been studied and proved that exploiting protein-protein interactions can greatly increase the likelihood of finding positional candidate disease genes. When applied on a large scale they can lead to novel candidate gene predictions.

The gene signatures provided as input are later implemented in the form of a protein-protein interaction network. Networks have been invaluable models for the understanding of biological systems. Since proteins carry out most biological processes, analysis of protein –protein interaction (PPI) networks is an effective technique to carry out cancer gene identification process. Since a protein almost never acts in isolation, but rather interacts with other proteins in order to perform a certain function, PPI networks by definition reflect the interconnected nature of biological

processes. Analyses of PPI networks may give valuable insight into biological mechanisms and provide deeper understanding of complex diseases.

Nodes/vertices in a PPI network represent biomolecules, such as genes, proteins, and metabolites. Edges/links between nodes indicate physical or functional interactions, including transcriptional binding, protein-protein interaction, genetic interaction (such as synthetic lethal), biochemical reactions, and many others. An edge on a network (if it happens in the cell) shows that two molecules are functionally related with each other, and the distance on a network is correlated with functional similarity. Network/graph theory provides multiple definitions and tools to measure the distance/proximity between two nodes on a network, which makes network analysis particularly suitable to the quantitative modeling of gene-gene and gene-disease relationships.

Once the network is implemented, some graph centrality parameters are used to predict the topological features of the proteins included in the network. These parameters are degree centrality, average shortest path, clustering coefficient, betweeness and eigen vector centrality.

The method performs a study of the importance of various cancer and non-cancer genes in a protein-protein interaction network, which will be the representation of a gene signature. The results contain a set of proteins sorted according to their final graph centrality score. By theory, the cancer genes should have a higher centrality score as compared to the non-cancer genes. Hence, they should top the output list. Following this, the top thirty percent of the list is selected as the threshold value and every protein above this value are assumed to be cancerous and the rest are assumed to be non-cancerous, for 100% accuracy. The accuracy of the algorithm can be further checked by analyzing a confusion matrix.

Gaining knowledge about an individual's cancer susceptibility or risk factor at a very earlier stage will definitely help to alert the person, so that he can take the necessary measures to reduce his chances of having cancer in the future. Knowing this information helps him to make more informed decisions about his health, and bring appropriate changes in his lifestyle. These precautions might definitely help a cancer risk person to delay the disease or to even, prevent it. Further, it also helps researchers and oncologists (doctors who treat people with cancer) to improve the health of large numbers of people. Information about the various cancer susceptible genes in a human body might also help in the development of new vaccines and medicines against cancer.

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Big Data Analytics- An Overview

"Big data" – which admittedly means many things to many people – is no longer confined to the realm of technology. Today it is a business priority, given its ability to profoundly affect commerce in the globally integrated economy. In addition to providing solutions to long-standing business challenges, big data inspires new ways to transform processes, organizations, entire industries and even society itself. Yet extensive media coverage makes it hard to distinguish hype from reality – what is really happening? Reports from industry states that organizations are using big data to target customer-centric outcomes, tap into internal data and build a better information ecosystem.

The Dawn of Big Data

Data becomes big data when its volume, velocity, or variety exceeds the abilities of our IT systems to ingest, store, analyze, and process it. Many organizations have the equipment and expertise to handle large quantities of structured data—but with the increasing volume and faster flows of data, they lack the ability to "mine" it and derive actionable intelligence in a timely way. Not only is the volume of this data growing too fast for traditional analytics, but the speed with which it arrives and the variety of data types necessitates new types of data processing and analytic solutions.

However, big data doesn't always fit into neat tables of columns and rows. There are many new data types, both structured and unstructured, that can be processed to yield insight into a business or condition.

Techniques for Analyzing Big Data – A New Approach

Big data analysis involves making "sense" out of large volumes of varied data that in its raw form lacks a data model to define what each element means in the context of the others. There are several new issues we should consider as we embark on this new type of analysis:

• Discovery – In many cases we don't really know what we have and how different data sets relate to each other. We must figure it out through a process of exploration and discovery.

• Iteration – Because the actual relationships are not always known in advance, uncovering insight is often an iterative process as we find the answers that we seek. The nature of iteration is that it sometimes leads we down a path that turns out to be a dead end. Experimentation is part of the process.

• Flexible Capacity – Because of the iterative nature of big data analysis, be prepared to spend more time and utilize more resources to solve problems.

• Mining and Predicting – Big data analysis is not black and white. We don't always know how the various data elements relate to each other. As we mine the data to discover patterns and relationships, predictive analytics can yield the insights that we seek.

• Decision Management – Consider the transaction volume and velocity. If we are using big data analytics to drive many operational decisions (such as personalizing a web site or prompting call center agents about the habits and activities of consumers) then we need to consider how to automate and optimize the implementation of all those actions.

For example we may have no idea whether or not social data sheds light on sales trends. The challenge comes with figuring out which data elements relate to which other data elements, and in what capacity. The process of discovery not only involves exploring the data to understand how we can use it but also determining how it relates to our traditional enterprise data.

Tools for Analyzing Big Data

There are five key approaches to analyzing big data and generating insight:

• *Discovery tools* are useful throughout the information lifecycle for rapid, intuitive exploration and analysis of information from any combination of structured and unstructured sources. These tools permit analysis alongside traditional BI source systems. Because there is no need for up-front modeling, users can draw new insights, come to meaningful conclusions, and make informed decisions quickly.

• *Business Intelligence Tools* are important for reporting, analysis and performance management, primarily with transactional data from data warehouses and production information systems. BI Tools provide comprehensive capabilities for business intelligence and performance management, including enterprise reporting, dashboards, ad-hoc analysis, scorecards, and what-if scenario analysis on an integrated, enterprise scale platform.

• *In-Database Analytics* include a variety of techniques for finding patterns and relationships in our data. Because these techniques are applied directly within the database, we eliminate data movement to and from other analytical servers, which accelerates information cycle times and reduces total cost of ownership.

• *Hadoop* is useful for pre-processing data to identify macro trends or find nuggets of information, such as out of- range values. It enables businesses to unlock potential value from new data using inexpensive commodity servers. Organizations primarily use Hadoop as a precursor to advanced forms of analytics.

• *Decision Management* includes predictive modeling, business rules, and self-learning to take informed action based on the current context. This type of analysis enables

individual recommendations across multiple channels, maximizing the value of every customer interaction. Oracle Advanced Analytics scores can be integrated to operationalize complex predictive analytic models and create real-time decision processes.

Kick off your big data evolution

To compete in a globally-integrated economy, today's organizations need a comprehensive understanding of markets, customers, products, regulations, competitors, suppliers, employees and more. This understanding demands the effective use of information and analytics. In fact, next to their employees, many companies consider information to be their most valuable and differentiated asset.

Now, with the emergence and expanding adoption of big data, organizations worldwide are discovering entirely new ways to compete and win. They are transforming themselves to take advantage of the vast array of information that is available to improve decision-making and performance throughout the enterprise.

Not every organization will need to manage for the full spectrum of big data capabilities. But the opportunity to utilize new data, technology and analytics exists to some degree within every industry. Organizations realize value by analyzing the volume, velocity and variety of new and existing data, and putting the right skills and tools in place to better understand their operations, customers and the marketplace as a whole. Whatever the starting point, organizations around the world will continue to expand the use of big data to gain business value and competitive advantage in today's globally integrated economy.

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HOW DO GOOGLE 'GOOGLE IT'?

Is there anyone who hasn't heard of Google? Of course, the answer is a big NO. The vast majority of searchers turn to Google. Yes, Google's search engine is a powerful tool. Without search engines like Google, it would be practically impossible to find the information you need when you browse the Web. As a Google user, you're familiar with the speed and accuracy of a Google search. How exactly does Google manage to find the right results for every query as quickly as it does?

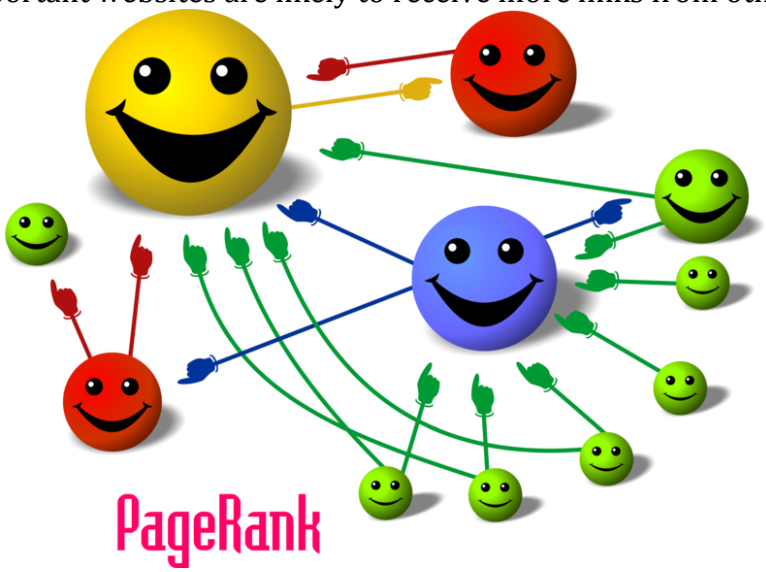
Google's algorithm does the work for you by searching out Web pages that contain the **keywords** you used to search, then assigning a rank to each page based on several factors, including how many times the keywords appear on the page. Higher ranked pages appear further up in Google's **search engine results page** (**SERP**), meaning that the best links relating to your search query are theoretically the first ones Google lists.

Google's keyword search function is similar to other search engines. Automated programs called **spiders** or **crawlers** travel the Web, moving from link to link and building up an index page that includes certain keywords. Google references this index when a user enters a search query.

In Google, the web crawling (downloading of web pages) is done by several distributed crawlers. There is a URL server that sends lists of URLs to be fetched to the crawlers. The web pages that are fetched are then sent to the store-server. The store-server then compresses and stores the web pages into a repository. Every web page has an associated ID number called a docID which is assigned whenever a new URL is parsed out of a web page. The indexing function is performed by the indexer and the sorter. The indexer performs a number of functions. It reads the repository, uncompresses the documents, and parses them. Each document is converted into a set of word occurrences called hits. The hits record the word, position in document, an approximation of font size, and capitalization. Indexer also parses out all the links in web pages and stores important information about them in an anchors file. This file contains enough information to determine where each link points from and to, and the text of the link.

The URL resolver reads the anchors file and converts relative URLs into absolute URLs and in turn into docIDs. It puts the anchor text into the forward index, associated with the docID that the anchor points to. It also generates a database of links which are pairs of docIDs. The links database is used to compute Page-Ranks for all the documents.

PageRank is an algorithm used by Google Search to rank websites in their search engine results. PageRank was named after Larry Page one of the founders of Google. It is a way of measuring the importance of website pages. According to Google, PageRank works by counting the number and quality of links to a page to determine a rough estimate of how important the website is. The underlying assumption is that more important websites are likely to receive more links from other websites.



Page Rank is a numeric value that represents the importance of a page present on the web. When one page links to another page, it is effectively casting a vote for the other page. A web page is important if it is pointed to by other important web pages. Google calculates a page's importance from the votes cast for it. Importance of each vote is taken into account when a page's Page Rank is calculated. Page Rank is Google's way of deciding a page's importance. It matters because it is one of the factors that determines a page's ranking in the search results.

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Top Trends of 2013

Internet of Things

The Internet of Things is more than just the newest buzzword. The IoT promises to be the most disruptive technological revolution since the advent of the World Wide Web. Projections indicate that, up to 100 billion uniquely identifiable objects will be connected to the Internet by 2020, but human understanding of the underlying technologies has not kept pace. This creates a fundamental challenge to researchers, with enormous technical, socioeconomic, political, and even spiritual consequences.

Cyber security

Recent technological advances in computing, communications, software, and hardware have enabled the significant growth of cyberspace, an important aspect of modern life that continues to transform the way citizens, business, and governments interact, collaborate, and conduct business. Our heavy dependence on various digital infrastructures has made them strategic national assets that must be protected to ensure economic growth, prosperity, and safety in the future. Cyber security is an emerging area of intense activity that endeavors to provide innovative solutions to ensure uninterrupted communications and service availability.

Big Data Visualization

We've entered a data-driven era, in which data are continuously acquired for a variety of purposes. The ability to make timely decisions based on available data is crucial to business success, clinical treatments, cyber and national security, and disaster management. Additionally, the data generated from large-scale simulations, astronomical observatories, high-throughput experiments, or high-resolution sensors will help lead to new discoveries if scientists have adequate tools to extract knowledge from them.

However, most data have become simply too large and often have too short a lifespan. Almost all fields of study and practice sooner or later will confront this big data problem. Government agencies and large corporations are launching research programs to address the challenges presented by big data. Visualization has been shown to be an effective tool not only for presenting essential information in vast amounts of data but also for driving complex analyses. Big data analytics and discovery present new research opportunities to the computer graphics and visualization community

Cloud Computing in Science and Engineering

Cloud computing has emerged as a dominant paradigm, widely adopted by enterprises. Clouds provide on-demand access to computing utilities, an abstraction of unlimited computing resources, and support for on-demand scale-up, scale-down, and scale-out. Cloud platforms are also rapidly becoming viable for scientific exploration and discovery, as well as education. As a result, it is critical to understand application formulations and usage modes that are meaningful in such a hybrid infrastructure, the fundamental conceptual and technological challenges, and ways that applications can effectively utilize clouds.

Mobile Computing Meets the Cloud

It could be argued that two of the most important technological developments of the last few years are the emergence of mobile and cloud computing. By shifting the hardware and staffing costs of managing computational infrastructure to third parties such as Google, Microsoft, or Amazon, cloud computing has made it possible for small organizations and individuals to deploy world-scale services; all they need to pay is the marginal cost of actual resource usage. At the same time, the deployment of 3G and 4G networks, the rapid adoption of feature-rich smart phones, and the growing integration of computation into consumer products such as cars and home appliances, have brought mobile and pervasive computing into the mainstream.

Simultaneously, cloud computing platforms are a natural fit to remedy the lack of local resources in mobile and pervasive devices, while enabling resource-intensive next generation applications. We invite original and high-quality submissions addressing all aspects of this field, as long as the connection to the focus topic is clear and emphasized.

Internet Censorship and Control

The Internet is a battleground where fights for technical, social, and political control are waged, including between governments and their citizens, separate governments, and competing commercial interests. These fights take many forms, including Internet filtering versus circumvention, surveillance versus anonymization, denial of service attacks and intrusion attempts versus protection mechanisms, and on- and offline persecution and defense of online activists. These battles impact and

are impacted by the Internet's technical structure. As the Internet continues to embed itself into our world, its structural changes will have an increasing effect on our social and political structures, and our social and political structures will have increasing impact on the Internet's technical structure.

Interactive Public Displays

Recent trends show an increasing prevalence of interactive displays of varying sizes in public and urban life. With their prominent visibility and the integration of diverse methods for interaction, they can offer new opportunities to enrich user experiences beyond the personal sphere, for instance in public knowledge institutions such as museums and libraries, or integrated within public plazas or architectural facades. The public context with its social and cultural particularities and constraints provides a large variety of intriguing but challenging settings and use-case scenarios for interactive displays of varying sizes.

Next-Generation Mobile Computing

We use mobile computing not only when we interact with our smart phones to connect with friends and family across states and countries, but also when we use ticketing systems on a bus or train to work or home, purchase food from a mobile vendor at a park, watch videos and listen to music on our phones and portable music playing devices. In other words, mobile computing is not only the interaction of smart phones with each other. Any computation system that is expected to move and interact with end users or other computational systems despite potential changes in network connectivity—including loss of connectivity or changes in type of connectivity or access point—participates in mobile computing infrastructure, and the number of such systems is expected to grow significantly each year over the coming decades.

Many of these systems in urban areas take advantage of robust networking infrastructure, gigabit bandwidth backbones, high-speed relays, and unlimited power and recharging capabilities. However, many of these systems operate within degraded network, power, or computing environments, such as for first-responders in a catastrophe, mobile phone users in remote regions or in countries where communication infrastructure is degraded or even millions of people watching fireworks along a river and overwhelming the local networking infrastructure in a major metropolitan area.

3D Imaging Techniques and Multimedia Applications

With the advances in sensing, transmission, and visualization technology, 3D information has become increasingly incorporated into real-world applications—from architecture to entertainment, manufacturing, and security. Integrating depth perception into such application can help present an even richer media interface. For example, in immersive telecommunication, spatialized audio and 3D parallax

increases the effectiveness of communication; in medicine, 3D instrument tracking enables more precise and safer operations; and new low-cost 3D cameras are starting a new chapter in interactive gaming and human-computer interaction.

One of the fundamental requirements of these applications is the estimation of scene depth information. The extraction of 3D information has been studied in the field of computer vision for more than three decades, but it remains a challenging problem, in particular under unconstrained environments that can include variable lighting, specular and deforming scene surfaces, and occluded objects, among other things

Safety-Critical Systems: The Next Generation

Safety-critical computer-based systems are woven into the fabric of our lives. These days, they can't be safe without being secure—yet security is just one of many challenges. These systems must be trusted to work adequately given user behavior, system interactions, changing environment and expectations, organizational turbulence, regulatory caution, routine component and operator failure, the complexity of international projects, and adaptation and refurbishment. In addition, there are the security-related issues such as intentional, malicious attacks and supply-chain risks.

Reliability

Over the past decade, designers have sought after efficient design points with respect to power, performance and cost. Of these, power has undoubtedly emerged as a first-order design challenge. In the coming era, this challenge may be subsumed by the challenge of building robust and reliable systems. As technology advances, susceptibility of systems to transient errors, such as timing violations, parameter variations, aging and infant mortality, is steadily increasing. Without innovations in the areas of microprocessor and software reliability, future systems may face continuous failure. Thus, new computing paradigms are required that incorporate adaptive techniques at both the hardware and software layers to ensure robust and resilient execution. The system, as a whole, must dynamically detect and recover from errors to meet historically established high reliability standards without exceeding power budgets and cost constraints, and violating performance targets.

Haptics in Rehabilitation

Robotic devices have been shown to be effective at delivering the intensive and repetitive therapy that is known to induce brain plasticity and foster restoration of motor coordination after stroke, spinal cord injury, and other neural impairments. Engagement of the sensorimotor system, including haptic feedback to the participant during rehabilitation, is an important factor in regaining motor control. Further, haptic feedback can enhance the natural control, utility, and efficacy of advancement of prosthetic and orthotic devices that restore mobility and manipulability to lower- and upper-extremity amputees. However, advanced prosthetic devices, for example, have decoupled the normal afferent-efferent loop and rely heavily on visual feedback to the

amputee for control in the absence of haptics. The science and technology of haptics thus has great potential to affect the outcomes of rehabilitation and adoption of advanced prosthetic and orthotic devices.

Multicore Memory Coherence

As we enter an era of large multicores, the question of efficiently supporting a shared memory model has become of paramount importance. Massively parallel architectures lacking coherent shared memory have enjoyed great success in niche applications such as 3D rendering, but general programming developers still demand the convenience of a shared memory abstraction.

Efficiently using a message passing interface requires that the individual computation tasks must be relatively large to overcome the communication latencies, and it becomes difficult to use MPI at the fine-grained level when fast on-chip communication is available. Higher-level mechanisms like MapReduce or shard-based databases are popular in particular application domains but researchers have not yet efficiently applied them at the chip/node level.

TypeScript

TypeScript is a free and open source language developed by Microsoft. It is a strict superset of JavaScript, and adds optional static typing and class-based object-oriented features to JavaScript language. JavaScript applications such as web e-mail, maps, document editing, and collaboration tools are becoming an increasingly important part of the everyday computing. TypeScript is designed to meet the needs of the JavaScript programming teams that build and maintain large JavaScript programs. TypeScript helps programming teams to define interfaces between software components and to gain insight into the behavior of existing JavaScript libraries. TypeScript also enables teams to reduce naming conflicts by organizing their code into dynamically-loadable modules. TypeScript's optional type system enables JavaScript programmers to use highly-productive development tools and practices: static checking, symbol-based navigation, statement completion, and code re-factoring.

TypeScript is a syntactic sugar for JavaScript. TypeScript syntax is a superset of Ecmascript 5 (ES5) syntax. *Every JavaScript program is also a TypeScript program*. The TypeScript compiler performs only file-local transformations on TypeScript programs and does not re-order variables declared in TypeScript. This leads to JavaScript output that closely matches the TypeScript input. TypeScript does not transform variable names, making tractable the direct debugging of emitted JavaScript. TypeScript optionally provides source maps, enabling source-level debugging. TypeScript tools typically emit JavaScript upon file save, preserving the test, edit, and refresh cycle commonly used in JavaScript development.

TypeScript syntax includes several proposed features of Ecmascript 6 (ES6), including classes and modules. Classes enable programmers to express common object-oriented patterns in a standard way, making features like inheritance more readable and interoperable. Modules enable programmers to organize their code into

components while avoiding naming conflicts. The TypeScript compiler provides module code generation options that support either static or dynamic loading of module contents.

TypeScript also provides to JavaScript programmers a system of optional type annotations. These type annotations are like the JSDoc comments found in the Closure system, but in TypeScript they are integrated directly into the language syntax. This integration makes the code more readable and reduces the maintenance cost of synchronizing type annotations with their corresponding variables.

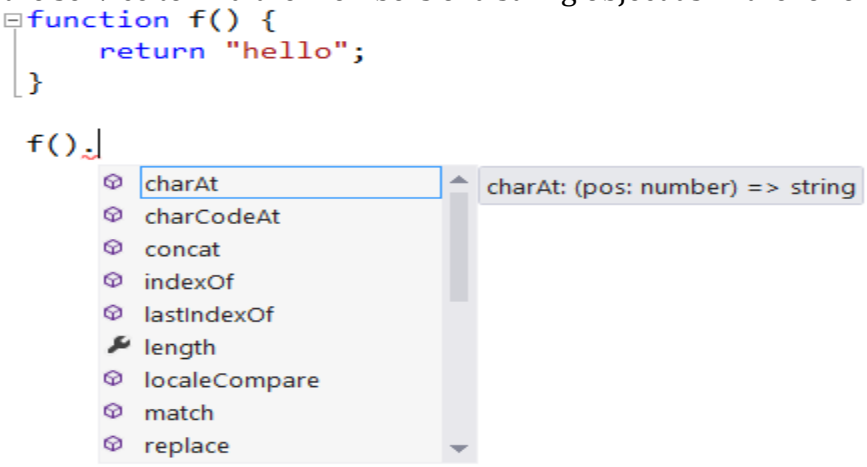
The TypeScript type system enables programmers to express limits on the capabilities of JavaScript objects, and to use tools that enforce these limits. To minimize the number of annotations needed for tools to become useful, the TypeScript type system makes extensive use of type inference. For example, from the following statement, TypeScript will infer that the variable 'i' has the type number.

```
var i = 0;
```

TypeScript will infer from the following function definition that the function f has return type string.

```
Function
    f()
    {
     return"hello";
     }
```

To benefit from this inference, a programmer can use the TypeScript language service. For example, a code editor can incorporate the TypeScript language service and use the service to find the members of a string object as in the following screen shot.



In this example, the programmer benefits from type inference without providing type annotations. Some beneficial tools, however, do require the programmer to provide type annotations. In TypeScript, we can express a parameter requirement as in the following code fragment.

```
Function
```

```
f(s: string) {
return s;
}
f({});      // Error
f("hello");  // Ok
```

This optional type annotation on the parameter's' lets the TypeScript type checker know that the programmer expects parameter's' to be of type 'string'. Within the body of function 'f', tools can assume 's' is of type 'string' and provide operator type checking and member completion consistent with this assumption. Tools can also signal an error on the first call to 'f', because 'f' expects a string, not an object, as its parameter. For the function 'f', the TypeScript compiler will emit the following JavaScript code:

```
function f(s)
        {
        return s;
         }
```

In the JavaScript output, all type annotations have been erased. In general, TypeScript erases all type information before emitting JavaScript. To conclude, TypeScript is 100% compatible with all existing JavaScript code, and optionally adds powerful features such as static type annotations and language services that turn JavaScript into a highly scalable and powerful language which can be used to develop applications whose codebases span over hundreds of thousands of lines of code. Since the output is plain JavaScript, any JavaScript host (including all browsers) will be able to run it. There is nothing stopping anyone to start using TypeScript immediately.

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A SURVEY ON VARIOUS PATTERN MINING TECHNIQUES

Pattern mining technique comes into play in the situations where we have to search for an entity in a large collection of data regardless of the way in which it is present in the collection. Pattern mining is very useful in extracting out data from the data collection in accordance with their pattern. Patterns can be sequential or non-sequential. This paper presents a survey on various existing pattern mining techniques and their comparisons. This paper focuses on implementing a pattern mining technique in identifying comparable entities.

PATTERN MINING TECHNIQUES

Auto Slog TS

Auto Slog TS is an extended version of Auto Slog which uses untagged text. Input to the system is a text with NP to be extracted is labeled with domain specific tags. Auto Slog TS uses Auto Slog method as the first step and it evaluates EP by processing corpus second time, generating relevance statistics for each pattern. Auto Slog TS tackles the following disadvantages of Auto Slog method:

- Produces undesirable patterns
- Faulty sentence analysis

Multi-level bootstrapping

Multi-level bootstrapping generates semantic lexicon and dictionary of extraction pattern for domain simultaneously. Input is an unannotated training texts and seed words for semantic category of interest. In the first step, it generates candidate Extraction pattern using Auto Slog for every NP. In the second step, the system applies this candidate Extraction pattern and save the patterns with their extractions to a database. This process continues along with an outer bootstrapping to identify reliable lexicon entries.

Class sequential rules with multiple minimum support

Class sequential rule is rule with sequential pattern on left and class label on right of the rule. Class sequential rules are found automatically using Class sequential rule mining system. Mining is done with fixed classes; hence it is called supervised method. Multiple minimum support is used in order to extract patterns with infrequent words. For that we set minimum support value very low.

Apriori

Apriori is based on candidate generation and test philosophy. It follows anti monotone property: if a pattern is not frequent, none of its superset is frequent. It is an iterative approach known as level-wise search in which k- itemsets are used to explore (k+1) itemsets.

SPAM

SPAM is an efficient method when sequential patterns in database are very long. It uses depth first traversal of search space with pruning mechanism. SPAM uses vertical bitmap data layout for simple, efficient counting.

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Cache Performance Improvement Techniques

Cache is an important effect factor of total system performance of computer architecture. Due to the ever increasing performance gap between the processor and the main memory, it becomes crucial to bridge that gap by designing an efficient memory hierarchy capable of reducing the average memory access time. In order to make room for the new entry on a cache miss, the cache may have to evict one of the existing entries. The heuristic that it uses to choose the entry to evict is called the replacement policy. The cache replacement algorithm plays a central role in designing an efficient memory hierarchy. Many of the recent studies in cache replacement algorithms have focused on improving cache replacement algorithms by minimizing the miss count. However, depending on the dependency chain, cache miss bursts, and other factors, a processor's ability to partially hide the cost of a cache miss varies. The various cache performance improvement techniques used is analyzed in order to improve the system performance.

Cache performance can be measured in terms of Average Memory Access Time.

Average Memory Time=Hit Time + Miss Rate * Miss Penalty.
Hit time: Time to hit in the cache
Miss Rate: (No. of accesses that miss/Total no. of accesses)
Miss Penalty: Cost per miss

Various cache Performance Improvement Techniques are discussed below.

By reducing the miss penalty:

Multi-Level caches

- Another level of cache is added between the original cache and the main memory.

Critical Word First

- In the above method extra hardware is necessary.
- CPU needs only one word of the block at a time. So do not wait for full block to be loaded.
- Request the missed word first from the memory and sends it to the cpu as soon as it arrives.
- Benefits for large blocks.

Read miss before write miss

- Here read misses are given higher priority than write misses.
- Complexity of write is high. So a write buffer is kept for updating dirty page.

Merging write buffers

- If the buffer is empty the data and the full address are written in to the buffer.
- If the buffer contains other modified blocks, the address is checked to see if it matches with the entered one. If matches new data is combined called write merging.

By reducing the miss rate:

- Larger block size
- Simplest one.
- Larger block size will reduce the compulsory miss.
- This is because of the spatial locality.
- However, they may increase the miss penalty by requiring more data to be fetched per miss.

Larger cache size

- To reduce the capacity misses.
- Disadvantage is higher cost.

Higher associativity

- Increasing the associativity decreases the miss.
- Compiler Optimization
- Loop Interchange
- Programs have nested loops that access data in memory in non sequential order.
- Simply exchanging the nesting of the loops can make code access the data in the order in which they are stored.
- Reduce misses by improving spatial locality.

Blocking

- Tries to reduce misses via improving temporal locality.
- The goal is to maximize accesses to the data loaded in to the cache before the data are replaced.
- Reducing the miss penalty or miss rate via parallelism

Non-blocking caches

- The CPU does not stall on a cache miss.
- The data cache supply cache hits during the instruction miss.
- Reduces the effective miss penalty.
- Execution overlaps with memory access.

Hardware prefetching

- Pre-fetch the items before they are requested by the processor.
- The instructions and data can be pre-fetched either directly in to the cache or to a buffer which can be easily accessed than main memory.
- Two blocks are fetched on a miss. The requested block and the consecutive block.
- Reducing the time to hit in the cache:

Small and simple caches

- Smaller cache reduces the hit time.
- Avoiding address translation
- Virtually indexed caches: Uses Virtual address
- Physically indexed caches: Uses Physical address

Trace caches

- Instead of limiting the instructions in a static cache block to spatial locality, trace cache finds a dynamic sequence of instructions including taken braches.

AN OVERVIEW ON HANDWRITTEN CHARACTER RECOGNITION SYSTEMS

Handwritten character recognition is one of the most interesting and challenging research areas in the field of pattern recognition. It has wide range of applications in the domain of postal automation, automatic number plate recognition, preservation of handwritten historical documents, bank check processing etc. Handwritten character recognition can be classified as: offline and online recognition. Offline character recognition is the process of recognizing handwritten text from a scanned sheet of paper. In the case of offline recognition, the data is obtained by a scanner after the writing process is over whereas in online recognition, the data is captured as a user writes on a special digitizer or PDA with stylus. As opposed to online recognition where temporal and spatial information about each stroke is available, offline recognition is performed on the image of the written text which makes the recognition process even more complex.

The major steps involved in the handwritten character recognition are:

DATA ACQUISITION: This is the stage in which data are collected for the recognition process. In the online case, the data may be captured while the user is writing on a digitizer or PDA whereas in the offline case, the data is obtained by scanning the image after the writing process is over.

PREPROCESSING: Preprocessing is an important step in the character recognition process because the writing style of different users are different and the existence of huge amount of noise in the images after scanning. The preprocessing steps involved in offline case are: binarization, noise removal, skew correction, skeletonization and normalization. The sequence of preprocessing steps involved in the online case are: de-hooking, smoothing, duplicate point elimination, interpolation of missing points, normalization and resampling.

FEATURE EXTRACTION: Feature extraction is the process of extracting relevant features from the characters to form feature vectors which are used by classifiers in the recognition process. The feature extraction methods for handwritten character recognition can be classified into three: Statistical, Structural and Hybrid techniques. Statistical approaches use quantitative methods for extracting the features. Geometrical moments, projection histograms, direction histograms, crossing points etc are used as features in this technique. Structural approaches use qualitative measurements for feature extraction. These features are based on topological and geometrical properties of the character, like strokes, loops, end points, intersection points etc. Hybrid approaches combines the features of these two techniques.

CLASSIFICATION: Classification is the next phase of character recognition where character images are assigned labels based on the features extracted. This is the most important phase in a character recognition system. Some of the main classifiers used for the recognition process are Bayesian classifiers, Binary tree classifiers, Nearest Neighbors classifiers, neural networks, MQDF and Support Vector Machines.

POST-PROCESSING: Post-processing is done after classification process is completed. It includes steps like representation of the output in Unicode format, error correction and disambiguation of confusing character pairs. Linguistic rules can also be applied to further improve recognition rate.

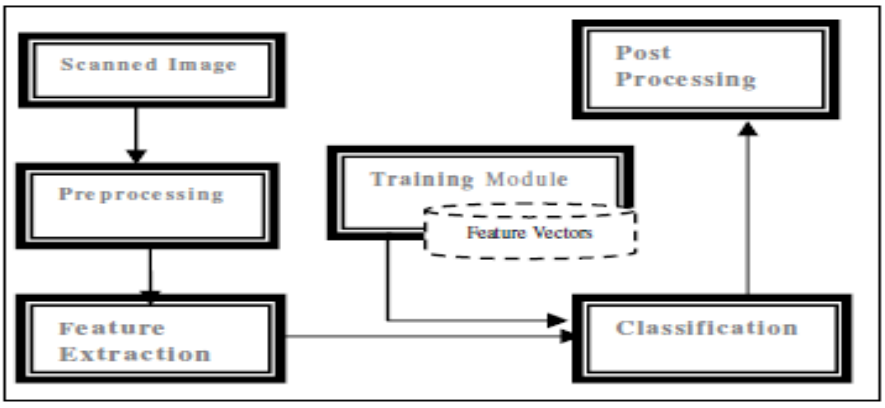

Figure 1. Architecture of a character recogniton system

Even though HCR research is well advanced in foreign scripts like Chinese and Japanese, only a few works exist in Indian scripts especially for the South Indian scripts. This is mainly due to the large character set, high degree of similarity in character shapes and the presence of compound characters in these scripts. Also variations in the handwriting among the writers make the recognition process even more difficult. These variations exist since each person has different speed of writing, styles and size for characters. Even within an individual's handwriting variations may exist. The character recognition systems in Malayalam are still in its infancy stage.

Classification models used for character recognition can be mainly categorized as: Neural network based techniques, Decision tree based techniques, Support Vector Machine based techniques and Modified Quadratic Discriminant Function based techniques. Each of the classifiers used had its own advantages as well as disadvantages. The best recognition accuracy in offline Malayalam character recognition of 95.42% was achieved using gradient features and MQDF classifier. For online Malayalam character recognition, the best reported recognition rate was 98.26% using structural and directional features and SFAM neural networks as classifiers

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DETECTION AND PREVENTION OF SYBIL ATTACK IN VANET

Vehicular ad hoc networks (VANETs) offer direct communication between vehicles and to and from roadside unit, and it can send and receive hazard warnings or information on the current traffic situation. The major goals are to increase road safety and transportation efficiency. Dedicated Short Range Communication (DSRC) is used as communication medium and it operates on 5.9GHz frequency band. Safety and non safety messages are forwarded between the Vehicle to Vehicle (V2V) and Vehicle to Infrastructure (V2I) on this communication medium. Vehicular Ad hoc Network (VANET) needs security to implement the wireless environment and serves users with safety applications. Attacker can create problems in the network using DSRC by launching some attacks. Security is the main concern of these applications where a wrong message (due to insecure environment) may directly affect the human lives.
Sybil attacks have become a serious threat as they can affect the functionality of VANETs.

Sybil Attack in VANET

When any node create multiple copies of itself to create confusion in the WSN network or illegally claims multiple identities or claims fake ID'S and also can cause collapse in the network, then that kind of situation can be referred as **Sybil attack.** This attack can affect the functionality of the network for the benefit of the attacker. In Sybil attack, the attacker sends multiple messages to other vehicles and each message contains different fabricated source identity (ID). It provides illusion to other vehicle by sending some wrong messages like traffic jam message.
Different techniques to detect Sybil Attack are:

1) Signal Strength based Position verification scheme

Estimate node position by analyzing signal strength. Calculates mean square error between estimated position and claimed position. The attacker can increase the signal strength while sending messages so that there is no mean square error to detect Sybil attack. Here every vehicle has to disclose its identity. All information is clear text and it is easy for attacker to steal the identity of other vehicle.

2) Privacy preserving Scheme(P2DAP approach)

Approach is P2DAP (Privacy Preserving Detection of Abuses of Pseudonyms). The DMV provides vehicles with a unique pool of pseudonyms, used for hiding a vehicle's unique identity. A vehicle uses these pseudonyms to send a message. A vehicle may abuse these pseudonyms to launch a Sybil attack. To prevent it, the pseudonyms assigned to a particular vehicle are carefully hashed to a common value, and the hash is stored at the RSBs and the DMV. By calculating the hashed values of overheard pseudonyms, an RSB is able to suspect a Sybil attack. The RSB sends the suspected pseudonyms and the hash value to the DMV.

3) Session Key Based Certificate

This paper uses SKC (Session Key based Certificate) to detect a Sybil attack. Vehicles' unique ID and master key are registered in a VANET server. Vehicle A generates anonymous ID and sends it to a local VANET server which vehicle A belongs to. A local VANET server validates the anonymous ID of vehicle A in a VANET server. Vehicle A and a local VANET server generates a session key each and they generates Vehicle A's local certificate with the session key. Vehicle A sends messages using these certificates to vehicle B. Vehicle B validates vehicle A by requesting vehicle A's local certificate to a local VANET server. If the authentication of vehicle A's local certificate based on session key is not correct, then a Sybil attack is detected.

4) Timestamp Series Approach

The paper proposes a timestamp series approach to defend against Sybil attack in VANET based on roadside unit support. The basic idea of the proposed approach is that vehicles obtain certified timestamps signed by RSUs whenever they pass by an

RSU. A traffic message sent out by a vehicle has to contain a series (two or more) of most recently obtained timestamp certificates. A vehicle may create multiple requests to obtain multiple time stamps from a single RSU. Multiple timestamps obtained by a single vehicle in a single transmission range of an RSU must be very close. Sybil attack can be detected when a recipient vehicle receives multiple messages with very similar timestamp series.

5) Sybil Attack Detection and Prevention Using AODV in VANET

This paper detects the Sybil attack, a new filed is introduced in the AODV algorithm named SCID i.e. Secondary id. AODV is an on demand algorithm, which builds routes between nodes only as desired by source nodes. When a source node desires a route to a destination, it broadcasts a route request (RREQ) packet across the network. RREQ contains the source node's IP address, current sequence number, and broadcast ID. A node receiving the RREQ may send a route reply (RREP) back to the source node. Once the source node receives the RREP, it may begin to forward data packets to the destination. The paper proposes an extension of the AODV protocol. To detect the Sybil attack, a new filed is introduced in the AODV named SCID i.e. Secondary id. It maintains a unique identity of each node. Now the packet format of AODV consists sequence number as well as secondary identity i.e. scid.

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GESTURE RECOGNITION

Gesture recognition pertains to recognizing meaningful expressions of motion by a human involving the hands, arms, face, head, or body. It can be seen as a way for computers to begin to understand human body language, thus building a richer bridge between machines and humans than primitive text user interfaces or even graphical user interfaces.

Introduction

Gesture recognition enables humans to communicate with the machine and interact naturally without any mechanical devices. It is of utmost importance in designing an intelligent and efficient human–computer interface. The applications of gesture recognition range from sign language through medical rehabilitation to virtual reality. Using the concept of gesture recognition, it is possible to point a finger at the computer screen so that the cursor will move accordingly. This could potentially make conventional input devices such as mouse, keyboards and even touch-screens redundant. Different techniques have been identified for gesture recognition, based on the approaches ranging from statistical modeling, computer vision and pattern recognition, image processing, connectionist systems, etc. Current focuses in the field include emotion recognition from the face and hand gesture recognition. A survey on the various gesture recognition techniques identified is being proposed.

Gesture taxonomies

Theoretically, research classifies gestures into two types, static and dynamic gestures. **Static** gestures refer to the orientation and position of the hand in space during an amount of time without any movement. **Dynamic** gestures refer to the same but with movement. Dynamic gestures include those involving body parts, such as waving the hand, whereas static gestures include single formation without movement, such as jamming the thumb and forefinger to form the OK symbol (i.e., a static pose). Gestures can also be classified into five types:

- **Emblematic/emblem/quotable gestures**: Direct translations of short verbal communication.
- **Affect displays:** Gestures conveying emotion or intention.
- **Regulators:** Gestures that control interaction.
- **Adaptors:** Habits unintentionally used during communication.
- **Illustrator gestures:** Emphasize key points in speech and thus inherently depend on the thought process and speech of the communicator.

Enabling technologies for gesture recognition

The two major types of enabling technologies for human computer interaction are:

- **Contact-based devices**: Based on physical interaction of users with the interfacing device.
- **Vision-based devices**: Rely on video sequences captured by one or several cameras to analyze and interpret motion.

Hand gesture analysis approaches

Hand gesture analysis can be divided into three main approaches:

- **Glove-based analysis**: Employs sensors (mechanical or optical) attached to a glove that acts as transducer of finger flexion into electrical signals to determine hand posture
- **Vision-based analysis:** Based on how humans perceive information about their surroundings.
- **Analysis of drawing gestures:** Involves the use of a stylus as an input device.

Gesture representations

Several gesture representations and models that abstract and model the movement of human body parts have been proposed and implemented. The two major categories of gesture representation are:

- **3D-model based representation:** Defines the 3-D spatial description of a human hand for representation, with the temporal aspect being handled by automation.

- **Appearance based representation:** Include the color-based model, silhouette geometry model, deformable gabarit model, and motion-based model.

Gesture recognition techniques

Common techniques used for static and dynamic gesture recognition are described as follows:

- **K-means:** This classification searches for statistically similar groups in multi-spectral space.
- **K-nearest neighbors:** This is a method for classifying objects according to the closest training examples in the feature space.
- **Mean shift clustering:** The mean shift algorithm is a nonparametric clustering technique that requires no prior knowledge of the number of clusters and does not constrain cluster shape.
- **Support vector machine (SVM):** SVM is a nonlinear classifier that produces classification results superior to those of other methods.
- **Hidden markov model (HMM):** HMM is a joint statistical model for an ordered sequence of variables.
- **Dynamic time warping (DTW):** DTW has long been used to find the optimal alignment of two signals.
- **Artificial neural networks (ANNs):** An ANN is an information processing paradigm based on the way biological nervous systems, such as the brain, process information.
- **Time delay neural networks (TDNN):** TDNNs are special artificial neural networks (ANNs) that work with continuous data to adapt the architecture to online networks and are thus advantageous to real-time applications.
- **Finite state machine (FSM):** An FSM is a machine with a limited or finite number of possible states.
- **Template matching:** Matching is a generic operation I-pattern recognition used to determine similarities between two entities (points, cures, or shapes) of the same type.
- Many other techniques have been identified and under research.

Conclusion

The importance of gesture recognition lies in building efficient human–machine interaction. A review study on the hand postures and gesture recognition methods is considered to be a challenging problem in the human-computer interaction context and promising as well. Many applications and techniques for gesture recognition are identified and developed.

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LOAD BALANCING IN CLOUDS

Cloud computing is the next generation in computation. Possibly people can have everything they need on the cloud. Cloud computing is the next natural step in the evolution of on-demand information technology services and products. Cloud Computing is an emerging computing technology that is rapidly consolidating itself as the next big step in the development and deployment of an increasing number of distributed applications.

Load balancing is one of the important factors to heighten the working performance of the cloud service provider. Balancing the load of virtual machines uniformly means that anyone of the available machine is not idle or partially loaded while others are heavily loaded. One of the crucial issue of cloud computing is to divide the workload dynamically. The benefits of distributing the workload includes increased resource utilization ratio which further leads to enhancing the overall performance thereby achieving maximum client satisfaction.

Goals of load balancing mainly are:

- Substantial improvement in performance
- Stability maintenance of the system
- Increase flexibility of the system so as to adapt to the modifications.
- Build a fault tolerant system by creating backups.

Based on the current state of the system there are two other types of load balancing algorithms, Static load balancing algorithms and dynamic load balancing algorithms.

Static load balancing algorithms are not preemptive and therefore each machine has at least one task assigned for itself. It aims in minimizing the execution time of the task and limit communication overhead and delays. The decision of shifting the load does not depend on the current state of the system.

In dynamic load balancing algorithms, the current state of the system is used to make any decision for load balancing. It allows processes to move from an over utilized machine to an under-utilized machine dynamically for faster execution.

Different techniques used for load balancing are coming under these categories:

Round Robin algorithm: When the cloud partition is idle, many computing resources are available and relatively few jobs are arriving. In this situation this algorithm is effective. It is a type of static load balancing algorithm.

Load balancing strategy based on game theory: When the cloud partition is normal, jobs are arriving much faster than in the idle state and the situation is far more complex, then game theory based algorithm is effective.

Ant Colony Optimization: ACO is inspired from the ant colonies that work together in foraging behavior. The ants work together in search of new sources of food and simultaneously use the existing food sources to shift the food back to the nest.

Distributed Load Rebalancing Algorithm: Offloading the load, rebalancing the task to storage nodes by balancing each of the storage node loads spontaneously. Here load balancing problem in distributed file systems specialized for large scale dynamic and data intensive clouds.

Data-grouping-Aware Data Placement Scheme: DRAW extracts optimal data groupings and re-organizes data layouts to achieve the maximum parallelism per group subjective to load balance.

Network-Aware Load balancing: It is based on creating several replicas of each job and sending each replica to different servers.

Virtualized resource auction and allocation based incentive and penalty(VRAA): It is a gaming model to allocate CPU resources in virtualized servers, which can overcome resource wastage and poor service quality.

NEST (Locality-aware Approximate Query Service for Cloud Computing): It is applicable for large-scale cloud computing applications. It supports queries, locality aware and balanced storage among cloud servers.

MobShced: A customizable job scheduler and a mobile friendly Map Reduce framework. Proposed framework can improve the performance of Map Reduce jobs running on top of MANET.

These different techniques are used in different workload situations to improve the service performance.

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MORPHOLOGICAL ANALYSER FOR MALAYALAM LANGUAGES

Morphological analysis is the segmentation of words into their component morphemes and the assignment of grammatical morphemes to grammatical categories and the assignment of the lexical morpheme to a particular lexeme or lemma. Morphological Analyzer is the first step to be done in many of the NLP task.

Natural Language Processing (NLP) has been developed in 1960, as a sub-field of Artificial Intelligence and Linguistics. The aim of NLP is studying problems in the automatic generation and understanding of natural languages. The primary goal of natural language processing is to build computational models of natural language for its analysis and generation. NLP focuses on the study of language as a means of communication. Though there are attempts to prepare morphological analyzer for Malayalam, no fully fledged morphological analyzer is made for Malayalam.

There are about 17 languages in the southern Indian family of Dravidian languages, the most prominent being Malayalam, Telugu, Kannada and Tamil. About 95 per cent of the South Indian population speaks one of these four languages. Malayalam is an agglutinative language. It is an inflectionally rich language with a free word order. In free word order languages, the order of the words carries only secondary information, while the gross meaning is contained elsewhere. In Malayalam, the case endings of words impart semantic and syntactic relations between the verbs and other constituents in a sentence.

There are different methods for the morphological analysis of Malayalam: Suffix Stripping Method, Rule Based Method, Hybrid Method, and Probabilistic Method. There are different approaches used for morphological analysis in Malayalam. They are Paradigm Approach, Suffix Stripping, and Hybrid Approach.

Paradigm Approach

A paradigm defines all the word forms a given stem and also provides a feature structure associated with every word. Based on paradigms the program generates add delete strings for analyzing. Paradigm approaches rely on findings that the different types of word paradigm are based on their morphological behaviors. In this one has to list down all possible inflected word forms of a representative lexical item of a paradigm type. For eg: "*maraM"* belongs to a paradigm class where the inflected word forms are maraM, marangngal , maratte , marangngaLe. It is important that each paradigm should have a paradigm number and an inflectional list.

Suffix Stripping Method

In Suffix Stripping Method, suffixes are identified first and then the roots are identified. It uses stem dictionary, suffix dictionary, Morphotactics rules and

Morphophonemic rules. Once the suffixes are identified and applying proper sandhi rules can obtain the stem of the whole word. In this approach, the searching is much faster. In this approach the searching is much faster.

Hybrid Approach

Hybrid Approach is a combination of both Suffix Stripping approach and Paradigm Approach. The categories like nouns, verbs etc are classified into different paradigm as in Paradigm Approach. Like Suffix Stripping Approach the list of all possible suffixes can be identified easily. In Hybrid Approach, the words to be analyzed are first checked in the inflection list. If the inflection list has the word with same feature then it identifies the valid root and the suffix. Then the individual and the common properties or features of the suffixes with the root/stem words are given.

Morphological Analyzer can be used for variety of applications in the Natural Language Processing. They are essential for any type of Natural Language Processing works. Malayalam is a language that have heavy amount of agglutination. Therefore Malayalam Morphological Analyzer would help in automatic spelling, grammar checking, natural language understanding, machine translation, parts of speech tagging and various other applications.

NIA MARY ROSE
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OBJECT TRACKING

Tracking of moving objects for measuring motion parameters and obtaining a visual record of moving objects is an important area in image processing. Object tracking is the process of segmenting an object of interest from a video scene and keeping track of its motion, orientation, and occlusion etc. to extract useful information. It is the problem of determining the positions and other relevant information of moving objects in image sequences. The use of object tracking is applicable in the tasks of motion-based recognition, automated surveillance, video indexing, human-computer interaction, traffic monitoring, vehicle navigation etc. In a process of tracking, an object can be defined as anything that a person wants to track. Objects can be represented by their shapes and appearances. The three basic approaches in object tracking are point tracking, kernel tracking and silhouette tracking.

FEATURE SELECTION FOR TRACKING

Selecting the right features plays a critical role in tracking. In general, the most desirable property of a visual feature is its uniqueness so that the objects can be easily distinguished in the feature space. Feature selection is closely related to the object representation.

Color

The apparent color of an object is influenced primarily by two physical factors, the spectral power distribution of the illuminant and the surface reflectance properties of the object. In image processing, the RGB (red, green, blue) color space is usually used to represent color.

Edges

Object boundaries usually generate strong changes in image intensities. Edge detection is used to identify these changes. An important property of edges is that they are less sensitive to illumination changes compared to color features.

Optical flow

Optical flow is a dense field of displacement vectors which defines the translation of each pixel in a region. It is computed using the brightness constraint, which assumes brightness constancy of corresponding pixels in consecutive frames

Texture

Texture is a measure of the intensity variation of a surface which quantifies properties such as smoothness and regularity.

OBJECT DETECTION MECHANISMS

Every tracking method requires an object detection mechanism either in every frame or when the object first appears in the video. A common approach for object detection is to use information in a single frame. However, some object detection methods make use of the temporal information computed from a sequence of frames to reduce the number of false detections.

- Point Detectors
- Background Subtraction
- Segmentation
- Mean-Shift Clustering
- Image Segmentation Using Graph-Cuts
- Active Contours
- Supervised Learning
- Adaptive Boosting
- Support Vector Machine

TRACKING METHODS

Point Tracking

Objects detected in consecutive frames are represented by points, and the association of the points is based on the previous object state which can include object position and motion. This approach requires an external mechanism to detect the objects in every frame. Point tracking can be divided into two Deterministic Methods for Correspondence and Statistical methods. Deterministic methods for point correspondence define a cost of associating each object in frame $t - 1$ to a single object in frame t using a set of motion constraints. In Statistical Methods, correspondence measurements obtained from video sensors invariably contain noise. Statistical correspondence methods solve these tracking problems by taking the measurement and the model uncertainties into account during object state estimation. The statistical correspondence methods use the state space approach to model the object properties such as position, velocity, and acceleration.

Kernel Tracking

Kernel refers to the object shape and appearance. For example, the kernel can be a rectangular template or an elliptical shape with an associated histogram. Objects are tracked by computing the motion of the kernel in consecutive frames. This motion is usually in the form of a parametric transformation such as translation, rotation, and affine. Kernel tracking can be divided into two. Tracking using template and multi view method.

Silhouette Tracking

Tracking is performed by estimating the object region in each frame. Silhouette tracking methods use the information encoded inside the object region. This information can be in the form of appearance density and shape models which are usually in the form of edge maps. Given the object models, silhouettes are tracked by either shape matching or contour evolution .Both of these methods can essentially be considered as object segmentation applied in the temporal domain using the priors generated from the previous frames. The goal of a silhouette-based object tracker is to find the object region in each frame by means of an object model generated using the previous frames. This model can be in the form of a color histogram, object edges or the object contour. Shape matching approaches search for the object silhouette in the current frame. Contour tracking approaches, on the other hand, evolve an initial contour to its new position in the current frame by either using the state space models or direct minimization of some energy functional

Geethu Paul
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SURVEY OF DIFFERENT TECHNIQUE IN TEXT MINING

Text mining is a new area of computer science which fosters strong connections with natural language processing, data mining, machine learning, information retrieval and knowledge management. Data mining is the non-trivial extraction of implicit previously unknown and potentially useful information about data. Text mining refers to the discovery of non-trivial, previously unknown, and potentially useful knowledge from a collection of texts. Since its origin, text mining has been considered an analog of data mining (Data mining, interpreted as Knowledge Discovery in Databases, or KDD) applied to text repositories.

Text mining is the discovery of interesting knowledge in text documents. It is a challenging issue to find accurate knowledge (or features) in text documents to help users to find what they want. This seminar deals with different approaches used in text mining.

Text mining seeks to extract useful information from unstructured textual data through the identification and exploration of interesting patterns. A clear distinction from data mining is that the data mining deals with structured data, whereas text presents special characteristics and its explicit appearance is basically unstructured.

Text mining is very important since nowadays, around 80% of the information stored in computers (not considering audio, video, and images) consist of text. Vast amounts of new information and data are generated everyday through economic, academic and social activities, much with significant potential economic and social value. Text mining is required to exploit this potential.

TECHNIQUES OF TEXT MINING

1. Summarization of Text

In this technique, length of the document is reduced such that meaning and main points should not be lost. Documents are represented in the structured form, by reducing the dimensionality of the documents. This can be done by applying filtering methods and stemming methods. Each sentence is a combination of words, and is represented by vector model, in which each sentence is considered as an N-dimensional vector. It makes possible to find the similarity between the different text elements.

2. Categorization

The goal is to train the classifier on the basis of known examples and then unknown examples are categorized automatically. A number of statistical classification techniques can be applied to categorize the text, for example Naive Bayesian Classifier, Nearest Neighbor classifier, Index term selection, Decision tree classifier, Support vector machine and so on.

3. Clustering

Text Clustering is an unsupervised technique in which no input output patterns are predefined. This method is based upon the concept of dividing the similar text into the same cluster. Each cluster consists of number of documents. Clustering can be divided into hierarchical clustering and partitional clustering.

4. Information Extractions

Information Extraction (IE) is the process of automatic extraction of structured information such as entities, relationship between entities and attributes describing entities from unstructured texts. Mostly, useful information such as names of people, places or organization mentioned in the text is extracted without a proper understanding of the text. Traditional data mining systems assumes that the information to be mined is already in the form of relational database.

5. Visualization

Visualization method provides better and faster understandable information which help us to mine large documents collections unlike the descriptions which are purely text based. By using this method, the users can distinguish between colors, relationships, distance, etc. Thousands of points can be scanned easily via this model. This rely on the fact of presenting the discoveries in the form of graphs, maps etc.

6. Information retrieval

Information retrieval (IR) is a field developed in parallel with database systems. Information retrieval problem: locating relevant documents based on user input, such as keywords or example documents.

7. Text Indexing Techniques

There are several popular text retrieval indexing techniques, including inverted indices and signature files. An inverted index is an index structure that maintains two hash indexed or B+-tree indexed tables: document table and term table, where document table consists of a set of document records, each containing two fields: doc id and posting list, where posting list is a list of terms (or pointers to terms) that occur in the document, sorted according to some relevance measure. term table consists of a set of term records, each containing two fields: term id and posting list, where posting list specifies a list of document identifiers in which the term appears.

Maria Rose Mathew
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TEXT SUMMARIZATION

Text Summarization is a challenging problem these days. The rapid development of emerging technologies poses new challenges to this research field. Due to the development of technologies, the response obtained for someone who searches something on the Internet, is lots of different Web pages with many information, which is impossible for a person to read completely. The main goal of a summary is to present the main ideas in a document or set of documents in a short and readable paragraph. A summary is useful since it can give an overview of the original document in a shorter period of time. Readers may decide whether or not to read the complete document after going through the summary. So, the needs of producing summaries have become more and more widespread. Summarization offers the possibility of finding main points of text and so the user will spend less time on reading the whole document. Different types of summary might be useful in various applications and summarization can be classified based on these types.

Definition

Text summarization is the process of distilling the most important information from a source (or sources) to produce an abridged version for a particular user (or user) and task (or tasks). Automatic Summarization is the process of reducing a text document with a computer program in order to create a summary. A summary can be defined as a text that is produced from one or more texts, that contain a significant portion of the information in the original text(s), and that is no longer than half of the original text(s).

Properties of a summary

- Meet major concepts of original document
- Pertinent
- Articulate
- Short
- Ordered
- Less redundant

Summarization Types

There are different summarizations base on various factors such as media, input, output, purpose and language used.

Media

Regarding media, there may be text, video, audio, images, speech and hypertext summarizations.

Input

Considering input given to the summarizers, there are single document and multi document summarizations.

Output

Based on output, there are extract and abstract summarizations.

Purpose

Regarding the purpose of summary, there may be generic, personalized, updates, sentiment-based, indicative, informative and critical summarizations.

Language

Based on the language used for summarization, there may be mono lingual, multi lingual and cross lingual summarizations.

Process of Automatic Text Summarization

Traditionally, summarization has been decomposed into three main stages. According to Sparck Jones approach, stages are:

- Interpretation of the source text to obtain a text representation
- Transformation of the text representation into a summary representation
- Finally, generation of the summary text from the summary representation

Approaches for summarization

There are different approaches based on the way they use to select most salient sentences from the original document.

- Statistical based approach assigns weights to words in the document and selects those sentences with highest score.
- Topic based approach determines sentence relevance by means of phrases or words contained in the document.
- Graph based approach uses graph topology which gives connectivity of different elements. Graph consists of nodes and edges. In this approach, nodes are used to represent text elements and edges represent links between text elements.
- Discourse based approach uses linguistic knowledge to select significant sentences from the given document.
- Machine learning based approach requires training to learn the features to select most salient sentences from the document.

The status, and state, of automatic summarizing has radically changed through the years. It has specially benefit from work of other asks, e.g. information retrieval, information extraction or text categorization. Research on this field will continue due to the fact that text summarization task has not been finished yet and there is still much effort to do, to investigate and to improve.

Nayana Arackal
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DIFFERENT STRATEGIES FOR RESTRAINING VIRUS PROPAGATION

Mobile phones and personal digital assistants are becoming increasingly important in our daily life since they enable us to access a large variety of ubiquitous services. Mobile networks, formed by the connection of mobile devices following some relationships among mobile users, provide good platforms for mobile virus spread. Mobile viruses can cause private data leakage and viruses can even jam wireless services by sending thousands of spam messages, and reduce the quality of voice communication. Hence there is an urgent need for both users and service providers to further understand the propagation mechanisms of mobile viruses and to deploy efficient countermeasures.

One of the most popular methods is network immunization where some nodes in a network are immunized so that they cannot be infected by a virus or a worm. Since cost of immunization is high, the core of immunization becomes how to immunize a small or minimum number of important nodes in order to prevent a virus from becoming a rapid epidemic in the network.

Currently, one of the most popular methods is network immunization where some nodes in a network are immunized (protected) so that they cannot be infected by a virus or a worm. After immunizing the same percentages of nodes in a network, the best strategy can minimize the final number of infected nodes. The main objective is to search quickly a short path from one "seed" node to a targeted node, just based on local information, and then effectively and efficiently restrain virus propagation. The most important measurement of the effectiveness of an immunization strategy is the total number of infected nodes after virus propagation. The best strategy can effectively restrain virus propagation, i.e. the total number of infected nodes is kept to a minimum. In order to evaluate the efficiency of different immunization strategies and find the relationship between local behaviors and global dynamics, two statistics are of particular interest:

1. *SID*: the sum of the degrees of immunized nodes that reflects the importance of nodes in a network

2. *APL*: the average path length of a network. This is a measurement of the connectivity and transmission capacity of a network

Network immunization cuts epidemic paths through immunizing a set of nodes from a network following some well-defined rules. Different immunization strategies are:

Targeted immunization

The targeted immunization takes the actual topology of a real-world network into consideration. The targeted immunization strategy aims to immunize the most connected nodes in order to cut epidemic paths through which most susceptible nodes may be infected.

Acquaintance immunization

The motivation for the acquaintance immunization is to work without any global information. In this strategy, *p* % of nodes is first selected as "seeds" from a network, and then one or more of their direct acquaintances are immunized.

D-step immunization

This strategy views the decentralized immunization as a graph covering problem. That is, for a node *vi*, it looks for a node to be immunized that has the maximal degree within *d* steps of *vi*. This method only uses the local topological information within a certain range.

Autonomy oriented computing-based immunization (AOC)

Group of computational entities is dispatched into a decentralized network. Entities autonomously work with each other and update their local environment based on their own autonomous behaviors. Each entity moves to the highest-degree node within its direct and indirect neighborhood.

Semi autonomy-oriented computing-based immunization (SOC)

Some entities are deployed in a network to search for mobile devices according to some specific rules and with the assistance of a center. The strategy can effectively send security patches to as many mobile devices as possible at a considerable speed and lower cost. A center is added to AOC – based strategy to combine and analyze the information received from the entities.

DeepCure

It identifies immunization targets as not only the highly-connected nodes but also the nodes with high availability and/or high link load, with the aim of ejecting immunization information into just right targets to cure. For better trade off the cost and the efficiency, DeepCure deliberately select these targets from 2-local neighborhood, as well as topologically-remote but semantically-close friends if needed.

Susan K Paul
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WEB USAGE MINING USING SEMANTIC INFORMATION

Web usage mining comes under the area of Data mining in Computer Science. It is an application of data mining techniques on the navigational traces of the users to extract knowledge about their preferences and behavior. The Semantic Web is an extension of the current Web in which information is given well-defined meaning, enabling computers and people to work in cooperation. The combination of Web Mining and Semantic Web has created a new and fast-emerging research area that of Semantic Web Mining. Domain knowledge of the Web application is in the form of Ontology. Applications of semantic web mining technologies include personalization, pattern navigation, information retrieval, web-page recommendations etc.

Web Personalization

Web Personalization method consists of two phases. The offline phase consists of data preparation, ontology creation, and association rule mining and the online phase consists of personalization components (generation of recommendations).

The Web server log file is preprocessed by data cleaning, user's identification and session identification tasks. Through the ontology, the system will express hierarchical links between entities. Association rules help to uncover relationships between seemingly unrelated data in a relational database or other information repository. Several methods have been used for this such as the Apriori algorithm, SPADE algorithm, OntoSP algorithm etc. Apriori is a classic algorithm for frequent item set mining and association rule learning over transactional databases and OntoSPM algorithm, a variation of Apriori algorithm, enhanced by semantic information.

Recommendation engine's role is to compute a recommendation set, by taking a collection of frequent itemsets as input and generates a recommendation set for a user by matching the current user's activity against the discovered patterns. A recommendation generation algorithm directly produces real-time recommendations from itemsets without the need to first generate association rules.

Improve pattern quality

Semantic web mining technologies for improving pattern quality consists of three basic phases: preprocessing, rule extraction, and evaluation. In the preprocessing phase, the web server log files are pruned, transactions are extracted, and ontology class individuals are mapped to the Web page addresses. In frequent navigation pattern generation, SPADE is used to obtain the sequential association rule mining algorithm since it is time efficient. Evaluation of generated semantically enhanced web traversal patterns is done using precision-with-threshold and coverage-with threshold.

Another method comprises of a dedicated pattern space built on top of the ontology, navigation primitives, mining methods, and recommendation techniques. Apriori is the prototypical pattern miner that performs a level-wise top-down

traversal and exploits frequency scores for a priori invalidation of infrequent candidates. The recommender system matches the members of family of patterns to the sequence of already accessed objects to isolate the applicable patterns.

Web-page recommendations

Better Web-page recommendations are provided using semantic enhancement by integrating the domain and Web usage knowledge of a website. Domain knowledge is represented using ontology or an automatically generated semantic network. A number of effective queries have been developed to query about these knowledge bases. Based on these queries, a set of recommendation strategies have been proposed to generate Web-page candidates. The recommendation results have higher performance than the WUM method.

Using semantic information provides more interesting patterns which consequently make the recommendation system more functional, smarter and comprehensive. Thus, relating to the provision of personalized experiences for the users. But if the ontology isn't made correctly, then the initial set of recommendations would be much far away from the domain.

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Efficient Event Detecting Protocol (EEDP) in WSNs

INTRODUCTION

Event-driven wireless sensor networks (EWSNs) is a special class of wireless sensor networks composed of large number of sensor nodes that are deployed in the terrain to sense physical Phenomena of Interests (PoIs). The main purpose of EWSNs is the accurate notification of the PoI to the sink which is expected to perform real time processing and to make accurate decision quickly. They are mostly used in emergency applications.

EXISTING SYSTEM

The drawbacks of most of the existing methods are that the real-time requirements are not taken into account and the amount of the exchanged data may be huge. Most of traditional protocols detect an event by a single event type, which is not practical in real environment. Taking fire as example, one cannot simply use a simple temperature sensor to detect the presence of fire. Smoke sensors are incorporated into temperature sensors to detect the fire more accurately.

PROPOSED SYSTEM

The proposed protocol compress the sensed event raw data by analyzing the characteristics of an event, thus the event is detected in a distributed and efficient way. In the proposed protocol the occurrence of an event is decided upon many attribute values and such an event is called a composite event. Taking fire as a composite event for example, the event fire is a fusion of multiple sensed values of multiple different attributes, i.e., the occurrence of

fire should satisfy some conditions such as temperature > 100 °C AND smoke> 100mg/L, rather than a simple condition temperature > 100 °C or smoke >100mg/L alone.
The protocol has the following contributions:
1) Decisions are locally made in the event area and then only particular conclusions such as the occurrence of an interested event is sent to sink.
2) No significant amount of data is sent to the end users to decide whether an event occurred or not. Thus, each node can naturally conserve more energy to extend network lifetime.

PROTOCOL DESIGN

The Efficient Event Detection Protocol (EEDP) consists of two procedures: Primary Detection Procedure (PDP) and Emergency Routing Procedure (ERP). In PDP, each node collects the environment information with its own equipped sensors and makes local primary decision. And then each node routes the local primary decisions to the sink node in the ERP procedure.

Primary Detection procedure (PDP) :

For the composite event E, two hypotheses are used to denote the absence and presence of it. It define x^i_m to be the observation of the mth sensor of node i to make a local atomic binary decision μ^i_m. Δ^i is used to denote the final decision result of node i . The node i with $\Delta^i = 1$ generates an alarm packet to destination immediately. It is assumed that the observations x^i_m are statistically independent. Each x^i_m value corresponds to an atomic event.
The independent signal x^i_m is obtained by:

$$x_m^i = \begin{cases} w_m^i & if \quad H_0, (\text{E } is\ absent); \\ f(r_i) + w_m^i & if\ H_1, (\text{E } is\ present); \end{cases}$$

1) Single Decision Rule (SDR):

$$\mu_m^i = \begin{cases} 1\ if\ x_m^i \geq \Gamma_m^i \\ 0\ otherwise \end{cases}$$

Γ^i_m is the per-sample threshold of node i for the mth atomic event.

2) Composite Decision Rule (CDR):

$$\Delta^i = \begin{cases} 1\ if\ \mu_1^i\ AND\ \mu_2^i\ AND\ \ldots AND\ \mu_{|M|}^i = 1 \\ 0 \qquad\qquad\qquad\qquad\qquad otherwise \end{cases}$$

A node generates alarm when Δ^i =1.

Emergency Routing Procedure (ERP)

A node with atleast μ^i_m value equal to 1 is called emergency source node (ESN) and all other nodes are called emergency forwarding node (EFN). A node generates alarm packet when it's Δ^i =1. An ESN which receives an alarm packet forwards it immediately. If it receives alarm packet again, it will drop it and keep silent. While, an EFN receives the alarm packet it will continue to send alarm packet until receiving acknowledgement, thus ensuring reliable notification of event.

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5G TECHNOLOGY

Introduction:

5G Technology stands for 5th Generation Mobile technology. 5G is a packet switched wireless system with wide area coverage and high throughput. 5G wireless uses OFDM and millimetre wireless that enables data rate of 20 mbps and frequency band of 2-8 GHz. The 5G communication system is envisioned as the real wireless network, capable of supporting Wireless World Wide Web (WWWW) applications in 2010 to 2015 time frame.

There are two views of 5G systems: evolutionary and revolutionary. In the evolutionary view the 5G (or beyond 4G) systems will be capable of supporting WWWW allowing a highly flexible network such as a Dynamic Ad-hoc Wireless Network (DAWN). In this view advanced technologies including intelligent antenna and flexible modulation are keys to optimize the ad-hoc wireless networks. In revolutionary view 5G systems should be an intelligent technology capable of interconnecting the entire world without limits. An example application could be a robot with built-in wireless communication with artificial intelligence. The 5G technologies include all type of advanced features which makes 5G technology most powerful and in huge demand in near future.

Key Concepts of 5G:

1) Real wireless world with no more limitation with access and zone issues.
2) Wearable devices with AI capabilities.
3) Internet protocol version 6 (IPv6), where a visiting care-of mobile IP address is assigned according to location and connected network.
4) One unified global standard.
5) Pervasive networks providing ubiquitous computing: the user can simultaneously be connected to several wireless access technologies and seamlessly move between them.
6) Cognitive radio technology, also known as smart-radio: allowing different radio technologies to share the same spectrum efficiently by adaptively finding unused spectrum and adapting the transmission scheme to the requirements of the technologies currently sharing the spectrum.
7) High altitude stratospheric platform station (HAPS) systems.

Conclusion:

5G network technology will open a new era in mobile communication technology. The 5G mobile phones will have access to different wireless technologies at the same time and the terminal should be able to combine different flows from different technologies. 5G technology offers high resolution. One can watch videos in HD clarity in mobile phones without any interruption. 5G technologies will change the way most high bandwidth users access their phones. With 5G pushed over a VOIP-enabled device, people will experience a level of call volume and data transmission never experienced before.

- Sneha Antony
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IMPORTANCE OF REDUCING REDUNDANCY OF PATTERNS IN TEXT MINING

Now days, the importance of data mining is highly increasing. Data mining is the process of extracting the needed information from large amount of data. This information is mainly in the form of texts, images, videos and audios. So we need to extract this information. Different methods using for this extraction are term based, closed set based and pattern based. 80% of the information is stored in text documents. Text mining is the process of extracting the information from the text documents. Text mining has different applications like online media applications, software applications, biomedical applications, security applications etc.

In the past decades several text mining methods were used, out of this pattern matching is the most efficient one. It is free from the problems of polysemy and synonymy. Pattern means it is the sequence of terms, a term can be either one letter or one word. Polysemy means a single word have multiple meanings and synonymy means multiple words having same meaning

Redundancy of the information is also important. If redundancy increases, it increases the number of frequent patterns, and it will also increase the requirement of memory space. So reducing the redundancy is an important factor. Different methods are using to reduce this redundancy.

Redundancy of Patterns

Redundancy is multiple occurrences of patterns or information. In frequent pattern mining, there is a chance of increase in the number of resulting patterns. This causes increase in the size of database using for storage.

Finding such frequent patterns plays an important role in mining associations, correlations, and many other interesting relationships among data. It will also help in data classification, clustering, and other data mining tasks as well. Association rule learning is a popular and well researched method for discovering interesting relations between variables in large databases. If the number of resulting patterns increases then the efficiency of creation of association rules decreases. In order to increase the efficiency, we need to reduce the number of selected frequent patterns by reducing the redundancy of information. Reducing the redundancy has the following advantages, such as:

- Reduction in the cost: - If redundancy is high it will increase the number of patterns, which will in turn result in the large amount of memory and time to manage these patterns. So reducing the redundancy will helps in the reduction of cost.
- Make the association rule efficient: - As number of patterns decreases, creation of association rule become easier.
- Reduces the time complexity: - As the number of patterns decreases, the time taking to generate the rules from them will also decreases.

Hence, it is clear that reducing redundancy of patterns is an important factor. Different methods are using to reduce redundancy. Different methods to reduce redundancy include lattice based, using certainty factor, by reducing antecedent size, using extended Huffman algorithm etc.

Redundancy is the multiple occurrence of patterns or information in these patterns. Frequent pattern mining is the important technique using to generate associative rules based upon the relationship between these patterns. Reduction of this redundancy will help us to reduce the storage space and in turn increases the efficiency. So reducing redundancy is an important factor.

Amrutha Benny
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SECURE DATA TRANSFER IN NETWORKED CRITICAL INFRASTRUCTURES

INTRODUCTION

Distributed systems play a major role today as they provide services in a reliable way. Critical Infrastructures (CI) are such distributed systems. They include information systems, telecommunication, banking etc. Secure communication is required here so that the data in transit through the complex communication links are protected from corruption. Critical infrastructures are spread over large areas, thus different parts of it require levels of security enforcement. Here, a layered encryption mechanism based on hash chain technology for protecting sensitive data is proposed.

EXISTING SYSTEM

Most of the CI were developed using legacy devices and were not designed with security in mind. So they have traditional networks in use as a result, they have a number of security vulnerabilities. Also there are issues of intruders, eavesdroppers who tamper with the data and information in transit through these systems.

PROPOSED SYSTEM AND FEATURES

The proposed model is acceptable for CI due to the advantage of been a lightweight solution. It gives importance to the security levels within such infrastructures and provides security layer wise not as a whole. Also it has fewer chances of errors and greater ease of deployment.

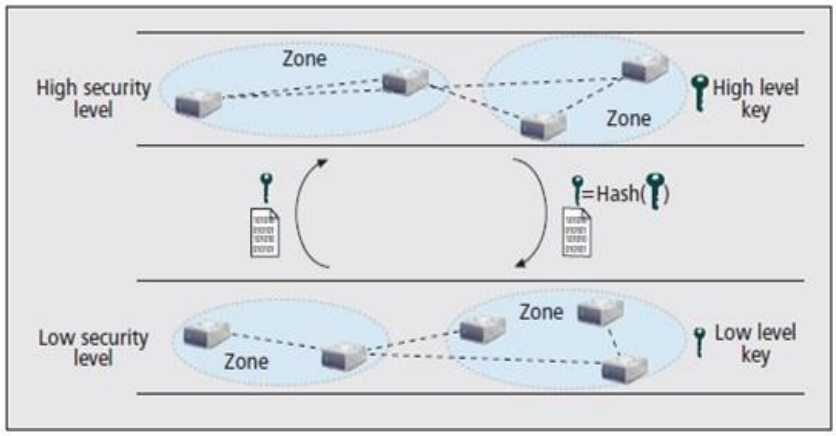
WORKING

In this technique CI system is divided into multiple hierarchical zones. A structure thus will have one or several top zones, which could be data centres, critical units etc. These zones are protected with strong perimeters. As we move down we have zones which require lesser security restrictions. Thus different network zones are given different security levels. We label zones with similar security defense measures with the same security level. Based on this either in-layer or cross- layer communication can occur. In this approach a one way policy is followed according to which higher security level zones can get lower level keys, but not vice-

versa. Thus the different nodes in zones first exchange their security levels and based on that decide pair keys for communication.

We adopt a key predistribution scheme which is done by a key management device. It generates secret identities for devices and also computes a hash chain and uses each component of the chain as the key for each device. After this, communication can be enabled by negotiating about key pairs between devices.

- If the neighbour's security level is higher than or equal to its own, it will use its key as the pair key to this neighbour.
- If the neighbour's security level is lower than its own, it will iteratively apply a hash function on the key according to the deviation value and get the result as its pair key to this neighbour.



After this exchange, a device stores all the neighbours' security levels and pair keys for secure communications. During exchange, the security level is transferred in plain text, so an adversary can also get this information. However, based on hash function, devices decide the key pairs locally, and do not transfer them back to neighbours, so the adversary cannot obtain secret information. Devices with the same security level share the same key, and a cross-level key can be obtained with the above rules. We also have an option of updating the keys and security levels of devices in case of any corruptions or attacks detected.

CONCLUSION

The proposed mechanism uses cryptographic techniques to protect sensitive data in Critical Infrastructures based on novel usage of hash chain technology.

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JISHA MARY JOSE
M.Tech.

Sentiment Classification: A method to identify subjectivity of text documents

With the widespread of internet and related services opportunities for people to share information has increased greatly. People around the world have found Internet as a new platform to share their experiences, opinions and knowledge on various topics. Online discussion groups, blogs, social networks, review sites, etc. are only some of these social media over Internet. One basic property of text shared over these social media sites is their sentiment. Identifying the sentiment conveyed by these texts and classifying them accordingly is one of the hot topics of research in recent years. These tasks fall into the area of sentiment analysis or opinion mining. Sentiment analysis (also known as opinion mining) refers to the use of natural language processing, text analysis and data mining to identify and extract subjective information in source materials. Generally, sentiment analysis aims to determine the attitude of a speaker or a writer with respect to some topic or the overall contextual polarity of a document. The attitude may be his or her judgment or evaluation, the emotional state of the author when writing, or the emotional effect the author wishes to have on the reader.

A basic task in sentiment analysis is classifying given text according to its sentiment polarity. This classification can be done at the document, sentence, or feature/aspect level, i.e., whether the expressed opinion in a document, a sentence or feature/aspect of an entity is positive, negative, or neutral. Another variation of sentiment classification looks at emotional states such as angry, sad, happy etc. A different approach to sentiment classification is the use of a scaling system whereby words commonly associated with having a negative, neutral or positive sentiment with them are given an associated number on a predefined scale; say -10 to +10 (most negative up to most positive). Feature/aspect-based sentiment analysis is a more fine-grained instance of sentiment classification. It refers to determining the opinions or sentiments expressed on different features or aspects of entities. A feature or aspect is an attribute or component of an entity, e.g., the screen of a cell phone, or the picture quality of a camera. This problem involves several sub-problems, e.g., identifying relevant entities, extracting their features/aspects, and determining whether an opinion expressed on each feature/aspect is positive, negative or neutral.

Machine learning techniques are being widely used for sentiment classification. These methods range from fully supervised techniques that utilize a labeled training corpus to unsupervised methods that make use of sentiment word lexicons like SentiWordNet and grammatical properties of text. Semi supervised methods that exploit the relatedness between words in target document and training corpus is also being used for sentiment classification.

With the proliferation of social media, online opinions have become an important aspect in determining the acceptability of products. Customers rely on online opinions to decide on the quality of products. Manufacturers rely on them to determine the customer opinion. Businesses can solely track positive and negative reviews of their brands with sentiment analysis. It also helps them measure their overall performance, especially on their online presence. Companies see sentiment analysis as a major aid in measuring sales and improving their marketing strategies as well. On the other hand, certain individuals can also get a lot from sentiment analysis, whether they are making a brand for themselves or just having that drive to know anything that regards to them. Artists, celebrities, famous authors and all other popular individuals can definitely benefit from the idea of sentiment analysis. They can simply know how they inspire the common public, how people react (negatively and positively) to any recent move they make and which of it triggers people's attitude towards them. An

ordinary person, say a fanatic or blogger, can also benefit from sentiment analysis. Automated sentiment analysis has therefore become an important research topic in recent years.

Neethu Kurian
M. Tech

NEURAL NETWORKS IN DATA MINING

Data mining is a widely used area where useful information is extracted from a large amount of data found in the data repository. Here data repository refers to data warehouse. A data warehouse has the capability of storing a large amount of data. Another advantage of using data warehouse is the application of techniques like data mining, OLAP, etc.

When an organization maintains a data warehouse simply as storage, there is no usefulness of the data residing in it. Instead of storing all the data together, it is enough to store only the useful data hidden behind the large amount of data. Data mining finds application in this area where hidden useful information is extracted from the large amount of raw data.

Data mining can be defined as a process or technique to extract useful information or pattern from large data warehouses. Now the question is how neural networks find application in data mining? The answer is simple. We know that data mining techniques are used for pattern recognition, and this can be done only through supervised learning or training. Neural networks employ training of neurons in such a way that it identifies a predefined output for a particular input. This training can be applied in data mining where an output pattern is known, the system or classifier (as referred in data mining) can be trained so as to predict the corresponding output. The training is called perceptron training.

Perceptron training involves a back propagation algorithm for determining the weights. A perceptron is considered as a neural network containing nodes in several layers. In each layer a predefined calculation is done based on the input obtained. Each neuron in a layer is connected to every other neuron in the next layer through a link which has some predetermined weight associated with it. The back propagation algorithm is used to determine this weight so as to obtain a certain output. The concept of perceptron is applied in data mining application where a classifier is trained so as to produce a certain output.

The most common action in data mining is the classification. Classification involves classifying a group of items into certain classes. So the classifier is trained using several samples of items and the classifier uses a learning algorithm to learn these patterns. Perceptron learning method is one of them. Then the classifier is tested using some testing samples and the output is verified. Thus in classifier there involves prediction of output. Data mining also involves pattern recognition.

Neural networks comprises of three pieces:

1. Architecture or model
2. Learning algorithm
3. Activation function

Neural networks are trained or programmed to store, recognize and actively retrieve patterns. It is this ability of a neural network which makes it a prevalent utility in data mining.

K S Radhika
M.Tech.

Fuzzy Type-ahead Search

Fuzzy Type-ahead Search is a new interactive, information access paradigm in which the system searches the underlying data records dynamically, as the user types in the query keywords. It extends Autocomplete interfaces by allowing keywords to appear in multiple attributes (in a random order) of the underlying data and finding relevant records that have keywords matching user query approximately. When searching for significant records, the system also tries to find those records that include words similar to the keywords in the query, in spite of the fact that they do not match exactly. Thus, even in the presence of slight inaccuracies, this framework allows users to explore data as they type.

The feature of supporting fuzzy search is particularly important when the user has minimal knowledge about the underlying data or the entities he or she is searching for. As the user types in more letters, the system interactively searches on the data and updates the list of relevant records. The system also utilizes a priori knowledge such as synonyms.

The main issue in implementing fuzzy search is the requirement of high efficiency in returning search results. Since each keystroke of the user could call forth a query on the backend, efficient algorithms are required to process each query within milliseconds. To make the search really interactive, for each input on the client browser, from the time the user presses the key to the time the results computed from the server are displayed on the browser, the delay should be as small as possible. This time delay includes the network transfer delay, execution time on the server, and the time for the browser to execute its JavaScript (which tends to be slow).

Providing high performance on a large amount of data is especially challenging because the query keywords are allowed to appear in any order and the on-the-fly join nature of the problem can be computationally expensive.

To these problems, several incremental-search algorithms can be availed for answering a query by using cached results of earlier queries. In this way, the computation of the answers to a query can spread across multiple keystrokes of the user, thus resulting in high speed.

A trie is used to index the words in the relational table. Each word w in the table corresponds to a unique path from the root of the trie to a leaf node. Each node on the path has a label of a character in w. Each leaf node has an inverted list of IDs of records that contain the corresponding word, with additional information such as the attribute in which the keyword appears and its position.

Type-ahead search is performed in two steps: Exact type-ahead search & Fuzzy type-ahead search. Exact type-ahead search using trie index can be done in a straightforward manner: For each prefix, there exists only one (if any) corresponding trie node. The candidate records are retrieved by accessing the inverted lists of its descendant leaf nodes.

Solving the problem of fuzzy search is perplexing since one prefix can have multiple similar prefixes called active nodes and they need to be computed efficiently. The leaf descendants of the active nodes are called the predicted keywords of the prefix. A caching-based algorithm is developed for incrementally computing active nodes for a keyword as the user types it in letter by letter. The idea behind this algorithm is to use prefix-filtering: when the user types in one more letter after p, the active nodes of p can be used to compute the active nodes of the new query. In case the user enters multiple query keywords, each query keyword (treated as a prefix) has multiple predicted complete keywords, and the union of the

lists of these predicted keywords includes potential answers. The union lists of multiple query keywords need to be intersected in order to compute the answers to the query. These operations can be computationally costly, especially when each query keyword can have multiple similar prefixes. There are many approaches to solve this problem. Its main idea is to use forward lists of keyword IDs for checking whether a record matches query keyword conditions (even approximately). An on-demand caching technique is developed for incremental search. Its idea is to cache only part of the results of a query. For subsequent queries, unfinished computation will be resumed if the previously cached results are not sufficient. In this way, a small amount of results are efficiently computed and cached.

Advantages:

- This method focuses on efficient query processing using in-memory indexes in order to achieve a high interaction speed.
- Fuzzy search produces relevant results even if queries are not cent percent accurate.
- Incremental caching technique in this method provides higher efficiency.

Remi S
M.Tech.

User Authentication in VANETs

INTRODUCTION

Vehicular Ad hoc NETworks (VANETs) are an emerging research area and also one of the most relevant forms of mobile ad-hoc networks. VANET vehicles will be capable of storing and processing great amounts of information, including a driver's personal data and geo-location information. VANET vehicles are equipped with processing, recording and positioning mechanisms with a potentially infinite power supply.

VANETs enable node-to-node and node-to-infrastructure communication, thus communicating nodes are either vehicles or base stations that can exchange information. Mainly there are three types of VANETs' messages: warning messages which are used to prevent detected risky situations, traffic management, and added value which provide Internet services.
In a VANET, the network can be accessed by all nodes, so messages sent by one node are available to all other nodes that have joined the network thus easing packets' eavesdropping. One of the most important challenges in VANETs is to enforce security and privacy.

Several techniques have been used for user authentication in VANETs, such as Trust Extended Authentication Mechanism (TEAM), Timed Efficient Stream Loss-tolerant Authentication (TESLA), Elliptic Curve Digital Signature Algorithm (ECDSA), Challenge Response Authentication using Digital Signatures, etc.

1. Trust Extended Authentication Mechanism(TEAM)

TEAM is a decentralized lightweight authentication scheme for vehicle-to-vehicle communication networks. It only uses an XOR operation and a hash function hence called as a

lightweight authentication scheme. TEAM requires only a few storage spaces compared to other schemes because the vehicle does not need to store the authentication information (e.g., public key) of the entire vehicle.

2. Timed Efficient Stream Loss-Tolerant Authentication(TESLA)
TESLA is an efficient authentication technique that can be used instead of Digital signatures in VANETs. In order to ensure that the sender is an authenticated source of message TESLA uses symmetric cryptography with delayed key disclosure. It can be used as an authentication mechanism for broadcast and multicast network communications. Since symmetric cryptography is much faster than signatures, delay can be avoided. Hence TESLA can be used to overcome most Delay-of-Service attacks, but does not guarantee a great protection against Denial-of-Service attacks.

3. Elliptic Curve Digital Signature Algorithm (ECDSA)
It is a mathematical representation for the elliptic curve analogue of the DSA. It has been accepted as a standard worldwide. It is an ANSI standard, as well as IEEE, NIST and ISO standard. The strength per key bit is significantly greater in an algorithm using elliptic curves because elliptic curve discrete logarithm problem has no sub exponential-time algorithm. Being a mathematical entity, the security of elliptic curve can be described in mathematical terms only. The computational intractability and mathematical hardness of the ECDLP contributes towards its security.

4. Challenge Response Authentication.
In Challenge–Response Authentication when the receiver receives a message he sends a challenge to the sender. As a response, the sender transmits his location and a timestamp to prove its authentication. Infrared rays are used to send the response hence it is impossible to modify the information transmitted since the response travels at speed of light. When the receiver gets the response and validity of the safety message will be established. The values of timestamps are compared by the receiver in both cases. Thus in this way, Challenge–Response Authentication avoids the chance of fraudulent messages and maintains the integrity of the system.

Conclusion

The security in VANET is an area that has not received much attention. It is effective to consider the various threats associated with wireless communication for the smooth flow of traffic. User has got critical importance in security concerns of VANETs and has to be implemented effectively.

Remyakrishnan.P
M.Tech.

VIRTUALIZATION

INTRODUCTION

Virtualization is creation of a virtual form of something. It could be a virtual computer or hardware, operating system, storage device, computer networks etc. A virtual machine is a software system that runs an operating system and various applications. Each virtual machine contains its own virtual software, hardware, including a virtual CPU, memory, hard disk etc. Because virtual machines are decoupled from specific underlying physical hardware, virtualization allows us to consolidate computing resources such as CPUs, memory, storage into pools of resources that can be dynamically and flexibly made available to virtual machines.

BENEFITS

- Save hardware cost and footprint
- Take advantage of Operating System Services
- Make use of Multicore Processors
- Increase system security
- Simplifies and scales IT infrastructure and administration
- Power savings

TYPES

- Hardware virtualization
- Desktop virtualization
- Memory virtualization - Virtual memory
- Storage virtualization - Virtual file system and disk drive
- Data virtualization and Database virtualization
- Network virtualization

Jisha Mary Jose
M.TECH.

QUESTION ANSWERING SYSTEMS

INTRODUCTION

The World Wide Web is a huge, widely distributed, global information service centre. Users find it difficult to navigate the wealth of online information. What a current information retrieval system or search engine can do is just "document retrieval", i.e. given some keywords it only returns the relevant ranked documents that contain these keywords. Information retrieval systems do not return answers, and accordingly users are left to extract answers from the documents themselves. The need for automated Question Answering (QA) systems, that allow a user to ask a question in everyday language and receive a quick and precise answer, has become more urgent in this context. The present search engines return a ranked list of documents, but not the exact answer. A Question Answering system addresses this problem.

SYSTEM FEATURES AND ARCHITECTURE

Typical search engines like Google accepts keywords and retrieve the related documents and links. In contrast, a QA system presents the exact answer. Present day QA system is composed of mainly 3 phases, namely question processing, document processing and answer processing. A typical QA system consists of three distinct modules, each of which has a core component beside other supplementary components: "Query Processing Module" whose heart is the question classification, the "Document Processing Module" whose heart is the information retrieval, and the "Answer Processing Module" whose heart is the answer extraction.

Question processing is the module which identifies the focus of the question, classifies the question type, derives the expected answer type, and reformulates the question into semantically equivalent multiple questions. Document Processing Module includes the normal document retrieval by a search engine. Answer extraction is the final component in question answering system, which is a distinguishing feature between question answering systems and the usual sense of text retrieval systems. Answer extraction technology becomes an influential and decisive factor on question answering system for the final results.

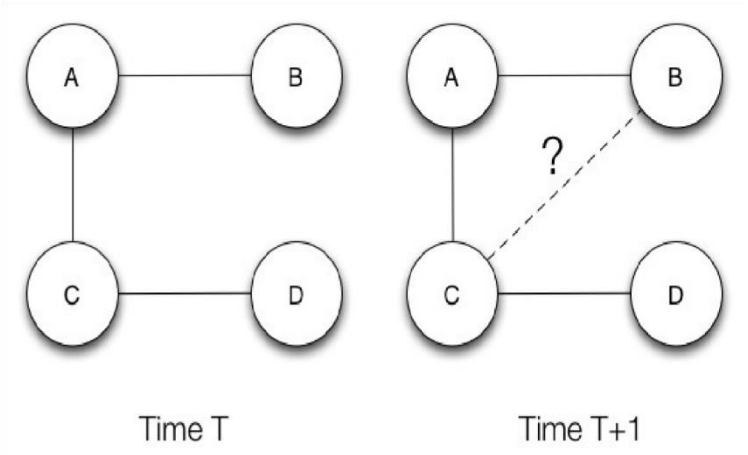
CONCLUSION

QA systems have been extended in recent years to encompass additional domains of knowledge. For example, systems have been developed to automatically answer temporal and geospatial questions, multilingual questions, and questions about the content of audio, images, and video. Current QA research topics include knowledge representation and reasoning, interactive QA, social media analysis, sentiment analysis etc. QA systems like DuckDuckGo.com, Wolfram Alpha, Ask.com, etc. are some of the major examples of Question Answering systems.

SREELAKSHMI V
M.TECH.

Link Prediction and its Applications

Alice joined a social networking site and she was wonder struck, because the system started to suggest her friends. You might also have experienced the same. Most of the mainstream social networking sites like Facebook, LinkedIn, Google plus and Myspace have this feature. Have you ever thought how this works? This is one of the latest technologies where a lot of researches are going on and it is named as "Link Prediction". We can define link prediction abstractly as, given the state of a social network at present time, the system will predict the future states. Though it seems easy at first, this is not an easy task. As per the latest information available, facebook has 1.9 million active users. Suggesting every possible links is quite complex. Various algorithms are there to make this task efficient. Before discussing the techniques, let is check how users and their relationships are represented in a social network. The easiest and the most common way to represent these kind of data is using a graph data structures, where nodes represents users and links represent the relationship between them.



Consider the given figure, which represents the state of a network at two times; T and T+1. There are four users A, B, C, D. Users are represented using nodes and the relationship between them are represented using an edge between them. If there is an edge between node A and node B that implies that they are connected at time T. So what link prediction does is that, it will predict whether there is any chance for a link between C and B at time T+1.

Localized link prediction- Friend of a Friend Algorithm

Friend of a Friend algorithm (FOFA) is one of the earliest and simplest technique that exists. The prediction is much simpler. Consider two users, say, Alice and Bob working in the same organization. Then there will be circle of friends common to both of them. So FOFA works be calculating the common friends between Alice and Bob. If the number goes above a certain threshold, the system predicts that 'Alice is friend of Bob'. It is interesting due to its simplicity, but there are some drawbacks for this. This technique just considers the number of friends and there are of course a lot of things that determines the friendship. Also FOFA technique is a localized one, which means, it doesn't consider a path length greater than two. During the primitive stages of social networking, this approach and its variants were extensively used. Some other examples for the localized approaches are Jaccard Index, preferential attachment index etc. These all are easy to use and understand but they fail to view the whole structure of network.

Global Link prediction approaches – Random Walk

As the name implies, in global link prediction approaches, it consider the whole structure of the network. One of the important global link prediction technique is based on the concept of random walk. In RW, suppose we are interested in predicting link of a particular node, the principle is that a 'random walker' will be released from that particular node and will be

allowed to walk freely through the network. Initially equal probability will be given to each of the connected node. As the walker continues walking through the network, the probability to each node changes. But after completing a long walk (infinity), this probability will reach a constant state. This particular state is called as steady state or stationary state and has a great importance. A higher probability to a node indicates the possibility of forming a new link between that node and the initial (starting) node.
Based on this steady state probability, the system will start suggesting new links.

Applications of Link prediction

Suggesting friends in social network is just a simple example for link prediction. There are a lot of areas where this technology is being used. Several variants of link prediction are used for ranking webpages by a search engine. Link prediction have an extensive application in bioinformatics for protein-protein link prediction. Proteins do interact with each other and they can be represented using network structures. Identifying missing links or new interacting proteins are of general interest and link prediction and its variants are used for the purpose. Government use link prediction in their crime and prevention departments, because this technique can be used to identify criminal and terrorist links. In research communities' link prediction are used for identifying authors with general interest and same research area where online stores and markets use this technique to predict which all goods their consumers will buy in near future, so they can make a good stock.

So we have seen link prediction is an important area in computer science and have extensive applications over various domains. Its application ranges from suggesting friends to predicting sales for corporates.

MANU
M.TECH

An interview conducted with the CEO of TechnoVia Solutions, Mr. Nishanth Ravindran.

Question: Sir, being an alumni of Rajagiri, we'll start with your college life. Can you please just brief about your college life?
Reply: I was in the fifth batch of Rajagiri. Being in the IT department, I was given enough freedom to grow and develop my technical skills. I ensured to maintain a very good company with all the faculties, staffs and management. My mini project, 'Pragathi', an examination management software is still in use in the college. Rajagiri has served for me as a very good platform for an over-all development. It is because of this reason that I still have a healthy relation with everyone there.

Question: Has Rajagiri life influenced you in developing your personal and professional life?
Reply: Of course. I have viewed RSET as a student, alumni, faculty and client. So, ever since 2005, I've been knowing and serving RSET. Hence, RSET has influenced me a lot. Four years as a student, the college helped to cement the basics of my knowledge in the field. As alumni, I still have contacts with all the friends and faculties of mine who still helps me a lot in many ways. As faculty, I could pass on my knowledge to my students and all the interested students. And as a client, I could help to provide software 'Pragathi', which serves as an examination management system in the college.

Question: The best teacher in your life?
Reply: Like I said, I was having a good relation with most of the faculties in my college. I learnt a lot from everyone. It is hard to specify a single name. All of them have taught me many new things. Still then, I must specially mention the name of Fr. Alex, who was the then director. He really motivated and helped me a lot in setting up an incubation centre in RSET itself. I must also mention the name of Mrs.Kuttiyamma, the HOD of IT department. She has really helped me a lot in many worst cases of my life. Principal Dr.Isaac and many others have influenced me in my academic, personal and professional life.

Question: What was your motivation in starting your own company?
Reply: Passion. When passion overrides everything, you can make wonders happen. I had this strong desire of starting up a new company. Initially I was alone. I had to ask my parents for a time so that I can prove myself (I am not sure on how much I could convince them even now!). I did not want to be the part of a crowd and work for some unknown client in some unknown region. When I do my work, I wanted to know the in and out of what all are happening. I realized that a laptop and an internet connection is all what you needed. I didn't thus have trouble with any initial investments. I set up my company in 2010 as a three member company, taking up a small space in Kakkanad. Later, my company was shifted to RSET, where we were given the full freedom. We conducted training sessions for about 48 selected students studying there. Internships were given to them after the class hours. They were given training regarding software development, content writing, marketing and other such areas of interest. All these happened because of a passion. I'm now able to employ about 20 people here. All these wouldn't have happened if I had ran behind the mass. Confidence and passion were the elements that motivated me.

Question: What is your advice to the parents of those students who are interested in setting up a new company?
Reply: I'm not a person to give advice to parents. But as a suggestion, I would say, give your ward some time to prove them. Let them take the time and if they couldn't prove within the time, give an extension! Give more and more extension in time and support to those who are interested. There are only a few people that are interested in standing out of a crowd. And if your child is one such person, allow him/her to chase his/her dreams. They can make wonders happen. Never shackle them up in chains and never force them to fulfill your dreams on their lives.

Question: Can you please talk about your latest project 'City on wheels'?
Reply: TechnoVia Solutions is having clients across the country. We have clients from US, UK, Australia. But to get recognition within our country, we needed to do something innovative, which will help even the common man. Something, that even the commoner will also consider as an asset. I considered the already existing technologies in this field and the competitors I'll have to face. Then I understood that IT is strongly required in the transportation field, but is the least used there. We use IT only for ticket booking, checking the time and all. Why not implementing something, that can reach even the minority population? Thus I considered the needs and challenges in the transport sector. The challenges in buses are mainly the availability of coins. The daily quarrel between the conductor and people can be avoided if proper technology is implemented. This was how the idea 'city on wheels' was shaped.
Consider the scenario where you get into a bus and you do not have the exact change. You need to argue with the conductor. Sometimes he gives back the money after a long fight and sometimes you just leave it. Issuing a Wheel card will let you avoid such a problem. You needn't carry coins anymore for travelling. Just recharge it, and each time you want to pay, just swipe the card. In this way it helps both the conductor and the passenger.

We are in a way implementing a go-green concept too. Since you are having a card with you, you'll consider and prefer to use the public transport system than your personal vehicle. And because only the exact amount can be deducted from the balance credit, the passenger needn't worry about a loss of money, if he does not have the exact change. So, this ultimately ensures the social commitments.

Question: Did the bus owners and workers agree to this? Because, in a way wont this lead to unemployment of many conductors?
Reply: It was a tedious task. I had to struggle for about 6-7 months to convince the bus associations about the relevance of this project. But in the end, three out of four associations agreed for this. All what I needed was to prove that this can practically be implemented. I believe that the rest of the owners across the state will also agree to implement this if it becomes a success here.
And, no! This will not lead to unemployment. In a state like Kerala, authorities won't allow us to even think of implementing a project that will affect employment opportunities. The software is implemented on the already existing device that the conductor uses even now. City on Wheels will not affect the conductors. In fact, it will ease their work. Like I said, this is not static. So to swipe the card and to recharge the card, you need the service of a conductor. In fact, you can tender the exact change also if you do not have the card. Again, you will need a conductor. So this will not affect the employment opportunities.

Question: Isn't this project a replica of the idea behind the billing of metro?
Reply: Not exactly. Metros use a static system. We swipe the card before getting in and the machine is situated in every stations. This is not practically possible in case of buses. Consider the huge amount of money required to set up the swiping machines in each bus stops! City on Wheels makes use of the machine on running vehicles. The internet facility attached to each of the machines makes it easier to identify the location and issue the bill. So, both are working on two different concepts.

Question: The challenges faced on the implementation?
Reply: The challenges were huge. We had to ensure that it does not affect the current employment opportunities. The system cannot be implemented as a static one. The transport system in Kerala is not controlled by a single authority. Hence we had to convince the four private associations and the government. The issues during the settlement of transactions were another major challenge, because the correct amount had to reach the current bus owners immediately when the transaction was made. We had to update the transaction in the central server and in the bank server. Above all, the idea must reach each and everyone.

Question: Why the name 'city on wheels'?
Reply: Wheels, as the name suggests, 'are for propelling'. It is not restricted only to transport system. This project is to boost the public transport, to solve the traffic congestion and to motivate a go-green concept even by maintaining the comfort level. On a long term perspective, this will ensure a green earth. The wheel card will serve as a multi-purpose card. Phase-by-phase, this will come in all the fields and not just in

buses. Like in our flag- the Ashok Chakra in the centre says, it is our duty to save the mother India. So with the green concept we are in a way protecting our mother Earth. One of the greatest revolutions in history is the invention of wheels. It made the work easier. In most instruments we find wheels. Our concept is to revolutionize the entire city. So, a reference on wheel is to indicate that we are implementing software that is ecologically sound and is indented to revolutionize the state for a better tomorrow.

Question: What all are your future initiatives?
Reply: Since the past 8 months, we have been focusing on this project itself. So our main future initiative now is to implement this technology in various other sectors and expanding the same in all the districts. We are planning to introduce the same in all the sectors possible.

Question: The ultimate goal in your life?
Reply: To accomplish many good projects that will take TechnoVia to a greater height. Another main goal is to make the product known by the company name and to reach even the commoner. To get an identity and to expand the company by bringing up new services; to try out variety of demands and to ensure quality services; to ensure more social responsibility than just a business motive; to come up with more quality products than just a profit motive.

Question: What is your opinion about Entrepreneurship? And, what is your advice to the youth?
Reply: Each and every child who is interested in starting up a new company must come forward for the best. I must say, maximum number of interested students must come up. Be an employer and work for yourselves. Chase your passion. If many start-ups come, more employment opportunities will be there. This will help a lot of passionate students graduating each year. One main advantage of working in a start-up is that you will know the in and out of the project. Even in the absence of your co-worker you can complete the work, since the work is not divided. You'll survive in all the circumstances if you be an employer and become an entrepreneur. Make a team with a strong passion and work hard with confidence, and then you'll survive. Take failure as an experience. Rectify the mistake of yesterday and correct it. Never make the same mistake twice. Today's mistakes will count to your success tomorrow. Never go down because of failure and never get excited when success strikes your door. Sometimes you may not be able to meet the requirements and you'll be stressed out. But never take that to head seriously. Aim and move for the best. Have confidence and begin the work. Never look back and regret on the doors you have once closed behind. Take safer risks and never give up. Each time you want to take a new decision, consider the worst case, understand it and work out new things. Success will be yours!!

Interviewed and compiled,
Elizabeth Jacob
Bivil M Jacob

Faculty Publications in the year 2013

- Seena Mary Augusty and **Sminu Izudheen**, "A Survey: Evaluation of Ensemble Classifiers and Data Level Methods to Deal with Imbalanced Data Problem in Protein-Protein Interactions", Review of Bioinformatics and Biometrics (RBB) Volume 2 Issue 1, March 2013.
- **Dhanya P M** and Jathavedan M," Comparative Study of Text Summarization in Indian Languages", International Journal of Computer Applications 75(6):17-21, August 2013.
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Workshops conducted by the department

3-day workshop on Network Simulation with NS2

The department of Computer Science arranged a 3-day workshop on Network Simulation with NS2 for S4 and S6 CSE students from January 9 to 11, 2013. It was inaugurated by Mr. Prince Joseph Scientist F, NPOL.

Workshop on Introduction to web design tools

Cyberblitz organized a workshop on Introduction to web Design tools (HTML, CSS, JavaScript) for the students of S6 and S8 computer science on February 7, 2013.

3-day workshop on Open source Academic Tools

Mr. Jose Cyriac Chief Secretary inaugurated the Three day workshop on Open Source Academic Tools which was conducted from February 22-24, 2013. The workshop highlighted the applications and advantages of using open source tools for academic activities. It also familiarized the audience with the role of open source tools in research.

2-day workshop on CASE tools

Department organized a 2-day workshop on CASE tools on November 19 and 20, 2013. Dr. Sobhana N.V, Professor and Head, Department of CSE, RIT Kottayam inaugurated the workshop.

Placement Details

Name of the Student	Company
Achuth Krishnan S	Wipro
Agile Jacob C.X	Digital Nirvana
Aida Ann Issac	Wipro
Aiswarya P.Krishnan	Wipro
Ajo Joy	HCL
Akshay Abraham OOmmen	Infosys
Amala Paulson	Wipro
Ammu Thomas	HCl
Amritha V	Wipro
Amritha S	CTS
Amritha Janardanan	Wipro
Amrutha Florence Raphel	CTS
Anitha Mathew	Wipro
Anjali Narayanan	Infosys
Annie Jose Kailath	Mphasis
Anupama S	Wipro
Ashi Rashid	Wipro
Aswathy P.Sreevatsan	Infosys
Aswathy R	Wipro
Atheena Celin Benny	Wipro
Bedwin Taitus K	CTS
Binu M.G	Wipro
Cicily Athira C.X	RMESI
Cimuron Saviona Paiva	CTS
Daise Rosaline Pradeep	HCL
Deepa Williams	CTS
Deepthi N	Wipro
Eliza Thomas Alapatt	CTS
Elizabeth Thomas	Sutherland
George Jacob Kappen	Muzaris
George P.V	Telenova
Georgi varghese Kurian	HCL
Ginu Mary John	CTS
Gittu George	Sriram
Heera Anil	Infosys
Helen Hendry	COLAN
Hitha Raju	CTS
Jaisymol P.James	Poornam
Jeevadas K.Y	Poornam
Jeffy Jose	CTS

Jobis Jacob John	Wipro
Jose Zacharias	Wipro
Kiran Kurias	CTS
Kochu Tresia Vincent	Wipro
Lakshmi K.U	Wipro
Lekshmi C.S	Infosys
Lidiya Ross George M	IBS
Liya Jose	CTS
Liz Martin	CTS
Maria John	Infosys
Mariya Jose Kuriyan	CTS
Meera Antony	CTS
Melvin J.Tomy	CTS
Merin George Pennezath	CTS
Merin Susan Thomas	CTS
Merlit Jose	CTS
Mobin Philip Mathew	CTS
Munna rae Lukose	Poornam
Nakul Joseph	IBS
Namitha Ema jacob	GET Your SOLN
Nazneen Musthaffa P	CTS
Neenu Varghese	Wipro
Nidhin Kurian John	CTS
Praseetha P.K	HCL
Rajeswari M.C	RMESI
Reemy Roy	CTS
Remy Jacob	CTS
Reshma Santhosh	CTS
Rini Rajan	CTS
Rintu Koikkara	CTS
Roshni George	CTS
Sachin James	Ernest & Young
Safall T. Kamaruddin	CTS
Sai Syam	CTS
Sajo Joseph	ALUMNI
Samir Zachariah George	GET your SOLN
Sanjay Thomas	Infosys
Sankar G	CTS
Sethulakshmi V	CTS
Sheethal babu	GET your SOLN
Sherin Mary Alex	GET your SOLN
Shilpa Joseph	Wipro
Soumya Mathew	Infosys
Sruthi Thomas	Subex

Thomas Cherian	Wipro
Thomas J.Padamadan	CTS
Thomas Sebastian	Infosys
Thomsy William	CTS
Tony kappen	HCL
Treesa Mary N.J	CTS
Veena Thomas	Wipro
Vidya Neelakanda Iyer	Infosys
Vimal	COLAN
YohanJoseph	CTS

Rank details

M.Tech. Rank Holder of 2010 - 2012 Batch.

Mr. Mahalingam P.R.

IInd Rank - M.Tech. Computer Science & Information Systems.

Paper Presentation by B.Tech Students

Ann Mary Sebastian Chinnu Tresy James	Nakshatra, Saintgits college of engineering and Ascend, Saintgits college of engineering (Cancergene identification using graph centrality)	Tech fests
Amritha Jose	Abhiyanthriki 2012 (Artificial Vision Through Prosthetics-Bionic eye)	Tech fest
Bivil M Jacob	Fugeniz, Sree Narayana Gurukulam College of Enginnering Kolenchery and Advaya-Xtreme, Government Engineering College Idukki. (Blue brain project and its possible applications)	Tech fests

Cultural Achievements by students

Ragam'13 Conducted by NIT Calicut	Anjali Narayanan	15-17 March 2013	Third Prize for Duplicate,
NAALAM'13 Conducted by NUALS	Anjali Narayanan Aswathy P.S	2013	Second Prize for Duet Dance

Entrepreneur Initiatives by CSE students

	Students
Innowaves http://innowavesmedia.com/	Mathew John
Insta Software Solutions http://www.instasoftwaresolutions.com	Varghese

Inauguration report of Cyberblitz

Cyberblitz is the association of Computer Science Engineering department of RSET. Cyberblitz plays its role of giving opportunities and exposure for the young minds of Computer Science department to the tech world through different events. 16th August 2013 was a special day for the CS department of RSET. The association, Cyberblitz was officially inaugurated on this day.

The inaugural function started by invoking the blessings of the Almighty. Sachin Joseph, the president of Cyberblitz welcomed the dignitaries of the function. The chief guest of the function was Mr. Sudheer Mohan. He was accompanied by Dr.Antony Kariyil CMI, director, RSET, Dr.J.Issac, Principal and Ajith.S, HOD, department of Computer Science.

Rev.Dr. Antony Kariyil CMI, director, RSET addressed the gathering. He shared the thoughts from his experiences. He reminded us the impact of computerization in the modern world. The importance of quality education and the need to focus on academic excellence was emphasized. He suggested arranging seminars, symposiums, exhibitions etc. to attract attention of youth.

The Principal, Dr.J.Issac in his address speech talked about the great advantages of getting higher education in good colleges. He advised the Cyberblitz community to rise up to the expectations in order to meet the NBA accreditation. He also remarked that Mr.Sudheer Mohan is a dedicated and hardworking person who has been continuously working for WIPRO since past 13 years.

HOD of CS department, Mr.Ajith S addressed the gathering and expressed his thanks to Mr.Sudheer Mohan for taking up the initiative to come to Rajagiri to give a technical talk.

An interactive session with Mr.Sudheer Mohan was the highlight of the inaugural function. He shared his experiences in the IT industry. He joined WIPRO as a trainee engineer after completing mechanical engineering. He told that he have been working with WIPRO for many years. He advised the students to learn things rather than studying. He stressed upon the art of developing technical skills and articulation. He

talked about SMAC. SMAC is an abbreviation for social, mobility, analytics and cloud. SMAC changes the way of business in future. He urged to get higher exposure to the outside world. He asked questions on Big Data Analysis. One of the student answered that Big Data Analysis is the analysis of large amount of data in an efficient manner so that it can contribute to business. Mr.Sudheer Mohan outlined the importance of reading newspapers, having continuous updates in social and technical fields. Relevance of cloud, big data etc. were discussed in detail.

A memento was presented to the chief guest, Mr.Sudheer Mohan by our Director, Dr.Antony Kariyil CMI. The prizes for the technical quiz conducted by Cyberblitz on 13th August 2013 were distributed by Mr.Sudheer Mohan. The prize winners were Anagha Umesh of S3 CS Alpha and Paul Jacob V of S5 CS Beta. Bivil M Jacob, secretary of Cyberblitz delivered the vote of thanks.

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