CHRIST
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DEPARTMENT OF COMPUTER SCIENCE

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GATEWAYS 2018

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From the HOD's Desk

Prof. Joy Paulose

Throughout its fifty years, CHRIST (Deemed to be University) has aspired to satisfy its vision, "Excellence and Service". The institution continues to be the nurturing ground for an individual's holistic development through its guiding principles.

The Department of Computer Science provides an environment of academics and co-curricular activities so that students have the opportunity to develop their leadership and soft skills by organizing various events such as the national level IT fest - Gateways and bring out their originality by contributing towards the bi-annual IT magazine, Infobahn among various others.

This is an exciting year for the department, as Master of Computer Applications (MCA) programme celebrates its silver jubilee and recognizes its alumni in achieving their desired goals. This year, the theme for Gateways is 'Gamelligence' which is the application of gaming concepts in non-game contexts, thereby creating an enjoyable learning atmosphere.

Thus, I take pride in having students who are technically, scientifically and analytically sound, who adjust themselves easily to the dynamically growing environment and compete with the world with great enthusiasm and strive for success.

I wish all the students very good luck in all of their future endeavors.

From the Editor's Desk

Vipul Agarwal
5MCA

Greetings! Postgraduate students of the Department of Computer Science are often recognized as technical people, engrossed in laptops and always into coding but nothing non-technical. To break such stereotypes, we organize a national level IT fest Gateways, where we release the first issue of this bi-annual IT magazine, Infobahn.

The students of MCA and MSc(CS) programme contribute articles, poems, crosswords and artwork which shows the other side of the so-called "technical people". Such a contribution by the faculty members and students portrays their thought process which comes out in the form of creativity.

Keeping in mind the theme for Gateways 2018, 'Gamelligence', the magazine has been drafted with great enthusiasm with contributions that highlight the theme. 'Gamelligence', commonly understood as anything related to gaming, is a wide pool where various applications of gaming concepts are used in non-game concepts to provide various solutions and highlight it as a boon if used wisely or a bane if used destructively.

The Infobahn team has worked vigorously, keeping no stone unturned to raise the standard of the magazine with every release. The magazine surfaces the upcoming trends in the IT industries, focusing on the future of the IT world. Highlighting the use of gaming concepts, it brings to the fore, the creative excellence of the students of the department.

I hope this issue of Infobahn brings along a lot of motivation and learning to all its readers.

Face Recognition System

Dr.V.B.Kirubanand

FACE RECOGNITION USING PRINCIPAL COMPONENT ANALYSIS:

Face Recognition should have the capability to tolerate variations in the faces. The human face is not a unique and rigid object. There are billions of different faces of which each face assumes a variety of deformations like inter personal and intra personal.

Interpersonal variations may be due to genetics, race etc. while intra personal variations could be of aging, expressions, facial wear, cosmetics and deformations and moreover, the output of detection and recognition system should be precise. The use of facial recognition range from controlled "mugshot" verification to uncontrolled face identification with a confused scenario. The most sought after problem could be based either on location and shape of facial attributes such as nose, eyes, lips etc.are the overall analysis of the face image that represents as a weighted combination of a number of canonical faces. This face recognition system also has some drawback in identifying a face captured from two divergent perspectives and under lighting condition. The face itself is and abundant measure for identifying a person among a great quantity of identities with high level certainty. For a Facial Recognition system to function proficiently, it ought to spontaneously:

1. Perceive and trace the face in the image
2. Identify the face from any position

Popular Recognition Algorithms encompass Eigenface, Fisherface, Hidden Markov model etc.

EIGENFACE BASED FACE RECOGNITION:

Eigenvectors are formed by extracting the main features of the face. The images forming the database are projected onto the major eigenvectors and then the values are computed. In the recognition stage, the projection value of the input image is also found and the distance from the known projection value and calculated Neural Network Based Face Recognition. A similar strategy is focused here as in the preceding viewpoint which are later laced into the neural network unit to practice it on those vectors. The awareness that is acquired is manipulated for identifying current input images. The training and recognition faces can be executed using numerous neural network models and algorithms. Eliminating duplicate id's, verifying identity, criminal investigation are some of the uses of face recognition system. The benefits are accuracy, non-invasive, cost effectiveness; use of legacy data often is the only appropriate bio-metric and finally built in human back up mechanism.

The Man and the Intelligence

Prof. Nandhakumar K G

The level of intelligence, knowledge and skills are epistemological components which differentiate human beings from other creatures. The growth of above said components are continuous and never ending from the prehistoric period to the present. Man knows from the perception and accumulation of perception, yields knowledge, application of knowledge is skill, and the very smart way of application of knowledge and deep thinking on knowledge jointly takes us towards intelligence. Achievement of intelligence is based on its roots which are spread across the disciplines of anthropology, education and psychology. In the past twenty centuries, humans have crossed various turning points in terms of gaining more intelligence. Intelligence is often considered the central point of epistemology as well as the indicator of human development.

Every concept has two major perspectives: ideological perspective and materialistic perspective. These two perspectives are more or less connected with the qualitative approach and quantitative approach respectively. The two approaches are complementing, supplementing and contradicting each other. They travel together over centuries. The concept of intelligence also has these two perspectives in terms of meaning, measurement, and outcomes. Nowadays, measuring everything has become the nature of human beings. Man wants to scale the input, benefit, and loss of each and every action, moment, object and incidents under personal, professional and social circumstances. He wants qualitative quantity as well as quantitative quality because of his materialistic perspective. The psychologists have derived some indicators to measure the intelligence of human beings. All those indicators are merged with three major components of intelligence namely IQ (Intelligence Quotient), EQ (Emotional Quotient) and SQ (Spiritual Quotient). IQ is a measure which shows the level of intelligence of a person. There are numerous tests to evaluate a human's capability of understanding, memory power, reasoning and problem-solving skills. A person is required to possess some minimum score in IQ tests in order to claim himself a normal human being.

Life of any human being is filled with different kind of emotions such as happiness, sadness, anger, hesitation, negligence, loneliness and many more. Management of these feelings in different situations is very vital for both educated and uneducated people. Since people face a variety of situations throughout their life, EQ is also inevitable. It is highly essential in the business and corporate fields in order to improve human resources. In this hasty world, everyone needs to manage their emotions according to the circumstances. EQ is the indicator of smartness in handling one's own emotions and feelings. The difference between IQ and EQ is the mixture of knowledge and feelings. In IQ, knowledge has more contribution than feelings. In EQ, feelings have more contribution than knowledge. The later will handle the former. The mixture is filled up equally.

At present, the world is highly competitive, result oriented, expects success and benefits always. These high expectations lead the human beings towards anxiety and stress. Man gets the opportunities to survive through his IQ and applies his EQ for continuous survival. Still, he is forced to

compete with others because of a highly materialistic society. To regain his joy, peace, and happiness he needs to have SQ also. The term Spiritual Quotient is the indicator of a person's intelligence in the spiritual world. SQ is filled with ideologies of theology. Humans are social animals. Though he is scientifically advanced and developed, he needs some supernatural concepts to console himself. It is an intangible feeling and like a moral support. Any person who is suffering from problems and situations will definitely expect such kind of support and willpower through divine thinking. SQ indicates one's own smartness on such divine and spiritual thinking. It is also considered by the corporate world in order to enrich the human resource.

The qualitative components of human intelligence now become the quantitative factors. They influence our day to day life. We are in the position to improve our IQ, EQ, and SQ for better survival because we are living in a highly materialistic world. We are forced to compete; we are forced to prove ourselves in terms of knowledge, ability, skill and financial matters. So knowing about the SQ and trying to improve the same would give more peace and meaning to our life. Naturally, we have a certain amount of IQ, EQ, and SQ, but, to prove that a man has this much of intelligence in a particular type, he needs to undergo psychological tests. In such a way we try to quantitatively measure the qualitative components of the human life. In this technological era, these natural things are being created and handled artificially by computers for various reasons. The artificial intelligence will also face the problems like humans, to a certain level. We may expect perfect humanoid robots with IQ, EQ, and SQ in near future.

Gamification and its Areas of Application

Dr. Sivakumar R

Gamification is making use of gaming concepts and techniques in a non-gaming domain like education, learning, business and societal challenges. It is used in every aspect of our life and in various real-world situations. In business, gamification is used in different organizational processes and it helps in motivating and improving the performance of the employees. Gamification in learning provides an informal learning environment which gives a better learning experience and immediate feedback.

In the area of marketing, gamification provides an opportunity to create a fun experience for the audience and it also improves the customer engagement. Gamification also influences human behavior. Various research results show that playing a game reduces stress, anxiety levels and enhances brain functions.

Gamification has proven to be an effective tool in the area of corporate social responsibility where staff, clients or customers' knowledge of environmental and societal matters can be greatly improved through fun and games. Gaming also plays a major role in other areas such as health care, recruitment and leadership development.

Gamification – The Game Changer

Prof. K. Saravanakumar

Digital delight techniques
In the era of digital natives!
Desire to learn
Socialize in society
Compete to achieve
Chase the challenge
Ready for reward
Realize the way of life!

Marvelous in marketing
The customer is the king!
Retention! Engagement! Delight!
Ideas to inspire
Health to heavenly life
Experience the efficiency
Work for productivity
The crowd for crowdsourcing!

Connect to innovation
Educate the employees
Polish the politics
Plenty to play through Perfection!
Fulfill by fun, the Game changer!
Altogether a different ball game!
Act for authentication!
Exploit - Game Over!!!

Computer Simulation - Entertainment Technologies

Smrithy R Sunil
1 MSc(CS)

Entertainment technologies is a discipline that uses various components to enhance the entertainment experience. There are various new trends in entertainment technologies which have a broad scope and plays an important role in mankind.

Computer simulation is one such subset of entertainment technologies. Computer simulation is a mathematical model that reproduces the behavior of a system using computer systems. They have become an effective tool for the mathematical modeling of many natural systems and they are physics, climatology, etc. which can be used to explore and gain new insights into new technology for performance estimation. They are realized using running computer programs that can be of any size. This technology was introduced in order to solve the 'closed form analytical problems' and to enhance the systems in the most effective way.

Earlier observers could not come to a conclusion or even predict any solution from the numerical obtained as data sets for the weather forecasting. Today the weather forecasting department uses computer simulation technology to balance the view of the clouds and predict its chances to rain. The CAT scans use computer simulations to simulate how a tumor can shrink or change during an extended period of medical treatment and this is a global advancement in the medical definition. Animation is an effective technique that is used to experience a simulation in real-time.

Since science always plays a major factor in the creation of new technology, it can be co-related with mathematics. The logic of these mathematical models is eventually turned out to be the algorithms for the software's implemented for various other purposes. In the latest technical aspect computer simulation has been used to formally model theories of human cognition and their performance.

Sensitivity analysis produces accurate results through computer simulation because the risk factor and its assurance to any discipline will depend on the simulation procedure and hence this analysis must be done to avoid any major destruction happening in the world. Computer simulation is excellent at portraying and comparing theoretical scenarios but to get an accurate result the case study must match what is actually happening today.

The trust people put in computer simulation depends on the validity of the simulation model because the verification and its validations play a great impact in the development of computer simulations. A computer simulation does not provide varied results on each execution, on any given circumstance, the solution to a problem on different system is always one and that's why it has a higher reproducibility effect. At some instance, computer simulation can be used for debugging and it relatively gives a faster response.

Therefore computer simulation plays a vital role in generating solutions to some analytical problems and enhances the future of the world in order to avoid any destruction caused in the environment.

Applications of Ubiquitous Computing

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Ubiquitous computing is the natural, advanced evolution of IoT (Internet of Things). We are living in a world where the prospect of having everything is connected to the Internet. IoT has attracted a variety of modern technologies like Machine Learning and Artificial Intelligence, and has become a conduit for bringing these technologies to mainstream application. Examples like Amazon's Alexa, connected to Amazon's home peripherals, have started to gain more widespread acceptance in mainstream consumerism.

However, are these IoT technologies 'ubiquitous', at the moment? Not quite, but they are getting there. To be ubiquitous means to be found everywhere, so as to sometimes be inconspicuous. Science Fiction movies have flirted with the idea of having devices connected to home appliances, public utilities (like roads, streetlights, and building doors/windows), vehicles, and even our own bodies. These devices, constantly communicating with each other, updating and relaying pertinent information, require minimal user oversight. They function without us even knowing they are there, until we want something from them. Let's take a look at the potential uses of ubiquitous computing:

Education:
Ubiquitous computing would do wonders in the realm of education. Devices could constantly track not just student performance, but also the mental state of students in each class using advanced facial recognition software or biometric sensors. They could also track a student's grasp of a subject, while the class is in session. This data can be collated constantly in real-time, and can help to counter any negative effects in the class atmosphere or a student's progress.

Sports:
Combined with Sabermetric analysis, ubiquitous computing devices, attached to player clothing, balls, cameras, and other items on the field, can provide real-time data to managers, referees, and supporters. This data can help make refereeing decisions with zero margin of error, track player performance and health to help managers make corrective decisions on the fly, and provide heat-maps and simulations to aid tactical decisions.

Healthcare and Human Enhancement:
Devices can be attached to the human body, to track health-related details, or to replace or support the performance of a person's organs. These can be used to monitor health, moderate functioning of support devices (like inbuilt insulin injectors), and notify the individual or healthcare professionals of discrepancies.

Security and Military Applications:
Cameras and monitoring devices in public places can be used to keep track of suspicious individuals (though these bring privacy concerns) during times of peace, or real-time battlefield analysis, with data of soldiers and tactical simulations during war, which would be similar to how Sabermetrics is applied in sports, as mentioned above.

The above mentioned applications only scratch the surface of what is possible with ubiquitous computing. As we move forward with advancements in AI/ML and Deep Learning, ubiquitous computing devices would be the vehicle that delivers these technologies to the masses.

Interaction Design and User Experience

Roshni S Cheradil
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The idea of design was always in the human mind unknowingly from the time humans evolved and started scribbling on the walls of the first caves known to them. In the early days, the curiosity of reproducing things that they had seen led to these drawings. Building a wheel or even a cart or a carriage was possible with the thinking that an early human had. But, when mankind actually started building really complex structures and machinery, there was a limit to what the brain could imagine. Imagining was never a problem, but to build something, the imagination had to be reproduced in a way that maximized efficiency. This led to the concept of designing.

Interaction Design

Designing evolved with human growth and the entire industrial revolution that led to the present-day scalable growth of humanity had a direct dependency on this. Interaction Design and User Experience Design (UX) are the terms that were coined during the recent times after the internet wave. That being said, this has always existed in an unnamed format in the history of every successful product's existence. To understand the underlying concept in an easier manner, let's dive into the story of how a present-day smart car like the Tesla evolved from a pottery wheel or a basic cart in the Bronze Age. This was a very long process that took thousands of years, but was accelerated in the last century. Mesopotamians built the first pottery wheel and over a period of time, when humans interacted with the product they built, they understood that a simple improvement like connecting two wheels together could create a different use case of that product altogether. Every change made the human life easier or in the present-day terminology, gave the users an amazing experience in the longer run.

Interaction design is simply the practice of designing a product by involving the user also in the whole process. By doing so, we can ensure the highest user satisfaction and we can say that the end product has the best user experience. In short, an interaction design done properly will lead to a great user experience.

UX Design Thinking and Tools.

The best designs lead to the building of great products and every successful product is the solution to a real-world problem. So, it's crucial for the designer to feel the problem. This will enable a designer to be in the shoes of an actual user. User experience (UX) design is so vast and a wide variety of tools are available in the market. Always the first option as a tool is pen and paper. You can translate what you have in your mind easily into this. But as the problem statements increase, there is a much higher need to organize and share the data with the teams working on the project; it becomes a necessity to use other tools that would make life easier for a designer.

The Future of Human-Computer Interaction

Osten Diniz
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The way in which we interfaced with PCs a year ago is very different from how it is used today. Until now, various devices designed various types of UIs which made the relationship between humans and PC's significantly more grounded. A straightforward gadget nowadays has the ability to process things that were not possible with the computers from decades prior. Think about Microsoft's DOS/MIDAS, the primary working framework launched in 1981 and then think about Windows 10 which was launched in the market in mid-2015. Comparing DOS and Windows 10 resembles comparing a cat with a lion; both come from the same family but are not quite the same as each other. Most of the portable gadgets have made things possible with just the snap of a finger. From clicking and choosing a file to using finger gestures to zoom and see a picture is where UI stands today.

UI isn't just about clicking and tapping, its much more than what we expect. Voice interaction is another HCI segment that is quickly climbing up the innovation ladder. Tech Giants like Google and Apple have effectively used voice interaction in their devices through Google Assistant and Siri. Indeed, even Amazon has a voice interaction gadget widely known as Alexa. These enable a user to search the web, set alerts and perform substantial other tasks with just their voice. Voice communication will take us way beyond our dreams. According to some people, selection rate of speech recognition will be more than 80%. Virtual Reality existed much before we existed, however, came into action in mid-1995 and in the coming decade will be absolutely remarkable. It is said that VR headsets may replace TVs and other related devices. After all, one can have the experience of one's favourite band performing directly before them without being physically present at a concert as opposed to watching them on a screen. VR will be a test for all developers as the days when it becomes the new form of human-PC communication are not so far off. In Google Maps the entire route might be directly in front of you. What's more, when Virtual Reality is fully developed to the point where it is everywhere, it will be imperative for all user-interface designers to learn to design in 3D.

Another type of human connection is the wearable kind. Examples would be smartwatches and smart shoes among others. Almost every company developing mobile phones has developed smartwatches of their own, which enable their clients to interface in an exceptionally productive way. Apple developed a smartwatch where the crown is computerized and acts as the home button for the watch. All different devices have various unique features. After a period of time, these wearables will be phone independent and will be used by a large part of the community. Researchers have said that in the future, there will be contraptions that will be infused into our bodies which can control things without hardware, and can be used for observing your body's vital signs.

Digital Computer Games

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People spend a lot of time playing computer games. Game developing industries focus mainly on making games that attract people. It is not required for kids to have any knowledge of computers to play simple games. In this article, we focus on the computer games that help in improving the health of gamers.

Youth and children spend a lot of time playing many games. It is noticed that youths regularly play computer games 6-8 hours in a week. Around 97% of Children between 10-19 years play video games. The gaming industry has estimated around $34.2 billion income in 2012. Gaming is the world's largest entertainment medium and its increase has established a new industry for developing digital computer games. Several games are developed for educating the children globally and this is called gamification. In recent times, many computer games are developed for promoting the health of children. Computer games have been developed to teach children about the effects of asthma and how to avoid asthma triggers. Quest for the code, wellapets, and lungtropolis are some games which are developed to spread awareness regarding asthma among children. Some other games are also developed for managing health issues like diabetes, cancer etc.

GAMES FOR MANAGING ASTHMA :

About 300,000,000 people in the world are affected by asthma. Breathing is made easier, as various games teach people how to successfully manage their illness. Wellapets is a game developed for children to manage asthma. It has a pet dragon which is suffering from asthma. The dragon blows fire only when its asthma is in control. The game is about caring for a pet which is suffering from asthma, through which the children learn how to avoid dust, smoke or other things which trigger asthma and its medical treatment. Lungtropolis gives awareness to the children of age 5 to 10 years on how to identify asthma symptoms. The children have to answer some questions regarding asthma and also tips are given which give them awareness regarding the disease and controlling the symptoms.

Dementia is another serious disease faced by many people over the world. Around 35.6 million people in the world are suffering from dementia and many face memory impairments. Many games have been developed over the past for improving the memory of patients who are suffering in different stages of dementia. By exercising to the brain which is called cognitive training the memory of patients can be improved. Computer games are designed to give this training to patients. Computer games like Wii Fit, Wii Sports, Lumosity, SmartBrain, and MasterQuiz are for treating dementia patients.

Gamify with Duo

Kunal Kala
3 MSc(CS)

The mascot for Duolingo – the mini green customizable bird Duo – is a bright representation of what it is all about to combine gaming with education. The organization's website and app teach new languages to its users through the languages they speak. The team at Duolingo takes this basic education deliverable and turns it into a magnificent implementation of gamification. One has levels for each language they are learning, virtual currencies which are rewarded for regularity and can be further betted for promised regularity, customizable per day goals, a leaderboard with ranking among friends, and even a notification system to draw back to the addiction of the game.

Looking at the way lessons are presented, one is given voice assistance, visual assistance, and a well-structured lesson progression. To cross a lesson, a set number of points need to be earned. The lessons are presented in sets with some basic lessons available to play head-on and every locked lesson accessible by level progression.

When attempting to clear a lesson for the first time, the questions are simple and a lot of visual assistance and grammatical clues are presented. When returning to the lesson for practice, however, the lesson becomes randomized with the concepts tested, takes longer to complete, and has a minor negative marking. Hence, just like in real learning, the lessons of Duolingo are easy to learn but difficult to master.

Where this approach is turned into a terrific learning tool is the algorithms they run to improve retention and absorption. Once a lesson is learned, the user's learning pace and accuracy are factored in and Duolingo calculates the time after which a revision is required. There are three levels to this: green being in recent memory, orange being could be revised, and red being needs brush up. Again, the more times a lesson is revisited, the longer it stays green. The color scheme attracts the user to push effort into revising and revisiting a language's concepts and that is all learning a language is about.

The Enigmatic Enigma

Kaustav Mondal
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Communication, as we know it now, was not there during earlier times when Telegraphs were used for communication and for secret transmissions, Morse Codes were used over Short Wave Radio. But, as we know, information is power, thus whoever has access to the communication link will easily have the upper hand over the other party. That's why encryption plays a huge role in communication, even more, when it comes to war.

The Enigma - device that was used by the German forces for a secure line of communication. Arthur Scherbius, was the German engineer who invented this mysterious machine at the end of World War 1. Initially, it was used for commercial purposes, as a secure line of communication. Later on, it was adopted by the military and governments of several countries. And among all, Nazi Germany being the avid user of this machine before and during World War 2. Most basic components of the machine were Keyboard, Lamp board, Plugboard, and Rotors. Inputs were given using the Keyboards and corresponding outputs were shown by the lamp board. The mapping process of the input to their corresponding outputs was anything but simple, as the input given via the keyboard took a long journey before its corresponding output was given.

First, the plugboard would scramble the input, as each of the wires in the plugboard would swap two letters, e.g. A-B or C-Z, and 10 such possible pairs could be made that is scrambling 20 out of 26 alphabets. Secondly, as from 5 possible rotors (each one had different architectures) only 3 were used (Navy used 3 of 8), there were interconnections in the rotors as well, mappings such as A-C or D-E. The rotors were mostly like classic Odometers in cars; one would rotate based on the previous output. These rotors could be used interchangeably. After a pass through the rotors, the input would be returned by the rotors again, effectively scrambling it once again before the final output is given. The settings (rotors and plugboard) were changed on a daily basis, according to the monthly schedule which in turn was reprinted every month, making it adamantine, even if you had the cheat-sheet.

Now for the calculation part, firstly 3 rotors could be chosen out of 5 (considering the Army and Air Force), which could be in turn permuted among themselves, giving us 5 x 4 x 3 = 60 ways in which only rotors could be arranged. There were 26 possible combinations among each rotor, thus giving us 26 x 26 x 26 = 17576 combinations among the rotors itself. For the plugboard,

$$\frac{26!}{6!*10*2^{10}} = 150\ 738\ 274\ 937\ 250\ combinations$$

now considering the previous combinations among rotors we get a total number of 158 962 555 217 826 360 000 combinations.
That's how much The Enigma was enigmatic!

Insight on How Youtube Compress the Uploaded Videos

Ashwin Chhetri
1 MSc(CS)

Every minute more than 400 hrs of video are uploaded on Youtube. So, every day Youtube has to handle thousands of videos of different quality and extensions. What happens to a video when it is uploaded on Youtube?

Every time a video of a different file type or different size is uploaded, it is compressed so that it is reduced to a format with a size much smaller than the original.

However, quality and size go hand in hand, so every time the video size is decreased, the quality of the video also decreases. Therefore, the compression method which is used, plays an important role. Youtube videos can be watched in HD or in the lowest quality (which is 180p) which indicates that the compressed file can be decompressed into any quality. One of the latest Video Compression Technologies used by Youtube is VP9. VP9 is an open source Codec (Compression and Decompression) TrueMotion series of video formats that Google bought in 2010 for $130 million from On2 Technology. The main objective of VP9 is to compress the video into as small a size as possible while retaining the quality like any other compression technology. However, the amount of data retained by VP9 compression is greater than any other compression technology previously used by Youtube.

How does VP9 compress a video?

A video for a computer is a block of images where each image is known as a frame. In general, in each second, 32 frames are displayed on the screen. When a video is stored in its original format, each frame is stored completely, containing the details of each pixel. But VP9 has an algorithm that allows us to store the frames whereby it is smaller in size but retains its data.

Let us consider an image.

As shown in the above figure, the frame is divided into cells. The bigger cells enclose a section of the image which remains the same for the next frame also. And the section of the images which change or are being replaced by new pixels are contained in smaller cells. More focus is given to the smaller cells, as they are what is going to change in each frame.Therefore, when the next frame is stored, it will only store the information of the smaller cells. For the data enclosed by larger cells, it will ask the computer to refer to the previous frame as the data which is to be displayed is exactly the same as that of the previous frame. In this manner the amount of data which needs to be stored is reduced by VP9. Similarly, audio is also compressed in order to reduce the size. Therefore, in a video where motion of the content is very little, the compressed version will be very small in size as compared to a video where there is a lot of motion.

www.youtube.com

Pratik Chhetri
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Do you often upload Your videos on YouTube? If yes, then you should know what happens to your data once you upload it on its server, and how different users from different places retrieve it and what role CDN(Content Distributed Network) has on it.

We all know that YouTube is a renowned website with a large number of users and a huge volume of videos. So the question is, how do they store videos and how do they show it to the other users on demand? This is where CDN plays a pivotal role. To try and understand this better, let us say that at the very top of a tree is the principal server which is the root source of everything that comes from its website. All of its content is right there. Now let us say we want to implement a content delivery network. How does this happen? Well, it is usually through DNS changes. We usually get a DNS record for the content delivery network and put it with all the links of the videos that are there on the website. Now there are two types of CDN, PUSH and PULL. When it is PUSH a server, that means you are pushing all its static contents on to the content network servers. For example, if I upload a video what will happen to a server? It will take the video and push it to the content delivery network. The network will then take that video and cache it out across its network.

The PULL server works a little bit differently. One has to request the link to the content that one is looking for. For example, in the case of a video, when the very first search for the video is done, the CDN goes to its root server, pulls the video out and downloads it to its server. It is then distributed across its network to be served locally. So when a pull CDN is first implemented, one will experience a measured speed of loading because it starts to cache all of its content. Now we have all of this content being served across the network. These CDNs have nodes and these nodes act as servers all around the world to serve the content locally. Thus, when a person who may be in a different country or maybe across the street, searches for a video, it sends the DNS of the video to the CDN. The CDN recognizes the DNS from say, Germany and finds the closest node to Germany and loads the video from there. This allows your website to be a little faster and the load on its server to be low. It is very helpful for people who might have some slow websites or web servers that aren't very fast. It allows you to reach more people in a shorter amount of time.

Virtual Reality in Sports

Gladius Rosia J
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From playing games on gadgets being a health hazard for the children to winning $120000 in a league, technology has come so far. Not only children, there are adults who are sitting in a place and playing video games for the whole day being lazy to even eat food. On the other hand there are people who are sporting so hard and competing with other people.

AR and VR has bridged this gap. How? One thing virtual reality does really well, is getting the user move. It makes the individual to move their hands and legs to reach out and physically grab an object rather than a lazy mouse click. Some of these experiences are bringing more traditional sporting activities into the virtual space such as boxing and baseball. MGM Grand in Las Vegas has observed their customers walk around 1km in real world during the game. According to this year's GDC report, more than half of surveyed developers have various AR/VR tech solutions on their radars while releasing new games.

VR's first FPS (First Person Shooter) was held on June 16-17th.This league called VR league took place in Leicester, UK presented by Oculus, Intel, Stackup and ESL. The top 4 teams from the VR Master League's fourth season were headed out to compete for $10,000 and all the glory that comes with being the winners of the first-ever offline tournament for what many call the "Counter-Strike of VR".

Players should physically bear their virtual rifles, heave their explosives, control their breathing, squat, lay inclined and more to succeed. Each activity must be finished by (virtual) hand - there are no hotkeys or ties for moment weapon exchanging or hopping, no HUDs and no focus. To reload a weapon, the player must press the mag discharge, get another magazine from his strategic vest, place it in the weapon's mag well and force the charge handle. All of it is as sensible as it could reasonably be expected, and each weapon is extraordinary, expecting players to have a sharp learning of how to utilize their apparatuses, as well as do it rapidly under strain.

Pointing is exceptionally reasonable too. Players must snatch the grasps on either end of their rifle and shoulder it, to glance through the sights. Sights work like their genuine partners - EOTech and red speck sights enable the client to keep the two eyes open, while amplification scopes expect you to close one eye and position your rifle at simply the correct indicate due the eye help,which seems interesting for the viewers and is challenging for the players.

The next season of the VR League is being held at Oculus Connect 5 on September 26th and 27th at the McEnery Convention Center in San Jose, CA, where the top two Echo Arena teams hailing from both Europe and North America (for a total of four) will compete for the $38,000 USD prize pool and the championship title. We have always wondered if there is a job which allows us to travel or play games and still get paid. Yes that's finally happening. Technology always has its own negatives but it is never always a bane. This league with the support of technology has changed the way people think and play sport.

Computer Digital Graphics

Manoj S M
1 MSc(CS)

A graphic, is a picture or visual portrayal. Computer illustrations are pictures portrayed on a digital screen. Designs regularly diverge based on context, which may involve characters, numbers and letters, instead of pictures.

The Graphic Design module furnish understudies with a range of abilities for creating thoughts, speaking to a crowd of people and the arrangement of substance. The proposed suite of modules upgrades understudy's visual attention to create tastefully satisfying substance.

Computer designed Graphics can be either 2D or 3D. Early PCs just bolstered 2D monochrome designs, which meant they were highly contrasting. While the primary machines just upheld 16 or 256 colors, most PCs would now be able to show designs in a huge number of colors.

Designs fall into three principal classifications:

1. Pictures/Images (example, photographs).
2. Computer produced illustrations (example, logos or interface components).
3. Computer produced pictures (example, illustrations that look similar to real life photographs).

The Animation module empowers understudies to assume a key part over an extensive variety of enterprises, from the Film Industry to TV, Games and even corporate promoting.

These can be additionally part of four sub-classifications:

- Bitmap: Bitmap illustrations are utilized for photos, designs with an extensive variety of hues and impacts. Bitmaps are utilized to make reasonable illustrations and pictures. Bitmap illustrations comprise of pixels.
- Vector: Vector illustrations are also called question arranged illustrations as they comprise of objects, i.e. shapes. Vectors are comprised of coordinates, shapes, line, and sharing information and not pixels.
- Meta: Meta graphics can be named as crossover designs as they are a blend of bitmap and vector illustrations. A case of a Meta realistic graphic would be a guide, comprising of a photograph demonstrating an aerial view of a town, where the historic points are featured utilizing vector content and designs, for example bolts.
- Animated Graphics: Animated illustrations are 'moving designs'. Vector illustrations are principally the premise of activity in Animation.

Animation began back in the mid-1800s. Early artists tried different things with the speed of playback of their illustrations, to decide the right settings to make them realistic. The term connected to the playback setting is known as casing rate. The casing rate is estimated/dictated by the number of edges every second (fps) that are shown.

1. 12-24 fps for activities utilized in interactive media.
2. 12 fps is prescribed for online web-based animations.
3. 24 fps for television in UK
4. 30 fps for television in the USA
5. 25 fps for film

Industry-standard programming, for example, the Autodesk suite and Adobe Creative Cloud suite is necessary to the conveyance of these modules.

Both Graphic Design and Animation have turned out to be profoundly specialized, progressively commanded by trend setting innovations and programming instruments. They request a one of a kind cross-disciplinary conveyance approach including both inventive and figuring ranges of abilities.

Which is the Real You?

Namrata Rupani
3 MCA

Today, in this socio-technological era, mostly everyone tends to possess two distinct identities. One is their real tangible self, while the other is the image they project, i.e., their virtual self. Now the confusion arises; which is the REAL YOU?

Intrigued by the fact that sharing is caring, we share our entire life with our friends on social sites. But again, real friends or the virtual ones? Leading these distinct identities, there now exists two discrete worlds as of naysayer, real offline world, and the virtual online world. But where do we exactly lie between these dynamic dimensions of existence?

Allured by the ability to connect easily through social media, we get easily flurried up. Seldom do we realize that our image has started taking over our reality. We begin to blur the line between reality and virtuality.

We get indulged in posting about events in our lives, updating status', etc. We inadvertently focus on shaping our virtual life. We try to connect to a larger circle of people which might include some unknowns.

In reality, becoming friends with a stranger requires a leap of faith; then how can we be so sure that the stranger sitting on the other side of the screen is a genuine one? It's not about wrong or right, it's just that we need to share consciously. Let's not become slaves to figures like followers, likes etc. We try chasing that perfect illusional image so hard, that we hurt ourselves badly in the process. When breathing our last, not even an iota of this virtual life would matter; merely the real and dear ones will be with us. Then why live in this imaginary bubble which will burst sooner or later?

Social sites forming the basis of the virtual world were created to enhance the quality of our lives by sharing information and staying connected, which indeed was successful. It was majorly for our comfort but now somewhere down the line, it has unknowingly become a cause of several issues and lack of peace in our lives. We get so engrossed in designing the perfect image that neglects reality and pushes ourselves to fit into that image rather than embracing our beautiful self and appreciate the reality. Let it be a mode of entertainment as it was intended to be. What we need is BALANCE and not to mess with the peripheries of both the dimensions of existence. We also need to comprehend that life here now at this moment is exquisite, it does not need to be projected. And never forget which is the Real You.

Gamification in Education

Sheffali Suri
1 MSc(CS)

Digital Games have been part of the IT industry from past 70 years. From the invention of earliest known interactive electronic game, gaming has emerged as one of the leading industry in the field of IT. Digital Gaming has evolved its applications in field of medical science, training, business and development. Recently gaming has gained acceptance in the field of education as well.

Every student spends 7-8 hours daily in school. The traditional teaching techniques implemented in schools may lack skills like creativity, decision making, critical thinking, perseverance etc. Digital Games provides a simulated virtual environment where students can learn and have hands on experience about these concepts. Educating students with the help of games not only motivates them to study but also enhances their learning capacity. These applications are planned and designed in such a way that increases student's participation and inspires them to continue learning.

According to various surveys conducted, game based learning increases learner engagement, improves retention power of students and enhances the overall learning experience. The most effective use of gaming in education is creating challenges and solving them which give a sense of accomplishment. In comparison to traditional learning techniques, game based learning promotes creativity and teaches students to be innovators. Where classroom teaching focuses on a fixed curriculum, gamification helps students to challenge their skills and think outside the box.

Civilization is one such example of gamification in education released by Sid Meier in 1991.It is a strategy based video game that resembles real world civilization .It allows players to govern and manage the civilization. ClassCraft is one such initiative to make school more relevant and meaningful by creating playful and collaborative learning experiences. They believe in reconstructing the approach of traditional classroom teaching with technology, games, and storytelling to create a learning environment for today's youth.

Many corporations are implementing gamification for training batches online. Examples of training gamification in corporations are The Deloitte Leadership Academy, IBM's Innov8, Bluewolf, Keas etc. There is a slow movement towards gamification in education domain. Survey suggest that by 2020, gamification will be widely adopted by industries, communication scenes and most of all education. With many such advantages like motivation to learn, cognitive growth of individual, skills development and digital literacy there are certain challenges ,yet to overcome. Game based learning may cost more as they take time to design and function properly. Also, there are technology constraints with respect to this approach. Thus, gamification is still in it's developing phase and may soon revolutionize education, worldwide.

Strength of Bayesian Network Prediction over Artifical Neural Network

Sangeetha Sharma G
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Neural Networks are widely employed for prediction purposes. It is important for us to know how the Neural Network Model predictions match the targets of real world and how risky the un-matching is. Neural Networks which have been trained through Bayesian learning techniques have better generalization power than other networks and is less affected by the random initializations.

Artificial Neural Network (ANN) and Bayesian Networks (BNs) look similar, both use classifier algorithms and probabilistic directional graphs which takes a set of inputs, perform calculations and predict outcomes. However there is inherent meaning behind the structure of Bayesian Networks. BNs are a graphical model which encodes probabilistic relationships among random variables and their conditional dependencies through directed acyclic graph. The mappings of relationship amount events in Bayesian Networks are in terms of probability. This kind of mapping is useful when we want to model outcomes, make decisions and have inter-dependent events.

Artificial Neural Networks are a computational approach of neurons based on the physical structure of the brain's neural network. They are highly structured network bases. An Artificial Neural Network can predict multiple output variables by taking multiple input variables. Here the predictions tend to be much faster because there is no lengthy iterative calculation needed.

The records are processed one after the other in a sequence, and the predictions of records are compared with known actual record. The ANN prediction holds a main advantage of grasping information through examples which enable them to identify hidden and strongly non-linear dependencies, even if there is noise in training set. One of the reasons to choose ANN is the ability of network structure to handle correlation between input variables.

Hence the strength of BNs prediction is that they are used from inference to prediction and even modeling. In BNs the structure of network itself gives information about dependencies between variables, thus the mapping (links) represent probabilistic sense of relationships. It successfully handles the missing data because it encodes all the variables. Instead of guessing, BN helps to make quantifiable, intelligent and justifiable decisions.

Tuning Instruments Mathematically And Understanding Ourselves

Aditya Sissodiya
1 MSc(CS)

A string fixed at both ends vibrates (producing sound) in certain ways, sine waves. Like a jump rope, with one, two or multiple "bumps". More bumps means a higher pitch, the string vibrates faster. The frequency of a string's vibration is exactly equal to the number of bumps times the string's fundamental frequency, i.e. the frequency of vibration for a single bump. Most melodious instruments use strings or air vibrating in pipes which have the same sinusoidal behavior; it's not surprising that musicians have different names for the ratios between these pitches.

In the traditional Western scale, 1 to 2 bumps is an octave, 2 to 3 is a perfect 5th, 3 to 4 is a perfect 4th, and then follows a major third, a minor third, and 8th to 9th is a whole step above. If you play few of these notes together, you get a nice sound of perfect harmony; hence the name for this pattern, harmony; game based learning promotes creativity and teaches students to be innovators.

Harmonics are used to tune instruments, guitarists compare 4th harmonic to the 3rd harmonic on the next string up, but then we come to the piano which has too many strings. There's a string for each of the 12 semitones on the western scale, times 7. If you wanted to tune a piano using harmonics, you can try using whole steps, i.e. comparing the 8th harmonic to the 9th ,two keys up, do it six times though, and you "should", mathematically get a whole step up, which "should" have twice the frequency, but our harmonic tuning method multiplies the frequency by 9/8 each time, and 9/8 multiplied 6 times is not two, it's 2.027286529541, if we tuned using major 3rd harmonics, you'd multiply 5/4 three times, and that is 1.953125, still not 2. This is the problem, it is mathematically impossible to tune a piano consistently across all keys using perfect and beautiful harmonics, so we don't.

Modern pianos are tuned using Equal Tempered Tuning, where the frequency of each key, is the 12th root of 2 times the frequency of the key below it. The 12th root of 2 is an irrational number, something you'll not find in simple ratios of harmonics, but its benefit is, after 12 keys, you end up with 12th root of 2 to the power 12, which is 2, a perfect octave. But an octave is the only interval tuned perfectly on a piano, fifths are slightly flat, because 12th root of 2 to the power 7 is 1.498, fourths are slightly sharp with a value of 1.335. Still not perfect.

The theories that we invented, which help us decode the universe, tell us that our own creation, music, is imperfect. We hardly understand anything about our own selves, and yet we have walked on a celestial body that is 384,400 kms away, in space. This is what being human is, we embrace our imperfections and never stop innovating. Our civilization has an objective that we collectively and unknowingly set. It is beyond amazing that we function the way we do, think about it.

Prediction Algorithm used by Hawk-Eye in Cricket

Frank Antony
1 MSc(CS)

Abstract:-

Hawk-Eye is a software that is used in sports such as cricket, tennis etc which traces the path of the ball and reports the appropriate path the ball has taken in the form of an animation. Most often it is used in finding the destination of the ball when released by the bowler in cricket.
This paper studies the algorithm that can be used in the implementation of Hawk-eye technology in Cricket.

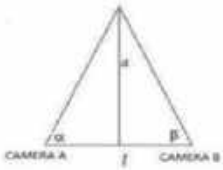
Introduction:-

Hawk-Eye technology has been a huge success in the field of predicting the path of the ball in cricket. The Hawk-Eye technology, invented by Dr. Paul Hawkins, helps the umpires in making the right selection. It makes the sport interesting and an honest game can be played.

The reason it is being used most in the field of cricket is that it can predict, or in other words, trace any form of movement of the ball like swing, spin, and most importantly detect the motion of the seam of the ball. Its report are found to be true 99% of the time.

Working:-

Hawk-Eye works by taking the video, shot on 6 high-end cameras, and the pace of the ball. The inputs fed to the software is processed with the Geometry algorithm.
Firstly, it follows a principle called the principle of Triangulation.



Here, $l = (d/\tan\alpha) + (d/\tan\beta)$ and $d = l/((d/\tan\alpha) + (d/\tan\beta))$

A database is fed with a model that is defined by the programmer during the development of the software. It contains information about the playing area and includes data on the rules of the game.
In each casing sent from every camera, the framework distinguishes the gathering of pixels which relates to the picture of the ball.

A progression of edges develops a record of the way along which the ball has voyage. It additionally "predicts"the future flight way of the ball and where it will communicate with any of the playing regions included as of now customized into the database. The framework creates a realistic picture of the ball way and playing region, which implies that data can be given to judges, audience members or training staff in close ongoing.

The following framework is joined with a back-end database and filing abilities so it is conceivable to separate and break down patterns and measurements about individual players, recreations, ball-to-ball examinations, and so forth.
The Hawk-Eye referral for an LBW choice depends on three criteria:
1) Where the ball is pitched
2) The area of contact with the leg of the batsman
3) The anticipated way of the ball passed the batsman.

A Child-God's Gift

Nicole Fernandes
5 MCA

"The child is father of the man" says William Wordsworth, for on a child is built the future of humanity. Look into a child's eyes, one sees oceans of wisdom which cannot be fathomed. This innocent smile defeats the vilest designs. So, a child is aptly defined as God's gift.

The presence of a child signifies that God still loves the world and that God has not given up on man, however cruel and ungrateful he may be. Science tries to play God but the final link is still held by God and makes goodness prevail on earth however much evil may try to destroy humanity.

If one carries one's childhood with him, one will never grow old say the sages, because it is the child in you that helps to overcome the greatest of trials. So early childhood education is the key to the betterment of society. Let us focus more on who one's child is than on what he does then he is indeed ready for the world.

There is no land so sublime as the land of childhood. Look at the world with a child's eyes and we find it most beautiful. If children are treated well, we can dream of a wonderful world and assure ourselves that all is well with humanity, for our future rests with our children.

Interactive Storytelling

Pritha Banik
1 MSc(CS)

Interactive storytelling is a form of digital entertainment in which the storyline is not predetermined. The author creates the setting, character, and situation that the narrator must address, at the same time, the user also experiences a unique story based on their interactions with the story world. All interactive storytelling systems make use of artificial intelligence i.e. , to certain extent. It allows the user to create several unique dramatic narratives.

The architecture includes a drama manager, user model and agent model to control aspects of narrative production, player uniqueness and character knowledge and behavior. Together these systems generate a character that acts like a human that alters the world to the real-time reactions of the player and ensures that new narrative events unfold comprehensively.

The field of study surrounding interactive storytelling encompasses many fields including computer science, natural language processing, user interface design, emergent intelligence, sociology, psychology etc. There are three functions that narratives should serve and carefully analyze to produce a good story: cognitive, emotional and social functions.

There are also three levels of story creation. First is the story plot, which is a series of related events that make up the story's content. The second level is the narrative which is the representation of the plot from a particular point of view. The third level is the presentation, that is the realization of the story in a particular medium.The participants are engaged in interacting with the virtual characters while moving in a physical apartment. Interactive storytelling is implemented in mobile urban drama, gaming and many other fields.

Marvel's "Guardians of the Galaxy, Vol. 2" that was carefully organised and narrated which took people by rage. In mobile urban drama the user becomes the main character in the play that is presented as a multimedia production on the user's phone and in the physical surroundings. The real world is set as the stage for the drama and the media files are linked to the real world using tags or GPS. Nowadays computer games convey a story or a plot that makes them all the more interesting like for example Asura's Wrath, where the players take control of the Asura who fights to save his daughter from his former comrades.

Real-time approaches were the best for entertainment because there was high interaction with it. The future of the entertainment history might also change and the entire industry may implement interactive storytelling. As present generation children are more into mobile screens and the gestures are completely different from that of adults, the way they swipe, touch and communicate with the screen is completely different. Interactive storytelling provides a platform for them to interact with the system this can even help them in their education. Interactive storytelling might become the future in all aspects of digital entertainment.

The Smile of Light

Nikhil Kumar Yadav
1 MCA

In my life I missed so much
But also gained equally
My life was full of happiness
But today it's the opposite

First, I was helpful to all
But today when I need help
There is no one
Only some understood me
But ignored
Ignored from heart

My life was covered by a deadly darkness
No one was there to help me to overcome

But suddenly ,there was a light
The light which made me smile
That turned into my best friend
A friend who I actually need..
We shared every movement of our life
We shared everything and nothing was a secret
This was the happiest moment of my life

Oh suddenly, I saw there was light
And the darkness went away, away and away
from my life

It was the time when I realised
That every darkness has light in it
So never give up hope to search

To the Revolutionary, I know since 96!

Nida Saiyed
3 MCA

You are the reason I could arrive,
Thank you for teaching me,
ways and means to survive.
Makeover on my to-do,
Revolution on your will do.
Freedom I want,
Empowerment you hunt.
My risk appetite goes high,
You gave answers to every WHY.
Keeping it all on stake,
Only for my sake.
You stood by,
When all doors gave a goodbye.
Never did you let rust,
The foundation of trust.
My love for you, I cannot quantify,
Let the world wonder why.

Was growing up just a trap?

Somya Abichandani
1 MCA

Was growing up just a trap?

making paper boats felt better than
being around people you don't know

lonely nights, and hectic days.
terrible people, terrible phases.

Was growing up just a trap?

Dreaming always felt better than
waking up without knowing why?

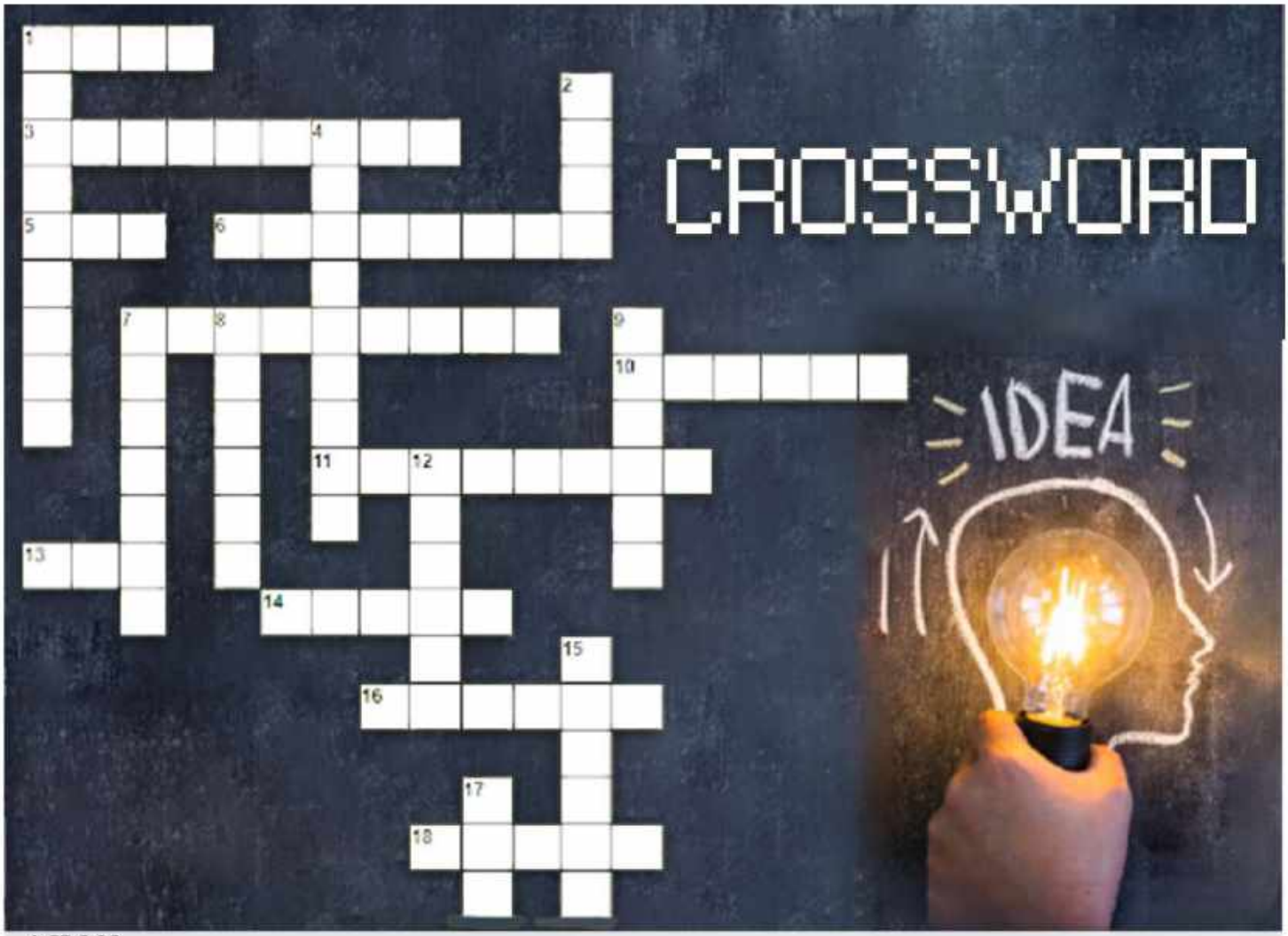
Terrible Monday's, super short Saturday's.
I cannot find a way out of this mess.
And it's almost been a million days.

Don't Give Up!

Jaiprakash Advani
1 MCA

When water is above your head
and no one to help,
When trouble comes all the way,
and there are problems all day.
Don't give up!
Because success comes to those,
a hard way, who chase.
Rivers may dry
but you have to still go by.
Autumn may knock at your door
but you have to travel more.
Waves may run offshore,
and can take away the
humanity you wave.
But still, don't give up!
Winners are the ones who hold on to their path
Losers are the ones who lose them apart
Try and try until you reach,
The door to success beneath your feet.
The Sun may set in the sky,
Tears may come as a sigh
But don't give up...
Until you have something to give.

Monica K P
3 MCA



ACROSS

1. Acronym for the combination Microsoft Windows, Apache, MySQL and one or more of Perl, PHP, and Python, defines the Windows-based Web platform.
3. Refers to software that calls itself.
5. The native file format for Adobe Systems' Acrobat. It can describe documents containing any combination of text, graphics, and images in a device-independent and resolution independent format.
6. An organized collection of data, stored and accessed electronically.
7. Procedure and sequence of actions to accomplish some task.
10. Is a number expressed in the base-2 numeral system which uses only two symbols: typically, 0 (zero) and 1 (one).
11. Translates source code into object code.
13. Integrated design environment and integrated debugging environment that assists computer programmers to develop software.
14. An action which is inaccurate or incorrect.
16. Refers to the spelling and grammar of a programming language.
18. Free and open source Unix-like computer operating system.

DOWN

1. Free and open-source content management system (CMS) based on PHP and MySQL.
2. Any series of statements written in some human-readable computer programming language.
4. Means for a system to communicate with other systems.
7. Used for active contents that are called and used by programs and the operating system.
8. A technology company that specializes in Internet-related services and products, which include online advertising technologies, search engine, cloud computing, software, and hardware.
9. A particular instance of a class, where it can be a combination of variables, functions, and data structures.
12. Faculty of the mind by which information is encoded, stored, and retrieved.
15. Process of copying data, software or other digital information on a separate media in addition to its original storage.
17. Data compression and archival format. It contains one or more files that have been compressed or stored.

word game

B	G	U	G	K	B	W	Z	M	B	U	G
N	O	I	T	A	C	I	F	I	M	A	G
O	C	L	O	C	A	N	I	I	Z	L	W
J	Q	B	I	V	Q	S	P	A	G	J	Y
V	Q	D	E	D	N	E	L	B	X	M	M
P	E	D	A	G	O	G	Y	P	O	A	Y
O	Z	X	D	M	E	T	S	N	T	K	N
D	E	Z	I	L	A	N	O	S	R	E	P
A	Y	M	O	Y	O	X	E	N	F	J	S
S	M	I	S	O	A	J	I	A	L	O	H
S	Q	Q	Y	T	R	A	M	S	I	B	T
E	D	T	E	C	H	W	M	R	P	L	O

1. Using virtual education to help overcome achievement _____.
2. Bloom's _____; a set of hierarchical models used to classify educational learning objectives
3. Learning in which content, pace, structure, are customized for individual students.
4. Use the _____ goals framework when planning an online learning program.
5. Instructional strategy that reverses traditional homework and the classroom environment.
6. Using game mechanics to drive participation, engagement, and motivation.
7. Education act signed into law by President Obama in December 2015.
8. Use the _____ goals framework when planning an online learning program.
9. Education that focuses on Science, Technology, Engineering, and Mathematics.
10. Learning that combines online content and instruction with traditional classroom teaching and experiences.
11. _____ is the academic discipline that deals with the theory and practice of teaching and how it influences student learning.
12. International Association for K-12 Online Learning, which hosts a large annual symposium.

Answers

Crossword

1W	A	M	P											
O											2C			
3R	E	C	U	R	S	4I	V	E			O			
D						N					D			
5P	D	F		6D	A	T	A	B	A	S	E			
R						E								
E		7A	L	8G	O	R	I	T	H	M		9O		
S		C		O		F						10B	I	N	A	R	Y
S		T		O		A						J					
		I		G		11C	O	12M	P	I	L	E	R				
		V		L		E		E				C					
13I	D	E		E				M				T					
		X			14E	R	R	O	R								
								R			15B						
						16S	Y	N	T	A	X						
										C							
							17Z			K							
						18L	I	N		U	X						
							P			P							

Manasa G
1 MCA

Gamify your Mind

Anish Lal
3 MCA

D	W	Y	G	Y	D	Y	V	S	D	F	N
L	C	M	A	M	E	T	S	E	S	Q	I
O	Y	O	M	V	Z	A	S	S	E	F	H
C	K	N	I	B	I	A	X	D	P	F	L
A	V	O	F	K	L	M	U	J	Y	A	B
N	L	X	I	H	A	T	O	A	G	D	G
I	Y	A	C	C	N	R	E	C	O	E	Y
T	Z	T	A	E	O	A	Z	O	G	D	G
I	V	X	T	T	S	M	F	G	A	N	Z
R	W	Y	I	D	R	S	L	W	D	E	V
K	D	A	O	E	E	O	I	E	E	L	S
W	L	T	N	V	P	W	P	T	P	B	C

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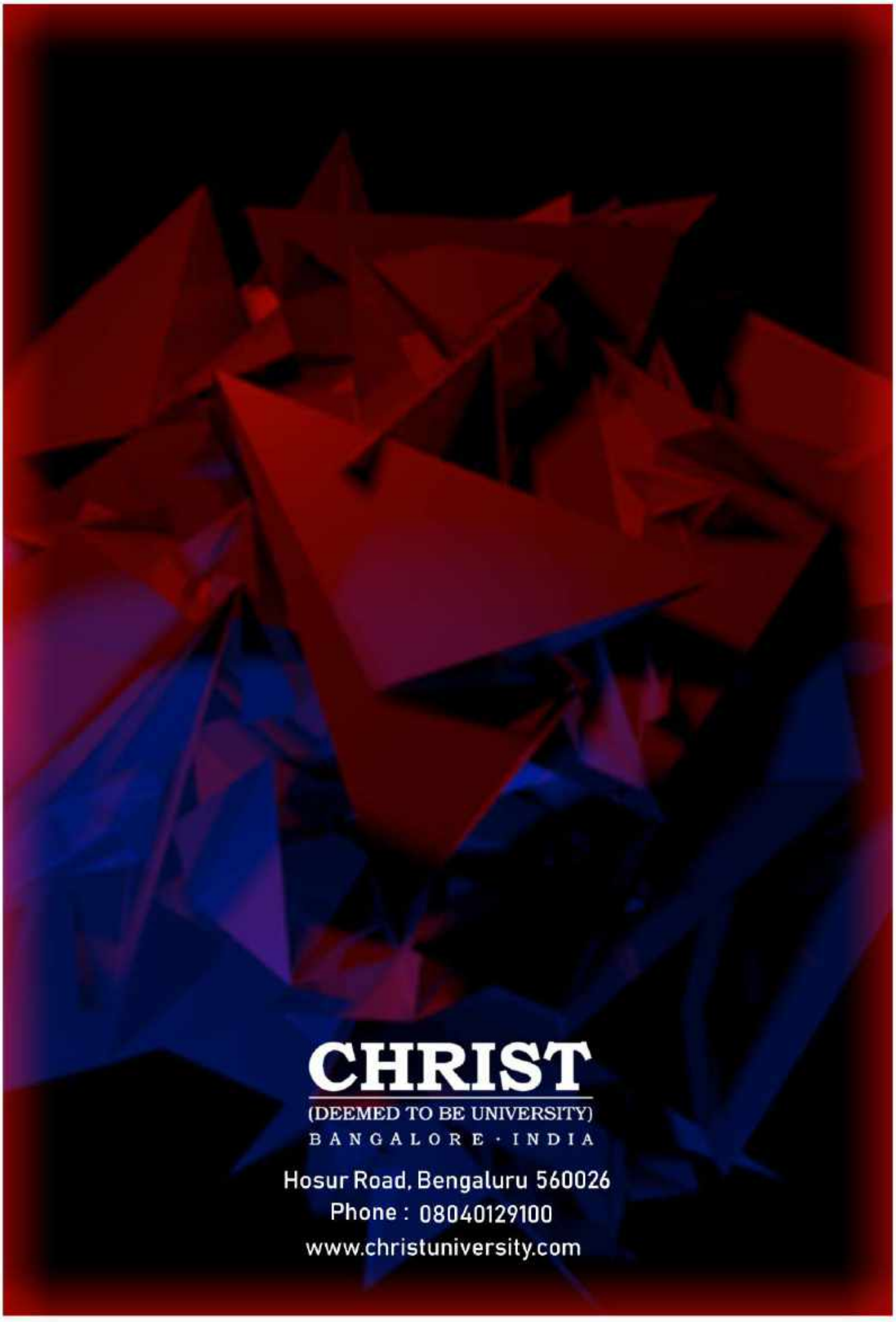

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