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CONTENTS

EDITOR'S MESSAGE

"Simplicity is about subtracting the obvious and adding the meaningful".

Welcome to the inaugural edition of "Techtoday" which opens into a plethora of technical news. In this time of technological revolution, it is vital to keep pace with the rapid transformations of this digital era, hence the birth of this magazine.

Our first magazine is the collective effort of both students and teachers who went lengths to make this dream evolve into reality. Delve into this mix of amusement and knowledge and hope this opens up a world of opportunities to every keen reader.

BINIL K JOSEPH
STUDENT CHIEF EDITOR

EDITORIAL BOARD

Message from Head of the Dept, CSE, FISAT

Congratulations FISAT CSE Technical Magazine Team for the initiative to publish a technical magazine 'techtoday'.

Computer science engineering students are technocrat individuals. They need to get refreshed with current technologies. Technology magazine is the best and most fascinating approach to update the most recent innovation news and events. Technology magazine is the best medium to invest your free energy while you are on vacation in light of the fact that the tech magazine is such a periodical distribution wherein you can get most recent innovation news, tech tips, traps and a lot all the more intriguing innovation-related stories.

The technical content of this magazine consists of a wide range of topics like IP version 6, Machine Learning and Haptic technology. The contents of the technical magazine are contributed by the students and faculty members of the CSE department, FISAT. I thank members of the editorial team and students for the suggestions and efforts for this initial attempt to release a technical magazine.

I wish the best circulation and readership for the annual technical magazine 'techtoday'.

Dr.Prasad J C
Head, CSE Dept
FISAT.

MOBILE AUGMENTED REALITY (MAR)

INTRODUCTION

Augmented reality (AR) is an interactive experience of a real-world environment where the objects in the real-world are augmented by computer-generated perceptual information. The origin of the word augmented is augmented which means add or enhance something. In AR graphics sounds and touch are added to improve the user experience. Unlike virtual reality, AR uses existing natural environment and add virtual information to it. The main feature of augmented reality is that it brings components of the digital world into a person's perception of the real world. AR is a live direct or indirect view of a physical, real-world environment whose elements are augmented by computer sensory input such as sound, video, graphics etc. It functions by enhancing one's current perception of reality. The Augmented reality takes a real-world scene and adds virtual objects to the scene and deletes the real world objects from the scene. With the help of augmented reality technology, the information about the surrounding real world of the user becomes interactive and digitally manipulable. AR can be implemented using a head mounted or helmet mounted display. The AR-enabled tracker which is an image linked to the augmented reality triggers the software to display a 3D version of the product with which the user can interact. One can use mobile to get more details about the real world product using AR.

Augmented reality mobile applications are designed to equip mobile phone users with rich services, applications and functionality, which are applied on top of physical reality. Such applications use the phone's camera, GPS, touch screen elements and other sensory and motion detectors to integrate real images, videos or scenarios within them. Mobile augmented reality is a relatively young technology, but it has already attracted a great deal of hype and scepticism in equal measure. The background of mobile based augmented reality which is non-mobile augmented reality actually dates back all the way to the early 60's when the patent was awarded for Sensorama an environmental simulator which added its own visuals, sounds and smells to the natural world. Until recently, Augmented Reality (AR) is one of the latest technologies that offer a new way to educate. Due to the rising popularity of mobile devices globally, the widespread use of AR on mobile devices such as smartphones and tablets has become a growing phenomenon. Therefore, this article reviews several literatures concerning the information about mobile augmented reality and exemplify the potentials for education.

WHAT IS MAR ?

Mobile Augmented Reality (MAR) is a new technology based on Augmented Reality and can be used on mobile devices such as smartphones iPod, gaming console and Head-Up Display. It extends and enhances the user experience of the mobile device. Portable augmented reality uses technology that you can move from place to place.

A desk-side computer with a monitor is somewhat portable in that it can be moved from one place to another relatively easily. A laptop computer is even more portable.
As with most things, there are advantages and disadvantages to using mobile devices for mobile augmented reality applications. The advantages are related to the fact that AR application can be experienced anywhere and at any time. The disadvantages are related primarily to constraints that are imposed in exchange for mobility, although there are sometimes advantages to using a permanent or semipermanent installation at a particular location.

ADVANTAGES OF MAR APPLICATIONS

Mobile augmented reality is especially well ideas such as "ubiquitous learning" in which the plan is that every person learns all the time, wherever they need to. might be that if someone is visiting wants to learn more about the Battle of Gettysburg that the information about the battle. This technology is very low cost compared to more permanent or special-purpose technologies. The key advantage of mobile AR is that in addition to being inexpensive, many people already own the necessary hardware. Current smartphones and tablets the sensors, processing, and displays necessary for mobile AR applications.

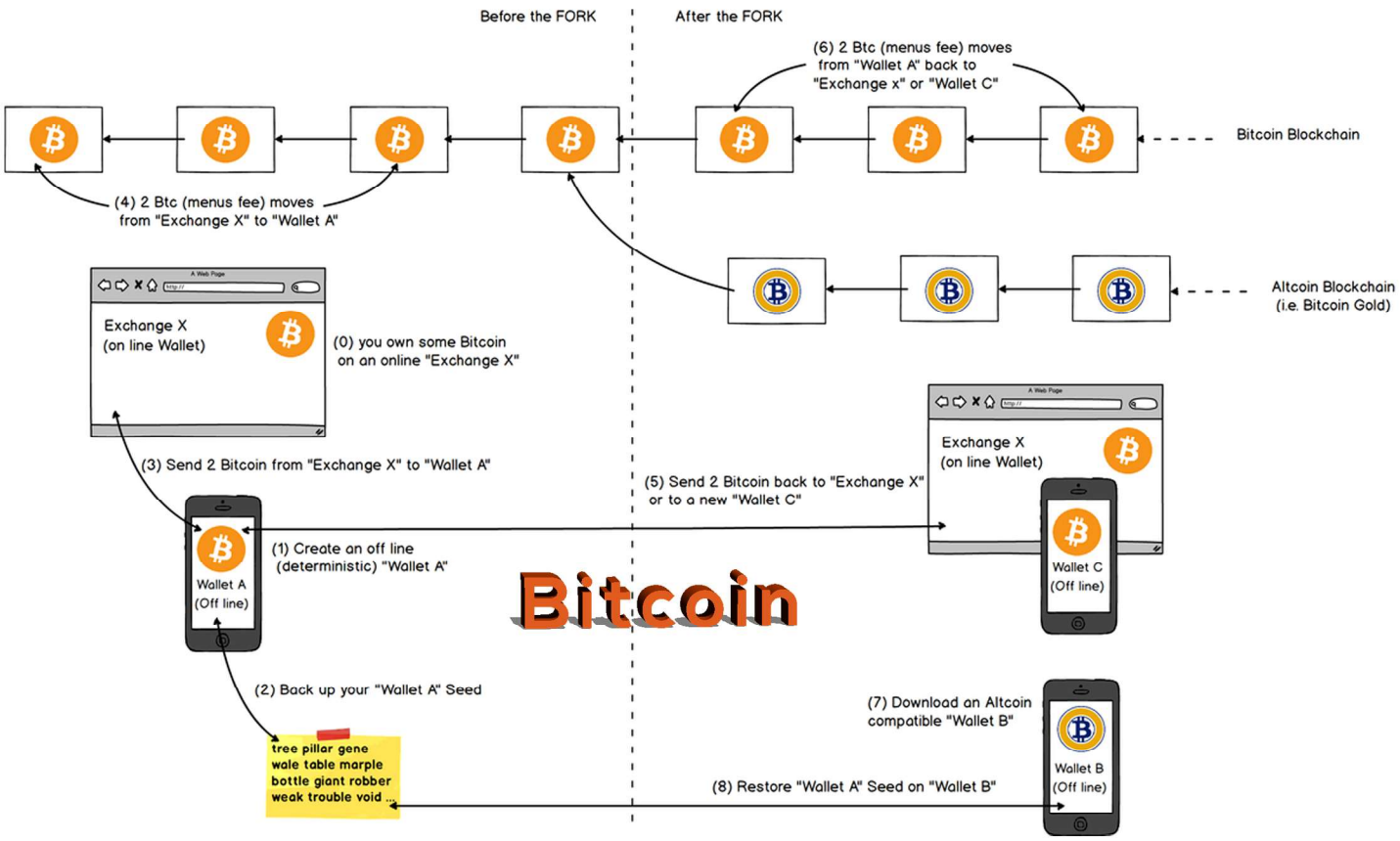
DISADVANTAGES

Along with some advantages, there are some disadvantages of mobile augmented reality augmented reality applications. One of the main constraints on mobile augmented reality is most devices are limited. Beyond the technological constraints the devices themselves, there are often that the mobile AR application developer must consider.

Summary

Mobile augmented reality has the explosive growth in the area of augmented reality. Mobile AR takes advantage of the widely distributed base of hardware such as smart phones and tablets. Since Mobile AR exists in the real world, people can experience it wherever or whenever they find it comfortable. Mobile devices that can support AR are becoming more powerful and less expensive at a very rapid pace. Additionally, new hardware possibilities are emerging such as mobile projection devices that will allow mobile new types of mobile AR applications to function and make sense. Some people are willing to accept and carry additional technology for mobile AR applications. Some AR applications are "stealth" in the sense that others in the area might not even realize that one is engaged in an AR experience. As computer vision algorithms become better, there will be less need to "set up" an area to be AR enhanced ahead of time in any way by utilizing natural features of the area, such as skylines or famous landmarks, to aid the AR application to determine where the device is in the environment.

- Arun Suresh ,
Ancelin George P
S7, CSE-A



Introduction

BitCoin is the first decentralized digital currency. That is a group of users controls and verify transactions instead of a central authority. It runs on a peer-to-peer computer network for security and trust. Anyone can send or receive money for the goods and services, and each transaction is recorded publicly onto a ledger known as a blockchain where all transactions are included as blocks. The transactions in the blockchain are verified by other bitcoin users known as Miners. As each block enters the system, it is broadcast to the network of users for validation. So users are aware of each transaction and this prevents stealing or double spending. Bitcoin emerged in 2008 just after Occupy wall streets accused big banks of misusing clients' money, charging high fees and duping clients. Bitcoin pioneers wanted to put the seller in charge by eliminating the middlemen. They created a decentralized system to make the transactions transparent. It has come far in a relatively short time. Bitcoin is either virtual currency or reference to the technology. While using Bitcoin, you refer the purchaser to your signature, which is a long line of security code encrypted with 16 digit symbols. The buyer decodes the code with his smartphone to receive your cryptocurrency.

How do you buy a Bitcoin?

1. Before a Bitcoin is purchased, A virtual wallet has to be installed onto a PC or smartphone. The wallet keeps tracks of every transaction and current balance.

2. To buy a bitcoin, real money has to be deposited into an account on a third party website which connects bitcoin buyers and sellers.

3. An order for a bitcoin can be placed once a

sufficient amount is available.

4. Bitcoins can be purchased from third parties such as BitInstant (It sends the coins directly into the virtual wallet.

Bitcoin Mining

Bitcoin mining is the process of adding transaction records to Bitcoin's public ledger of past transactions. It is used to secure and verify bitcoin transaction payments from one user to another in a decentralized manner. Each node uses the blockchain to distinguish legitimate Bitcoin transactions from attempts to re-spend coins that have already been spent elsewhere.

Bitcoin Mining Tools

Bitcoin mining pools provide a way for Bitcoin miners to pool their resources together and share their hashing power while splitting the reward equally according to the number of shares they contributed to solving a block. This began when the difficulty for mining increased to the point where it could take years for slower miners to generate a block. A "share" is given to members of the Bitcoin mining pool who present a valid proof of work that their Bitcoin miner solved.

Proof-Of-Work

New blocks are mined to add to the blockchain, by a system called Proof-of-Work. Proof-of-Work approves and then adds these blocks to the new public ledger. Mining is purposely designed to be resource intensive and twisted so that the number of blocks found each day by miners remains steady. Individual blocks must contain a proof of work to be counted as valid. This proof of work is verified by other Bitcoin nodes each time when they take a block.

Creation of Bitcoins

The prime purpose of mining is to provide Bitcoin nodes to reach a secure, tamper-resistant consensus. Miners are paid transaction fees as well as a subsidy of newly generated coins, called block rewards. This both serves the goal of propagating new coins in a decentralized manner as well as urging people to provide security for the system through mining.

1 Bitcoin = 2,55,004.75 INR

- Anupa Saji,
Lakshmi A S,
Chitira Raj,
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AUTOMATION AND THE FUTURE OF WORK

Have you ever imagined what our work environment would look like in the future with the emergence of automation in our day to day lives? If you have not, then start thinking of it, because it is highly likely that your professional dreams will be shattered by automation within the next few decades. It is predicted that almost 800 million jobs will be lost to robot automation by 2030. And that is just by robots alone. Now, think of the jobs that can be automated without robots. I recently met a guy who was trying to enter the field of cybersecurity after having three years of experience as a Java developer. When I enquired on why he was changing his career path, he replied that most of the software development will be automated within the next 5-10 years and he was changing his profession to be on the safer side. He went on to explain about the project Google is working on to automate software development. I was astonished to know that such skilled occupations are getting automated at a faster rate than I thought it would. If this is the case of such challenging jobs, then think of the jobs that require lower skill levels. Robotic Process Automation (RPAs) have already started taking over software jobs that have a high volume of repeatable tasks which humans had to perform earlier. Such technologies are emerging and only time can tell what the future will actually look like.

Now, why do companies prefer automation over human labor? Well, there are a lot of reasons for it. The main reason is the competitive advantage that automation provides to an organization. Unlike humans, robots and computers do not require food, rest, etc. Moreover, they do not complain about their job and are able to work 24x7 in a highly efficient manner. All they require are electricity and proper maintenance. With the advancements in technology and renewable energy like solar, wind and biomass, such things are not a big challenge. Automation leads to enhanced productivity for an organization and as the old quote says, time is money and money is what organizations are looking for. So whatever problems arise, companies will promote automation to survive in this world of vicissitude.

So how can we survive if automation comes into prominence? Well, for a fact, automation at present can only eradicate jobs that require lower levels of intelligence and skills. But that is also a concern at hand since most of the physically intensive and repeatable jobs come under this category. So how can we solve this issue? How can the millions of people who lose their jobs due to automation survive? Well, these are some questions organizations will have to deal with as they move forward to the era of the Fourth Industrial Revolution. One plausible solution to this problem is the coexistence of humans and robots. A great example of this is of a Trivandrum based robotics startup called GenRobotics. This startup developed a robotic scavenger named Bandicoot to automate the process of sewage cleaning

and it is now being used in various parts of India to clean sewage. But did the people who used to do manual scavenging lose their job? Absolutely No! They trained the manual scavengers to control the robotic scavenger and now, they are happy controlling the robots instead of going into those manholes themselves.

Organizations require more and more employees to control, analyze and/or maintain the automation tools used by them. The need for people who can adapt and learn quickly will be in huge demand in the coming years. Also, all the jobs that require medium to high levels of intelligence and skills will still be in huge demand. There will be systems and automation technologies that can assist such jobs but they can never replace such positions. For example, an AI cannot be a project manager capable of running a project. But it can still provide suggestions and assistance to a project manager based on the data it possesses. Similarly, robotic surgery exists to help the surgeon but it can never replace one. Technology can enhance the education sector and the way of teaching but it can never replace a teacher. Similarly, we can develop tools to automate software development but complete automation of software development without the supervision of a human is nearly impossible.

So what should we do now to have a better working world? The best solution is to upskill ourselves. Research on how automation can impact the job you are looking for and take your decisions accordingly. Always be updated on the changes that occur in your field of interest. Always involve yourself in a continuous learning process throughout your lifetime. This practice will help you grow both in confidence and as a person. It will give you the ability to adapt to the changes in your environment and take challenges on the way. It is not for fun that many huge organizations tie-up with online learning platforms to provide learning solutions to its employees. It is because they know the importance of professional growth and gives a high priority to upskilling their employees.

The fear of unemployment has existed since the invention of computers. But it is not technology that is causing unemployment. It is the people who fail to adapt to the fast-changing advancements that fail to get employed. The need for skilled labor is still high. It is just that companies fail to find qualified employees for such jobs. So, you are on the right track if you are able to meet what the industry requires from you in your field of interest and upskilling yourself is the best way you can get through this situation.

- Job Jacob
S5 CSE B

SUPER RESOLUTION TECHNIQUES

The last time you looked at the pictures of moon's surface, did you wonder how they captured this image with high resolution? These images are a product of high-resolution image capturing devices as well as a set of powerful image processing algorithms. One might wonder why we cannot just use really good imaging devices.

Firstly, they are expensive as well as bulky, both of which is not desirable.

Secondly,there are various physical constraints due to the limited bandwidth of transmission. So, there is a trade-off between the resolutions against bandwidth for any remote sensing systems. This problem is also prevalent in medical imagery techniques. Extracting 3D models of the human structure with high-resolution images while reducing the level of radiation still remains a challenge.

There are many techniques that have evolved recently to overcome this problem, one of them is to use some powerful super-resolution(SR) techniques. SR is a technique which reconstructs a higher-resolution image or sequence from the observed LR images. SR techniques can be categorized as multi-frame or single-frame based on the input LR information. If multiple images of the same scene with motion can be acquired, multi-frame SR can be done. These scene motions can occur due to the controlled motions in imaging systems, e.g., images acquired from orbiting satellites. The same is true of uncontrolled motions, e.g., movement of local objects or vibrating imaging systems. However, there might be the case that multiple LR images may sometimes not be available for the reconstruction, and thus we need to recover the HR image using the limited LR information, which is defined as single-frame SR.

In the beginning, many methods concentrated on the frequency domain. These algorithms can make use of the relationship between the HR image and the LR observations based on a simple theoretical basis(using Fourier transform and discrete cosine transform), and have high computational efficiency. However, the methods have apparent limitations, such as sensitivity to model errors and difficulty in handling more complicated motion models, which have prevented them from further development. Due to the drawbacks of the frequency domain algorithms, spatial domain methods then became the main trend. The popular spatial domain methods include non-uniform interpolation, iterative back-projection (IBP), projection onto convex sets (POCS), the regularized methods, and a number of hybrid algorithms.
Among them, the regularized methods are the most popular due to their effectiveness and flexibility. In recent years, however, the development of multi-frame SR has slowed down, and researchers have mainly focused on SR reconstruction in the various application fields.

- Chandana S
Anjali Vijayan
S7 CSE A

CLOUD COMPUTING

Cloud computing is a fundamental change in approach that provides computing over the internet. Cloud computing provides a virtual data center that provides various software, hardware and information resources where in need, organizations can simply connect cloud and use the available resources on a pay per use basis. For example, can take the case of Gmail. Instead of running an email program in our computer, we log in to a web email account remotely. The software and storage for our account don't exist in our computer , it's on the service's computer cloud. Following are the features:

 Cloud computing is omnipresent, provides myriad of services over the internet. It helps to perform intelligent and small computations.

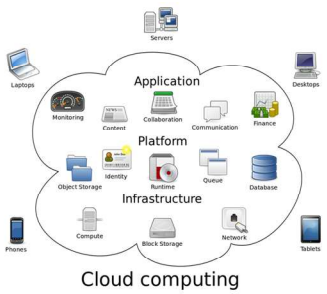
 Resources are easily available through cloud serving multiple users at the same time.

 Updates at the server are done often and the updates are suited with the devices.

 Users are given the option of accessing the data from the cloud and uploading the data into it with the help of logged in device and internet connectivity.

 Cloud provides storage at low costs.

 Even the server fails the data is not lost because the system has already taken the snapshot of the system and it reduces the usage of tangible devices for storage.



Cloud computing

Three services provided by cloud computing are Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS).SaaS uses the web to give applications that are taken care of by a third-party vendor and whose interface accessible on the client's side. SaaS applications can be run directly from a web browser not having the use of any downloads or installations, although some need plugins. SaaS completely removes the need to install and run applications on each computer. Eg. Google apps. PaaS is a framework that can be built upon to develop or customize applications. PaaS brings about the development, testing, and deployment, to be quick, simple, and cost-effective. Third-party provider can handle OSes, virtualization, servers, storage, networking, and the PaaS software.Eg. Apprenda IaaS are models for retrieving, observing, and controlling remote data center infrastructures, such as compute, storage, networking, and networking services (e.g. firewalls). Users purchases IaaS based on utilization, similar to electricity or other utility billing. Cloud computer is the future. It has a profound mark in the field of technology. It is used in all the major state of art technologies.

- Gopika Ajit
  S7 CSE A

IPV6 ADDRESSING

What is an IP address ? As people use their address for their identification and for many services, similarly IP addresses are the unique service of numbers used by the computer on the internet. For transferring a mail or to download anything from any source, for all these IP addresses plays a major role. It is a numerical label assigned to each device connected to a computer network that uses internet protocol for communication. An IP address mainly plays two principle functions and they are host or network interface identification, and location addressing.

Coming on to the different versions of IP address, presently most used version is IP version 4, which was developed when the interest was in it's fancy. And it's this IPV4 reason for 98% of web traffic. Almost 7 billion people, among that 3 billion are connected to the network, where some will have more than one device which is connected literally every second. Only 4.3 billion addresses could be supported by IPV4. Since now even almost all electronic devices are connected to the internet, the IP system becomes very complicated. So a solution to this web traffic IP version 6 was introduced which was launched in 1999. Also, IP version 5 is there, but it's not going to mainstream usage.

IP version 6 addresses are represented as eight groups of four hexadecimal digits separated by the colons. The IP version 4 only supports 32 bits address, but IP version 6 supports 128 - bit address. As IPV4 supports 2^{32} addresses, double this is supported by 2^{33}. Therefore we can imagine how large is 2^{128}. This is a big advantageous reason for the usage of IPV6.

Coming to the addressing methods, unicast addressing, anycast addresses, and multicast addressing which are the primary addressing and routing methodologies common in networking. A unicast address identifies a single network interface where an anycast address is assigned to a group of interfaces, usually belonging to different nodes. A packet that is sent to a multicast address is delivered to all interface that has joined the corresponding multicast group.IPV6 does not implement broadcast addressing.

With IPV6, everything from appliances to automobiles can be interconnected. But an increased number of IP addresses isn't the only advantage of IPV6 over IPV4, it has some other strong advantages too.IPV6 reduce the size of routing tables and makes routing more efficient and hierarchical.IPV6's simplified packet header makes the packet processing more efficient. Compared to IPV4, IPV6 contains no IP-level checksum, so the checksum no need to be calculated at every router hop. It supports multicast rather than the broadcast. That is, it supports directed data flow. Address auto-configuration is built in IPV6, this helps in the simplified network configuration. It also has high levels of the security system.But there are a few disadvantages too. IPV6 addresses are much

longer and involve letters as well as numbers. So they are more difficult to remember. Local networking management often involves assigning specific IP addresses to specific devices, and manually assigning IPV6 addresses can be difficult. Cost of upgrade and occurrence of more internet traffic are also some of its disadvantages.

Coming to an overall view of this technology, IPV6 has overcome many of the limitations of IPV4 by introducing new features and functionality to make the job of the network administrator easier. Where IPV6 is significantly different from IPV4, the changes are meant to enhance the administration experience. Where the similarities to IPV4 remain, the IPV6 protocol feels familiar. In the overcoming of IPV4's weaknesses, IPV6 has made great strides. The fact that the technology is new represents major challenges to implementers. But since the techniques that are used for many IPV4 networks are very similar for IPV6 networks, it allows the IPV6 implementers to leverage their existing expertise in the deployment of next-generation networks using the IPV6 framework.

-ANKITHA. M. S
S3 CSE A

Life in the Unix Terminal

Have you ever considered living entirely in a Unix terminal?

Well sounds very boring and hard at first, doesn't it? But it's doable with time and some initial efforts. But after you get acquainted with the terminal and when you start using it on a daily basis, you may find that not everything comes out of the box, when trying to do some productive work. Well here are some of the most efficient and time-saving CLI-tools that anyone who uses the terminal often can make use of for an improved workflow.

fzf > ctrl+r

In the terminal, using ctrl+r will allow you to search backward through your history. It's a really good feature. But when you have to use it on a regular basis, it becomes cumbersome and hard to navigate between multiple entries with the same keywords. fzf is an interactive Unix filter for command-line that can be used with any list; files, command history, processes, hostnames, bookmarks, git commits, etcAs you can see from the above video, fzf can fuzzy find through your command history. Also, fzf can be extended to be used on any kind of text streams, like navigating to different directories, bookmarking your most visited directories, searching and previewing files etc. Check out the examples section for more implementation details..

Tip:Enable fuzzy completion for commands using TAB key in the terminal by adding these lines to your .bashrc file.

complete -F _fzf_path_completion -o default -o bashdefault <COMMAND_NAME>

Installation Directions

youtube-dl > other video downloading tools.

Oh yeah! Believe me, when I say this, it's the best CLI tool for downloading videos from numerous sites like from YouTube, Dailymotion, Photobucket, Facebook, Yahoo, Metacafe, Depositfiles, and few more similar sites. Let me show you how you can use this.

As simple as it can be, to download a video, say from Youtube, you just have to copy the URL of the video and then run youtube-dl like below.

 # usage: youtube-dl url

youtube-dl

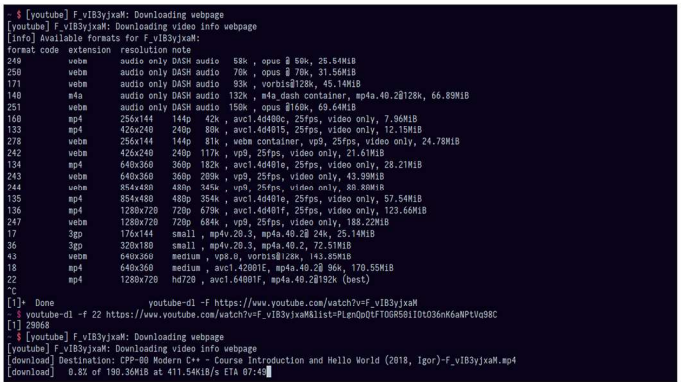
https://www.youtube.com/watch?v=F_vlB3yjxaM&list=PLgnQpQtFTOGR50iltO36nK6aNPtVq98C

By default youtube-dl tries to download the best available quality, i.e. if you want the best quality you don't need to pass any special options, youtube-dl will guess it for you by default.
Now if we want to choose the quality/resolution of the video (which would, in turn

determine the size of the video), then we just have to pass in the "-F" flag. It lists out all possible formats and then from that, we can choose the preferred quality by specifying its corresponding id along with the "-f" flag.

youtube-dl -F url

youtube-dl -f <format code> url



The best part is that youtube-dl tool supports resuming interrupted downloads by default. We can also download the subtitles (if available) along with the video, download a playlist, or even download the videos from a whole channel. It even allows you to download and extract the audio into an audio file of a specific format. The default format is OGG.

youtube-dl -x --audio-format mp3 <video_url>

hyperfine > time

Whenever you run 'time <command>' you could consider running 'hyperfine <command>' to get an answer that has been averaged over multiple runs and which can be very precise for certain commands. I personally use command-line benchmarking to compare different tools. You might want to compare grep, ack, ag, and ripgrep. You could also use it to find an optimal parameter setting for a command-line tool (make -j2 vs. make -j8). For a simple benchmark, you could call hyperfine <command>. If the program execution time is limited by disk I/O, the benchmarking results can be heavily influenced by disk caches and whether they are cold or warm. For such commands, we provide a warm-up time.

hyperfine --warmup 3 'grep -R TODO *'

You could even export the benchmark results into different formats like CSV, JSON, Markdown (see --help text for details).

bat > cat

cat is used to print the contents of a file but given more time spent in the command line, features like syntax highlighting come in very handy. bat has highlighting, paging, line numbers, and git integration. The bat command also allows one to search during output (only if the output is longer than the screen height) using the "/" key binding (similar to "less" command searching).

The simplest way to display a file onto terminal with syntax is by calling bat <filename>.

bat note.md

We can read from stdin, and determine the syntax automatically :

curl -s https://sh.rustup.rs | bat

other common use cases include :

bat > note.md # quickly create a new file
bat header.md content.md footer.md > document.md
bat -n main.rs # show line numbers (only)
bat f - g # output 'f', then stdin, then 'g'.

entr > watch

Now, this tool is pure gold! The Event Notify Test Runner(ENTR) is a general purpose Unix utility which can provide rapid feedback and can perform certain commands based on conditions. It's very much minimal and is as simple as possible.

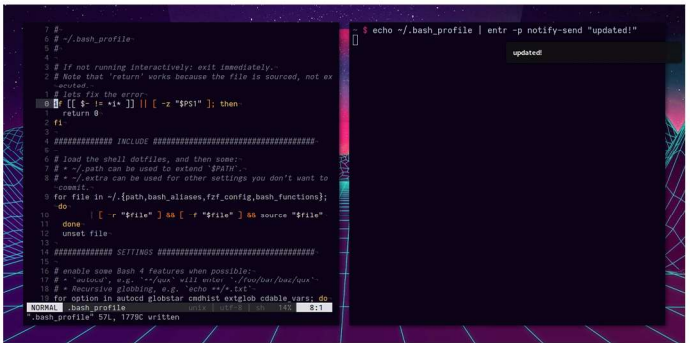
Say for example, if I want to be notified(with notify-send you can send desktop notifications) every time my .bashrc file has been updated, then i could simply do this with entr:

echo ~/.bashrc | entr -p notify-send "updated"

Why echo though? that command could be anything at all. entr can read from stdin. The "-p" flag is used to suppress the initial notification.

watching for new files in a particular directory :

while true; do
ls -d src/*.py | entr -d ./setup.py
done!!!



entr can be further extended to work with live markdown preview, live latex compilation and display using a pdf viewer, or even live reloading of a web-page etc.

- Yedhin Kizhakkethara
S5 CSE - B

LINEAR REGRESSION IN ML

Machine learning or predictive modeling mainly deals with reducing the error of a model or making an accurate prediction, only that wehave to explain how it happens. In machine learning, we will refer and use many algorithms from many different fields but it mainly includes statistics and our application of them in this field.

As such, linear regression was developed in the field of statistics. Linear regression is mainly used for identifying and analyzing the relationship between input and output numerical variables but borrows some part of machine learning. Therefore it is both a statistical algorithm and a machine learning algorithm.Currently, linear regression is one of the most popular and easy to understand algorithms in not only machine learning field but also the statistics field.

Linear regression is basically a linear model, that is they can help us understand and predict the behavior of complex systems or analyze data. For example, take a model that shows a linear relationship between many input variables X and only a single output variable Y. Here Y can be calculated by taking the combinations of input variable X.

Here when there is an only a single input X, we use a term known simple linear regression and when there are multiple inputs X, we term it as multiple linear regression.Different techniques can be used to prepare the linear regression equation from data: Simple Linear Regression, Gradient Descent, Regularization and most commonly used Ordinary Least Squares.

Simple Linear Regression

By simple linear regression, we can use statistics to estimate the coefficients when we have a single input. For this, we have to calculate statistical properties from the data such as means, standard deviations, correlations and covariance. To traverse and calculate statistics all of the data must be available.

Gradient Descent

Suppose the number of inputs is greater than or equal, we have to optimize the values of the coefficients by iteratively depreciating the error of the model on your training data. This is called Gradient Descent and works by beginning with some arbitrary values for every coefficient. The errors are squared and their sum is calculated for each input and output pair values. Alpha (Learning rate) is used as a scale factor. The coefficients are updated so as to minimize errors. This process goes on until the merest error is obtained. In this method, a learning rate that determines the size of change for each iteration of the procedure is to be selected.

Regularization

There are two famous examples of Regularization procedures for linear regression, Lasso Regression and Ridge

Regression. In Lasso Regression Ordinary Least Squares is modified to get least value for the absolute sum of the coefficients Also called as L1 regularization. In Ridge Regression, Ordinary Least Squares is modified to minimize the squared absolute sum of the coefficients. Also called L2 regularization.

- Sachit Anand
S3 CSE - B

HAPTIC TECHNOLOGY

Nature, including all the five elements of the earth have given us plenty of opportunities to develop things, coming out of our mind. We are the future generation which shapes the world, to make it, a better place to live in not, only through cultural aspects or rotten learning, but through an imaginary world of technology too. It not only improves our capability, but the economic status of the whole nation is brought up. Haptics is not just a mere "seven letter Greek word", it means a form of interaction, which mainly involves the sensation of touch.

This was a great technological evolution in the history of technology .Haptics once when made out to work well; it was made to be introduced into different fields: medical, physical rehabilitation, phones, robotics, and virtual reality.

The craze of man, behind technology, has made it possible for future generations to live in a world filled with technology.

In Biomedical Field

As said earlier, Haptics is a sensation of touch. it was and is, a boon to the medical field, which had to lend a helping hand to the professional doctors. Age is an inevitable process .even if a doctor is so excellent in his or her works, it will not last as ages pass by. so Haptics, gave a solution for the shivering hand of the people, next to god. This had helped the professional doctors to assist their juniors in major surgeries. Through this, they could get a sensational touch feel, for the organs of a patient even though they don't actually, touch with their hands, mostly used in laparoscopic surgeries.

We all wonder how does it work, right? Here goes the answer. A surgeon may receive tactile feedback due to side collisions of a Haptic device with the 3D models of the organs.

There are lots of challenges while applying Haptics: the Elasticity, roughness, non-linear anisotropy, the depth, homogeneous and heterogeneous layering. So to overcome such problems of tactile feedback, there are two methods –particle based and finite element based.

Particle-based tactile feedback is a type of Haptic feedback, where the virtual organs are divided into nodes where each node are connected using springs and these are having different velocity acceleration etc. Finite element based tactile is the next type where the virtual organs are divided into parts into surface elements .the properties are decided by each element which is joined to form the forces that for during deformation by using surgical instruments. This helps the doctors from taking any kind of risk, as the operations become perfect, without any kind of major issues. and it also prevents the patient from being tensed of whether the surgery would be appropriate or not.

"HAPTICS HAS FINALLY GAINED THE SOLUTION AND TRUST OF PEOPLE FROM DIFFERENT TYPES OF CULTURE, CREED, GENDER AND AGE ESPECIALLY IN THE FIELD OF MEDICAL SCIENCE."

So friends, "without humans there is no evolution of technology and without technology, humans won't exist"

- ROSE STOMBEL
S1 CSE - B

APPLICATION OF IOT IN HEALTH CARE

The boom in healthcare industry indicates the increase in diseases and aging population. The ever-increasing medical expenses drive 39 million Indians to poverty every year. Medical diagnosis eat-up a substantial amount of hospital bills. The influence of technology in the medical field has changed the healthcare sector.

From anesthetics to magnetic resonance imaging scanners and radiotherapy, the world of medicine has dramatically changed. The advancement in IoT is no exception. It has numerous applications in the medical field. By using advanced wearable sensors, we are able to monitor the health of a person at home, reducing regular hospital checkups. We are also capable of increasing the quality and efficiency of medical checkups.

IoT aids in the early detection of many distinct health conditions and also helps in times of medical emergencies. The IoT used in healthcare is also known as IoMT (Internet of Medical Things). It is an extension of Supervisory control and data acquisition (SCADA) which is a type of software application program for controlling the process and collecting data in actual time from secluded regions to control equipment.

BENEFITS

COST EFFECTIVE AND "END TO END CONNECTIVITY"

IoT implements "interoperability" and system

to system communication (i.e. interconnecting systems via the network without human interactions), data movement and exchange of information helps to manage healthcare services efficaciously. The more the use of IoT the more information it provides about the patient's database. It helps in identifying several ailments and can immediately start the treatment. The cost hence reduces significantly and is more reliable.

TRACKING AND ALERTS

IoT gadget compiles and transfers parameters such as blood sugar levels, pressure, ECG's, etc... and are reserved in the cloud which can be easily shared with certified doctors. Remote monitoring systems can either be a wearable or ambient sensor which is used for compiling patient's health information and alert the respective medical centers in case of medical emergencies. This helps hospitals to be prepared for medical procedures irrelevant of time and can reduce emergency

causalities. Several ambulant patients in the facility can also be easily tracked using this technology. Thus, IoT provides live tracking and alerting system which helps in improving the patient database substantially.

Eror Reduction using RF Identification Technology

"RFID" (radio frequency identification) is regularly used in medical shops for the restocking process and is extremely accurate and error free. It helps in reducing the time consumption of restocking and increases efficiency.

Monitoring Medical Equipment

RFID tags are fixed on the medical equipment's and can easily be tracked by patient and doctors alike using its app. It enables the user to locate each of the equipment's that are having RFID tags.

Challenges

PRIVACY AND STANDARD PROTOCOLS

Almost every IoT devices lack privacy and data protocols. As it lacks proper security protocols, anyone with hacking skills is able to easily retrieve the private health details of patients. Personal Health Information (PHI) of the patient or the doctors can be misused to create fake ids to buy and sell drugs and other medicines. Also, false medical insurance claims can also be filed by hackers to make money.

ACCURACY AND DATA OVERLOAD

As IoT is an advancing field, the accuracy can only be up to an extent.
There can be small unconditional errors which occur due to failure in the proper transfer of accurate data from a sensor or from the cloud. The amount of data that is readily stored every second from the user can also result in data overloading. It can affect the accuracy and evaluation of a patient's health. Hence it is important to understand the limitations of IoT and utilize it with proper instructions.

Application

- Reducing emergency room wait time.
- Tracking patients, staff and inventory.
- Enhancing drug management.
- Ensuring the availability of critical hardware.
- In Computer vision technology

Healthcare charting: IOT devices such as Audemix reduce much manual work which a doctor has to do during patient charting. It is powered by voice commands and captures the patient's data. It makes the patients' data readily accessible for review. It saves around doctors work by 15 hours per week.Several

wearables and devices which has made lives of patients comfortable.

Hearables: new age hearing aids which are compatible with Bluetooth that syncs your smartphone with it (eg: Doppler labs).

Ingestible sensors: Pill sized sensors which monitor the medication in our body and warns us if it detects any irregularities (Proteus Digital Health is an example).

Moodables: Moodables are head-mounted wearables that send low-intensity current to the brain which elevates our mood (thync and Halo Neurosciences are working on it).

Conclusion

It is a matter of fact that IoMT is providing to be a boon for the healthcare sector but it has several challenges as well. It has great potential to transform the healthcare industry but it needs to be used in the right way.

-Devu R Kurup
S3 CSE A

DUELING NEURAL NETWORK

Technological advances have defined our age. With the 'coming of age' of technology, they literally control our day to day life. Technology trends such as Artificial intelligence and machine learning have been touted by the world's biggest technology leaders for some time. It further pursues creating a computer or machines as intelligent as human beings. AI is a way of making a computer-controlled robot, or a system thinks intelligently.

"Success in creating AI would be the biggest even in human history".

Resonating this famous quote by Stephen Hawking, AI has yet created another miracle in the dual - neural network. This approach known as a generative adversarial network(GAN) takes two neural networks, the simplified mathematical models of the human brain that reinforces most modern machine learning and pits them against each other in a digital cat and mouse Game. GAN was experimented by Ian Goodfellow zthen, Ph.D. student at the University of Montreal.

The two are trained on the same data set. One known as the generator is undertaken creating variations on emerging it's already seen. The second known discriminator asked to identify whether the example it sees is like images it has been trained on or a false produced by the generator.Over the past couple of years, these have been steady and advancements of GAN's with hundreds of variants created and many more innovations underway.
Main areas of GAN's would be :

1. Creative pursuits

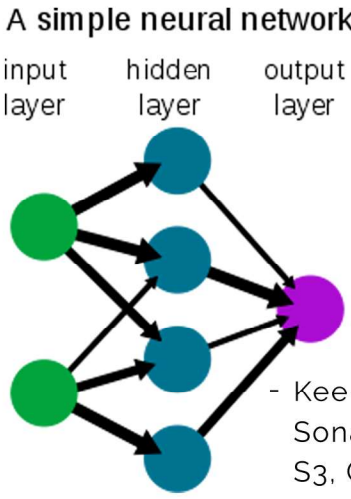
Machines coming up with a new found approach to mimic real images. GAN's have started creative creating imaginary celebrities or new masterpiece that bear a distinctive signature of artists

2. Translating text

By creating new flora and fauna to user specification a short description, GAN's have been grading a wide range of demands for users.

3. Generate training data

They can shift AI into the fast-lane progress by creating a tone of training data.
The main advantage of GAN is it produces very realistic images of humans, animals, etc. They have also been applied to high impact business applications like drug discovery. The object is to generate artificial data that is indistinguishable from real data by another



- Keerthana Krishnakumar
Sona Grace John,
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HOLOGRAPHIC DATA STORAGE

Holographic Data Storage is a potential technology in the area of high capacity data storage, which is now currently dominated by magnetic and optical data storage. Magnetic and Optical data storage devices rely on individual bits being stored as distinct Magnetic and Optical changes on the surface of the recording medium. While holographic data storage records data throughout a given volume and is capable of recording multiple images in the same volume using the light at a different angle. The main advantages of the holographic data storage are it can read and record a large number of bits in parallel thus the time consumed by this device is very low. In conventional data storage, the data is written in a 2-Dimensional manner, also this type of data storage consumes a large storage space for less data. Whereas in holographic data storage the data is written in a 3-Dimensional manner, using this technology a few Terabytes of data can be stored in a much smaller device. Also, this device is predicted to last for a large number of years.

Recording and Reading of data

In Magnetic Storage Devices there is a large shiny, circular "plate" of magnetic material called a platter, divided into billions of tiny areas. Each one of those areas can be independently magnetized (to store a 1) or demagnetized (to store a 0). These platters rotate at up to 10,000 revolutions per minute (rpm) so the read-write heads can access any part of them. These read and write head move across the from the center to the outer edge and back again repeatedly to access the data. There are two read-write heads for each platter, one to read the top surface and one to read the bottom Here the data is stored in a very orderly pattern on each platter. Bits of data are arranged in concentric, circular paths called tracks. Each track is broken up into smaller areas called sectors. Part of the hard drive stores a map of sectors that have already been used up and others that are still free. (In Windows, this map is called the File Allocation Table or FAT.) When the computer wants to store new information, it takes a look at the map to find some free sectors. Then it instructs the read-write head to move across the platter to exactly the right location and store the data there. To read information, the same process runs in reverse.

In holographic data storage once the page of data is created, the next step is to fire a laser beam into the beam splitter to produce two identical beams. one of the beam is directed away from the SLM--this beam becomes the reference beam and the one which is directed toward the SLM is called the information beam.hen the information beam passes through the SLM, a portion of the light is blocked by the opaque area of the page, and the portions pass through the translucent area. In this way, the information beam carriers the image once it passes through the SLM. When the reference beam and the information beam rejoin on the axis, they create a pattern of light interference the holographic data.

- Naveen P Jacob
S1 CSE B

PERFECT ONLINE PRIVACY

Earlier online privacy was a difficult task. But now true online privacy may be finally possible on the Internet with this tool. On the internet, while using some applications we may be forced to reveal our personal details in order to proceed. For example, we may have to give the date of birth to prove we are over 18. But this tool allows proving we are over 18 without disclosing our personal details. By using this tool we are free from the risk of identity theft. The tool is zero-knowledge proof, an emerging cryptographic protocol. With this tool perfect privacy is now possible.

Cryptocurrency Zcash providing online privacy

Much of the merit of a Zero-Knowledge practice proof lies in Zcash, a digital currency launched in late 2016. Zcash developers used a method called zk-SNARK . The acronym zk-SNARK stands for "Zero-Knowledge Succinct Non-Interactive Argument of Knowledge" . Vitalik Buterin, the creator of Ethereum, the second most popular blockchain chain in the world, described the zk-SNARK as a "revolutionary technology". It refers to a proof construction where one can prove possession of certain information, without revealing that information. In order to have zero-knowledge privacy in Zcash, the function determining the validity of a transaction according to the network's consensus rules must return the answer of whether the transaction is valid or not. It allows us to do anonymous transactions.

In case of cryptocurrencies like Bitcoin and in most other public blockchain systems, transactions are visible to everyone, anonymous transactions are not possible. Although these transactions are theoretically anonymous, they can be combined with other data to track and even identify users. This tool is helpful to ensure the privacy of details and also resolves security concerns put across by financial institutions. For these financial institutions, for example, banks, this could be a way to use blockchain in their payment systems without sacrificing their clients' privacy. Last year, one of the major banks JPMorgan Chase added zk-SNARKs to its own blockchain-based payment system to ensure privacy.Even though they ensure privacy, privacy protocols like zk-SNARK are heavy and slow. Also, they require a "secure configuration," which creates a cryptographic key. It will be dangerous if this key falls in the wrong hands.

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