KARPAGAM
COLLEGE OF ENGINEERING
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TECHTODAY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

KARPAGAM COLLEGE OF ENGINEERING

2022-2023

COMPUTER SCIENCE AND ENGINEERING

VISION

To create computer professionals with a strong academic and technical background to achieve special distinction at the national and international arena and also to serve and lead the society.

MISSION

- Providing excellent learning opportunities for students in Computer Science and Engineering to meet the needs of Nation as a whole.
- Establishing centers of research in areas of immediate needs to society.
- Develop ICT based solutions for the development of the nation.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Programme Educational Objectives (PEOs)

1.PEO1:

Graduates will be able to comprehend mathematics, science, engineering fundamentals, laboratory and work-based experiences to formulate and solve problems in Computer Science and Engineering and other related domains and will develop proficiency in computer based engineering and the use of computation tools.

2.PEO2:

Graduates will be prepared to communicate and work effectively on the multidisciplinary engineering projects practicing the ethics of their profession with a sense of social responsibility.

3.PEO3:

Graduates will recognize the importance of lifelong learning to become experts either as entrepreneurs or employees and to widen their knowledge in their domain.

Programme Outcomes

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering Problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental Considerations .

PO4: Conduct investigations of complex problems: Use research-based knowledge and Research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and Information Technology tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 : The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES

PSO-1: Analyze, design, implement, test and evaluate computer programs in the areas related to algorithms, networking, web design, cloud computing, Internet of Things (IoT) and data analytics of varying complexity.

PSO-2: Develop innovative ideas to provide solutions for complex problems and apply advanced knowledge of computer science domain to identify research challenges in Computer Science and Engineering.

TECH TODAY MAGAZINE 2022-2023

ABOUT THE DEPPARTMENT

The Department of Computer Science and Engineering was established in the year 2000 and it offers four year undergraduate program in Computer Science and Engineering. The Department is located in a newly constructed 70000 Sq.ft high-tech Computer Science and Information Technology block. The Computer Science and Information Technology block also includes a separate laboratory block and an Open Air Theatre with a capacity to accommodate 500 students. The Department has a separate library of more than 1000 books, international journals, national journals, magazines, back volumes, project reports and lecture CDs. The department maintains exclusive question bank library comprising vast collection of courses related to computer science and engineering. The department has good record of student placements in national, international and multinational companies.

The Department imparts value addition to the students by providing weekend courses on fundamentals and also by aiding students with industry sponsored programs offered through the coordinated efforts of the faculty and industry partners from IBM, Infosys, RedHat Academy, ICT Academy and Oracle Workforce Development Programme (WDP).

Department of Computer Science and Engineering has signed MOU with IBM, Oracle, Global Edge, Microsoft India Ltd, Red Hat Academy and Infosys to help the students in training and to instill them with skilled resources based on leading software technologies. Periodic faculty Enablement Programmes are offered to our faculty members by technical experts from Infosys and ICT Academy. The department has 9 laboratories with 567 computers.

Program Offered

B.E COMPUTER SCIENCE AND ENGINEERING

STUDENT ARTICLE

STUDENT ARTICLE

INDRODUCTION TO SCREEN LESS DISPLAYS

SCREEN LESS DISPLAYS

Now a days, advanced technologies are growing faster wherein each technology is renewed with implementation of new one. The current trending display technology most commonly used in gadgets such as tablets, smart phones, etc., is the touch-screen display, which will become outdated in the near future. Screen less display is the advanced display technology, which replaces the touch screen technology to resolve the problems and to make lives more comfortable. Therefore, this article is intended to give an idea of the screen less display, which transmits or displays the information without using a projector or the screen. By using this screen less display technology, we can display the images directly on the open space, human retina and also to the human brain.

Screen less display is an interactive projection technology developed to solve the problems related to the device miniaturization of the modern communication technologies. The lack of space on screen based displays provides an opportunity for the development of screen less displays. As the name indicates screen less display has no screen and it can be defined as a display used to transmit any data such as pictures or videos without the help of screens.

Screenless Display

Types of Screen less Display

Screen less display technology is divided into three main categories:

- Visual Image Display
- Retinal Display
- Synaptic Interface

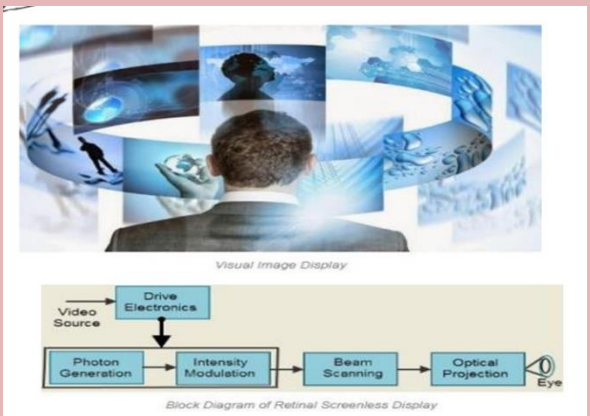
The first category, visual image is defined as the things that can be seen by the human eye such as holograms. The second category, retinal display – the name itself- indicates the display of image directly onto the retina. The third category synaptic reference which means sending information directly to the human brain. Let us look in detail about these three display types.

1.Visual Image Display

The visual image is a type of screen less display, which recognizes any type of image or thing with the help of the human eye. The following are few examples of the visual image display: holographic display, virtual reality goggles, heads up display, etc. The working principle of this display states that the light gets reflected by the intermediate object before reaching the retina or the eye. The intermediate object can be a hologram, Liquid Crystal Displays (LCD) soreven windows.

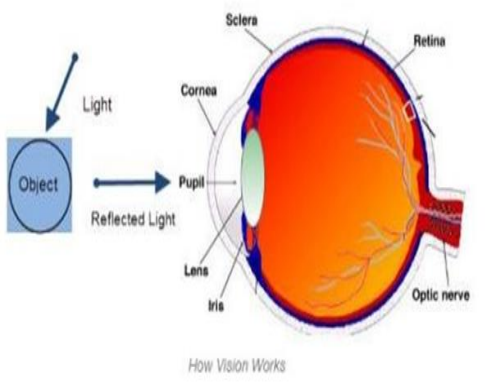
2.Retinal Display

The second category of advancement in display system, retinal display as the name itself indicates the display of image directly onto the retina. Instead of using some intermediate object for light reflection to project the images, thisdisplay directly projects the image on to the retina. The user will sense that thedisplay is moving freely in the space.

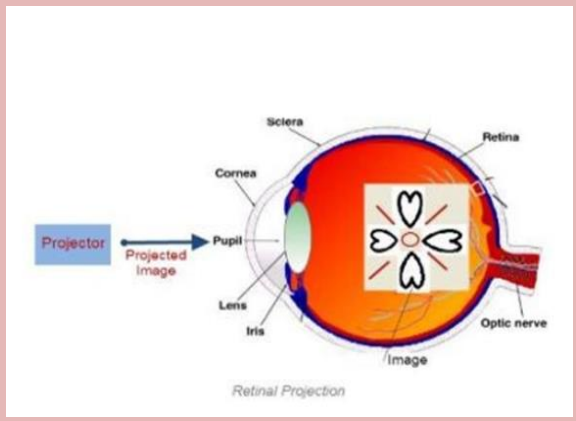


The block diagram of the virtual retinal display consists of following blocks: Photon generation, intensity modulation, beam scanning, optical projection and drive electronics. Photon generation block generates the coherent beam of light; this photon source makes use of the laser diodes as coherent.

Source with retina display to give a diffraction onto the retina of the human eye. The light generated from photon source is intensity modulated. The intensity of the light beam gets modulated to match the intensity of the image.



The modulated beam gets scanned by the beam scanning. By using this scanning block, the image is placed onto the retina. In this beam scanner, two types of scanning modes takes place: raster mode and vector mode. After the scanning process, optical projection takes place for projecting a spot-like beam onto the retina of the eye. The spot focused on the eye is sketched as an image. A drive electronics placed on the photon generator and intensity modulator is used for synchronization of the scanner, modulator and coming video signal. These displays are made available in the market by using MEMS technology.

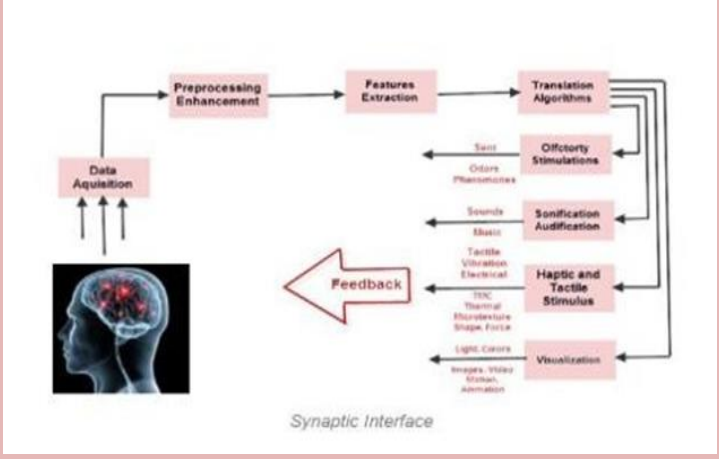


1.Synaptic Interface:

The third category, synaptic interface means sending information directly to the human brain without using any light. This technology is already tested on humans and most of the companies started using this technology for effective communication, education, business and security system. This technology was successfully developed by sampling the video signals from horse crab eyes through their nerves, and the other video signals are sampled

from the electronic cameras into the brains of creatures.

The brain computer interface allows direct interaction between the human brainand external devices such as computer. This category can also be known by different names such as human machine interface, synthetic telepathy interface, mind machine interface and direct neural interface. These are the three types of latest Screen less displays which replace the current use of touch screen technology to fill the lack of space in the screen- based electronic displays. We hope that the future definitely looks promising for this technology. Let us wait for the day when we all will be treated by this technology. Leave your comments below.



Synaptic Interface

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COMPUTER NETWORKING

What is computer networking?

Computer networking refers to interconnected computing devices that can exchange data and share resources with each other. These networked devices use a system of rules, called communications protocols, to transmit information over physical or wireless technologies.

How does a computer network work?

Nodes and links are the basic building blocks in computer networking. A network node may be data communication equipment (DCE) such as a modem, hub or,switch,or data terminal equipment(DTE) such as two or more computers and printers. A link refers to the transmission media connecting two nodes. Links may be physical, like cable wires or optical fibers, or free space used by wireless networks.

In a working computer network, nodes follow a set of rules or protocols that define how to send and receive electronic data via the links. The computer network architecture defines the design of these physical and logical components. It provides the specifications for the network's physical components, functional organization, protocols, and procedures.

What do computer networks do?

Computer networks were first created in the late 1950s for use in the military and defense. They were initially used to transmit data over telephone lines and had limited commercial and scientific applications. With the advent of internet technologies, a computer network has become indispensable for enterprises.

Modern-day network solutions deliver more than connectivity. They are critical for the digital transformation and success of businesses today. Under lying network capabilities have become more programmable, automated, and secure. Modern computer networks can:

Operate virtually

The underlying physical network infrastructure can be logically partitioned to create multiple "overlay" networks. In an overlay computer network, the nodes are virtually linked, and data can be transmitted between them through multiple physical paths. For example, many enterprise networks are over laid on the internet.

Modern networking services connect physically distributed computer networks. These services can optimize network functions through automation and monitoring to create one large-scale, high- performance network. Network services can be scaled up or down based on demand.

Respond Quickly to Changing Conditions

Many computer networks are software-defined. Traffic can be routed and controlled centrally using a digital interface. These computer networks support virtual traffic management.

What are the types of computer network architecture?

Computer network design falls under two broad categories:

1.Client-server architecture

In this type of computer network, nodes may be servers or clients. Server nodes provide resources like memory, processing power, or data to client nodes. Server nodes may also manage client node behavior. Clients may communicate with each other, but they do not share resources. For example, some computer devices in enterprise networks store data and configuration settings. These devices are the servers in the network. Clients may access this data by making a request to the server machine.

In Peer-to-Peer (P2P) architecture, connected computers have equal powers andprivileges. There is no central server for coordination. Each device in the computer network can act as either client or server. Each peer may share some of its resources, like memory and processing power, with the entire computer network. For example, some companies use P2P architecture to host

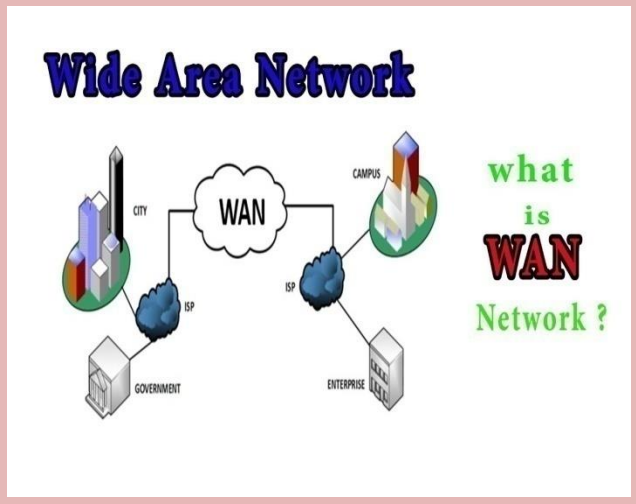
memory- consuming applications, such as 3-D graphic rendering, across multiple digital devices.

Local area network(LAN)

A LAN is an interconnected system limited in size and geography. It typically connects computers and devices within a single office or building. It is used by small companies or as a test network for small-scale prototyping.

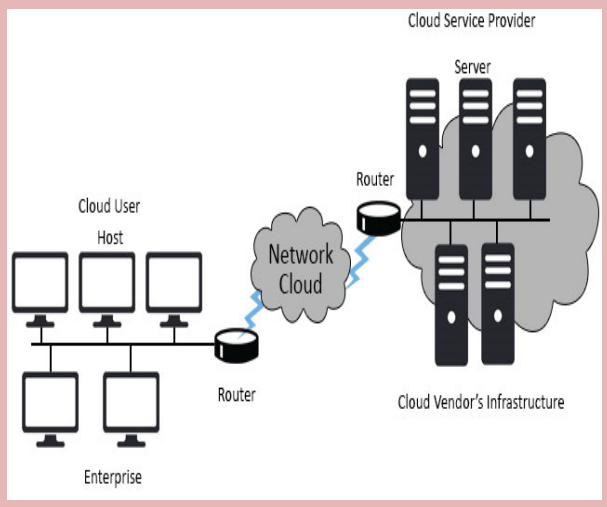
Wide area networks(WAN)

An enterprise network spanning buildings, cities, and even countries, is called a wide area network (WAN). While local area networks are used to transmit data at higher speeds within close proximity, WANs are setup for long-distance communication that is secure and dependable.SD-WAN or software-defined WAN is virtual WAN architecture controlled by software technologies. An SD-WAN offers more flexible and dependable connectivity services that can be controlled at the application level without sacrificing security and quality of service.



Cloud networks

Conceptually, a cloud network can be seen as a WAN with its infrastructure delivered by a cloud-based service. Some or all of an organization’s network capabilities and resources are hosted in a public or private cloud platform and made available on demand. These network resources can include virtual routers, firewalls, bandwidth, and network management software, with other tools and functions available as required. Businesses today use cloud networks to accelerate time-to-market, increase scale, and manage Costs effectively.



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3-D OPTICAL DATA STORAGE

3-D OPTICAL DATA STORAGE INTRODUCTION:

3D optical data storage is the term given to any form of optical data storage in which information can be recorded and/or read with three dimensional resolution (as opposed to the two dimensional resolution afforded, for example, by CD).This innovation has the potential to provide by te-level mass storage on DVD-sized disks. Data recording and read back are achieved by focusing lasers with in the medium. No commercial product based on 3D optical data storage has yet arrived on the mass market, although several companies are actively developing the technology and claim that it may be come available "soon".

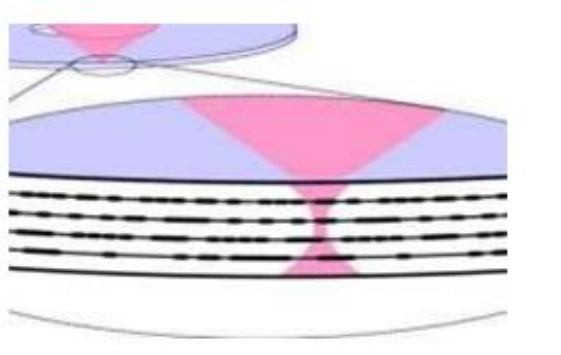
MEDIA FORM FACTOR:

Media for 3D optical data storage have been suggested in several form factors: Disc: A disc media offers a progression from CD/DVD, and allows reading and writing to be carried out by the familiar spinning disc method. Card: A credit card form factor media is attractive from the point of view of portability and convenience, but would be of a lower capacity than a disc. Crystal, Cube or Sphere: Several science fiction writers have suggested small solids that store massive amounts of information, and at least in principle this could be achieved with 3D optical data storage.

MEDIAMANUFACTURING:

The simplest method of manufacturing - the molding of a disk in one piece is a possibility for some systems. A more complex method of media manufacturing is for the media to be constructed layer by layer. This is required if the data is to be physically created during manufacture. However, layer- by layer

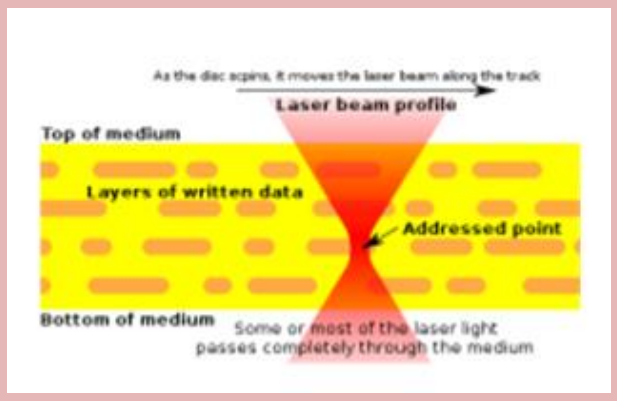
construction need not mean the sandwiching of many layers together.



Drive Design Laser Variables Pherical Aberration Correction:

A drivede signed to read and write to 3Doptical data storage media may have a lot in common with CD/DVD drives, particularly if the form factor and data structure of the media is similar to that of CD or DVD. However, there are a number of notable differences that must be taken into account when designing such a drive, including: Laser Variable spherical aberration correction Optical system Detection Data tracking. In addition to the academic research, several companies have been set up to commercialize 3D optical data storage and some large corporations have also shown an interest in the technology. However, it is not yet clear whether the technology will succeed in the market in the presence of competition from other quarters such as hard drives, flash storage, and holographic storage.

Examples of 3D optical data storage media. Top row - Written Call/Recall media; Mempile media. Middle row - FMD; D-Data DMD and drive. Bottom row - Landover media; Microholas media in action.



ADVANTAGES:

- Durability With proper care, optical media can last a long time, depending on what kind of optical media you choose. Great for archiving.
- Several forms of optical media are write- once read-many, which means that when data is written to them, they cannot be reused.
- This is excellent for archiving because data is preserved permanently with no possibility of being over written.

Transportability. Optical media are widely used on other platforms, including the PC.

- Optical media provide the capability to pin point a particular piece of data independent of the other data on the volume or the order in which that data Was stored on the volume.

DISADVANTAGES:

- Reusable.
- The write-once read-many (WORM) characteristic of some optical media makes it excellent for archiving, but it also prevents you from being able to use that media again.
- Writing time the server uses software compression to write compressed data to your optical media.
- This process takes consider able processing unit resources and may increase the time needed to write and restore that data.

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CLOUD STORAGE

WHAT IS THE CLOUD?

The cloud is simply a network of computers. It refers to a network of computers owned by one person or company, where other people or companies can store their data. On your personal machine, everything is stored on one physical storage device – your hard drive.

Advantages of the Cloud:

Syncing

Many cloud storage services offer syncing services. When you set up the software on your local machine, it will create a special folder on your computer and any changes made to the files in that folder will be automatically synced to your cloud storage as long as your computer is connected to the internet.

When you access your cloud storage from a different computer, you will see the same files that are in that folder on your personal computer. Also, any files you upload to your cloud storage from a different computer will be synced to that same cloud storage folder.

Convenience

One of the biggest benefits of using the cloud is that your data can be accessed from multiple devices. Cloud storage services can usually be accessed from any device with an internet 4 connection. You can check your email, read your documents, view your online photos, or listen to your online music from any computer, tablet, or internet-enabled cell phone.

Online Backups

One advantage to using a cloud service is that it can serve as an online backup for important files in case your computers tops working. If your computer crashes or you accidentally delete pictures from your hard drive.

Disadvantages of the Cloud Internet :

Connection Required

Since data stored on the cloud is on a third party's computer, you will need an internet connection to access it. If you do not have access to the internet, you will not be able access the network of computers that store your data.

Bandwidth Costs

Bandwidth refers to the amount of data that can be carried over the internet from one point to another. Some internet service providers give users a monthly bandwidth allocation. By transferring data to and from the cloud, you will be using part of the allocation and may have to pay overage charges if you go over that allocation.

CLOUD STORAGE SERVICES:

There are many cloud storage services available and many offer a free plan for a limited amount of space. Depending on your needs, a free plan might be plenty for you.

- Google Drive
- AppleiCloud

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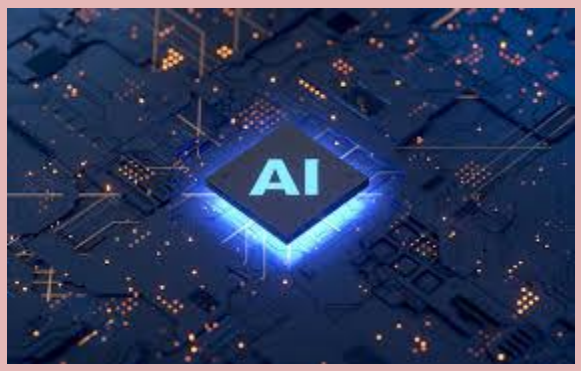
ARTIFICIAL INTELLIGENCE



According to the father of Artificial Intelligence John McCarthy, it is “The science and engineering of making intelligent machines, especially intelligent computer programs”. Artificial Intelligence is a way of making a computer, a computer-controlled robot, or software thinks intelligently, in the similar manner the intelligent humans think. AI is accomplished by studying how human brain thinks and how humans learn, decide, and work while trying to solve a problem, and then using the outcomes of this study as a basis of developing intelligent software and systems.

What Contributes to AI?

Artificial intelligence is a science and technology based on disciplines such as Computer Science, Biology, Psychology, Linguistics, Mathematics, and Engineering. A major thrust of AI is in the development of computer functions associated with human intelligence, such as reasoning, learning, and problem solving.

Programming Without and With AI

The programming without and with AI is different in following ways:

Programming Without AI	Programming With AI
A computer program without AI can answer the **specific** questions it is meant to solve.	A computer program with AI can answer the **generic** questions it is meant to solve.
Modification in the program leads to change in its structure.	AI programs can absorb new modifications by putting highly independent pieces of information together. Hence you can modify even a minute piece of information of program without affecting its structure.
Modification is not quick and easy. It may lead to affecting the program adversely.	Quick and Easy program modification.

Applications of AI:

AI has been dominant in various fields such as: Gaming AI plays a crucial role in strategic games such as chess, poker, tic-tac-toe, etc., where machines can think of a large number of possible positions based on heuristic knowledge. Natural Language Processing It is possible to interact with the computer that understands natural language spoken by humans. Expert Systems There are some applications which integrate machine, software, and special information to impart reasoning and advising. They provide explanation and advice the users. Vision Systems These systems understand, interpret, and comprehend visual input on the computer. For example, a spying air plane takes photo graphs which are used to figure out spatial information or map of the areas. Doctors use a clinical expert system to diagnose. The patient. Do Police use computer software that can recognize the face of a criminal with the stored portrait made by a forensic artist?

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Roll Number:20P214

ARTIFICIAL INTELLIGENCE

DATAMINING

The process of extracting information to identify patterns, trends, and useful data that would allow the business to take the data-driven decision from huge sets of data is called Data Mining. In other words, we can say that Data Mining is the process of investigating hidden patterns of information to various perspectives for categorization into useful data, which is collected and assembled in particular are a such as data warehouses, efficient analysis, data mining algorithm, helping decision making and other data requirement to eventually cost-cutting and generating revenue.

Data mining is the act of automatically searching for large stores of information to find trends and patterns that go beyond simple analysis procedures. Data mining utilizes complex mathematical algorithms for data segments Data Mining are also called Knowledge Discovery of Data (KDD).

1.Relational Database

A relational database is a collection of multiple data sets formally organized by tables, records, and columns from which data can be accessed in various ways without having to recognize the database tables. Tables convey and share information, which facilitates data search ability, reporting, and organization.

A Data Warehouse is the technology that collects the data from various sources within the organization to provide meaningful business insights. The huge amount of data comes from multiple places such as Marketing and Finance. The extracted data is utilized for analytical purpose sand helps in decision- making for a business organization. The data warehouse is designed for the analysis of data rather than transaction processing.

The Data Repository generally refers to a destination for data storage. However, many IT professionals utilize the term more clearly to refer to a specific kind of setup within an IT structure.

For example, a group of databases, where an organization as kept various kinds of information.

Object-Relational Database:

A combination of an object-oriented database model and relational database model is called an object-relational model. It supports Classes, Objects, Inheritance, etc. One of the primary objectives of the Object-relational data model is to close the gap between the Relational database and the object-oriented model practices frequently utilized in many programming languages, for example, C++, Java, C#, and so on.

A transactional database refers to a database management system (DBMS) that has the potential to undo a database transaction if it is not performed appropriately. Even though this was a unique capability a very long while back, today, most of the relational database systems support transactional database activities.

Data Mining Applications

Data Mining in Healthcare:

Data mining in healthcare has excellent potential to improve the health system. It uses data and analytics for better insights and to identify best practices that will enhance health care services and reduce costs. Analysts use data mining approaches such as Machine learning, Multi-dimensional database, Data visualization, Soft computing, and statistics. Data Mining can be used to forecast patients in each category. The procedures ensure that the patients get intensive care at the right place and at

the right time. Data mining also enables healthcare insurers to recognize fraud and abuse.

Data Mining in Market Basket Analysis:

Market basket analysis is a modeling method based on a hypothesis. If you buy a specific group of products, then you are more likely to buy another group of products. This technique may enable the retailer to understand the purchase behavior of a buyer. This data may assist the retailer in understanding the requirements of the buyer and altering the store's layout accordingly. Using a different analytical comparison of results between various stores, between customers in different demographic groups can be done.

Knowledge is the best asset possessed by a manufacturing company. Data mining tools can be beneficial to find patterns in a complex manufacturing process. Data mining can be used in system-level designing to obtain the relationships between product architecture, product portfolio, and data needs of the customers. It can also be used to forecast the product development period, cost, and expectations among the other tasks.

Billions of dollars are lost to the action of frauds. Traditional methods of fraud detection are a little bit time consuming and sophisticated. Data mining provides meaningful patterns and turning data into information. An ideal fraud detection system should protect the data of all the users. Supervised methods consist of a collection of sample records, and these records are classified as fraudulent or non-fraudulent. A model is constructed using this data, and the technique is made to identify whether the document is fraudulent or not.

Apprehending a criminal is not a big deal, but bringing out the truth from him is a very challenging task. Law enforcement may use data mining techniques to investigate offenses, monitor suspected terrorist communications, etc. This technique includes text mining also, and it seeks meaningful patterns in data, which is

usually unstructured text. The information collected from the previous investigations is compared, and a model for lie detection is constructed.

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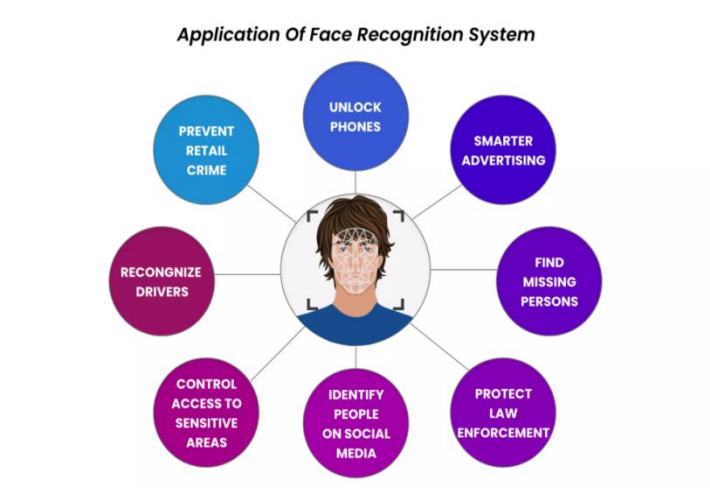
FACE RECOGNITION

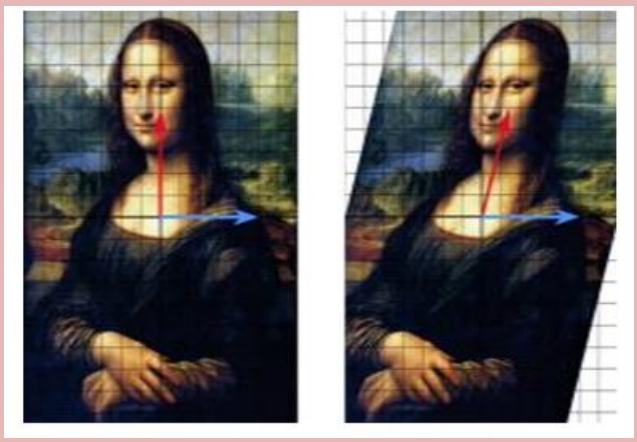
Face recognition is a method of identifying or verifying the identity of an individual using their face. Face recognition systems can be used to identify people in photos, video, or in real-time. Law enforcement may also use mobile devices to identify people during police stops.

But face recognition data can be prone to error, which can implicate people for crimes they haven't committed. Facial recognition software is particularly bad at recognizing African Americans and other ethnic minorities, women, and young people, often misidentifying or failing to identify them, disparately impacting certain groups.

How Face Recognition Works



Face recognition systems use computer algorithms to pick out specific, distinctive details about a person's face. These details, such as distance between the eyes or shape of the chin, are then converted in to a mathematical representation and compared to data on other faces collected in a face recognition database. The data about a particular face is often called a face template and is distinct from a photo graph because it's designed to only include certain details that can be used to distinguish one face from another.



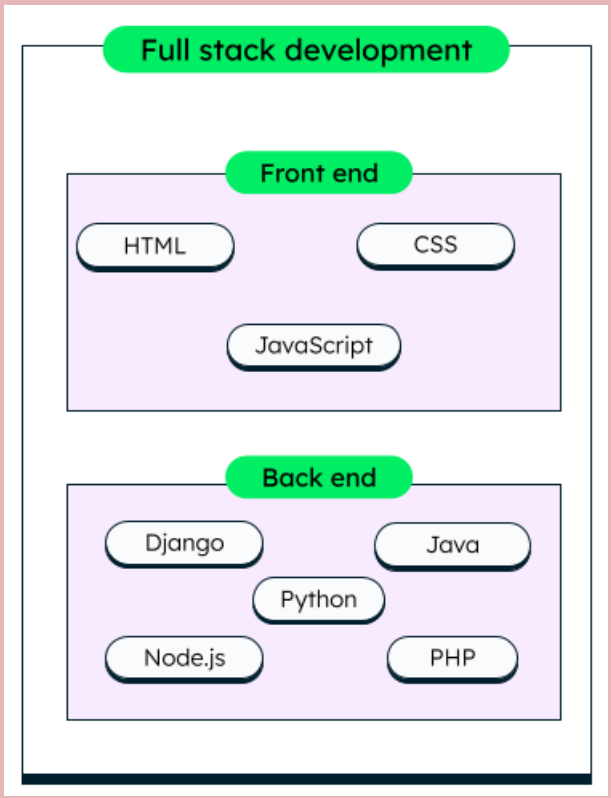
When it comes to errors, there are two key concepts to understand:

- A “false negative” is when the face recognition system fails to match a person’s face to an image that is, in fact, contained in a database. In other words, the system will erroneously return zero results in response to a query.
- A “false positive” is when the face recognition system does match a person’s face to an image in a database, but that match is actually incorrect. This is when a police officer submits an image of “Joe,” but the system erroneously tells the officer that the photo is of “Jack.”

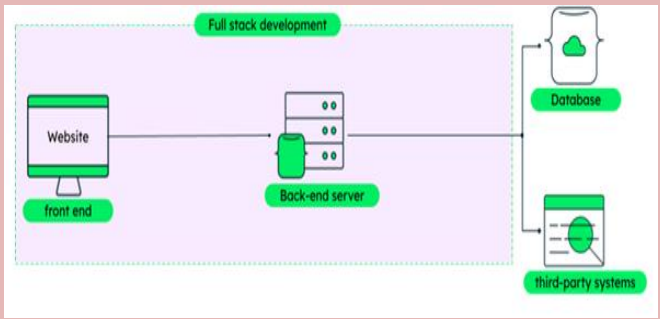
Name:Jayapriya C(III)

Rol l Number:20P218

FULL STACK DEVELOPMENT



The main components of a full stack development are the front-end, back-end and database *A full stack developer is one who can single- handedly implement both the front-end and back-end work flows, like placing the order or changing the user profile.



Role of Full Stack Developer:

Full stack developers must have knowledge of an entire technology stack, i.e., the set of technologies that are used to build an end-to-end application quickly and efficiently. For example, if they want to build an application using the MEAN stack, they should know how to work with Mongo DB, Express, Angular and Node.

*Full stack developers should be able to judge whether the selected technologies are the right choice for their project during the early phases. Some responsibilities of a full stack developer are to:

*Help in choosing the right technologies for the project development and testing both on the front end and the back end.

*Write clean code across the stack by following the best practices of the tools used.

Skills:

Technical skills: Full stack developers need to know all the technologies used in the web application, and help in speeding up the project with their expertise.

Soft skills: They should communicate effectively, have clear ideas in mind, and de sign and code each work flow meticulously.

Management skills: Full stack developers should be good time managers, follow dead lines, and have good experience in handling multiple technologies simultaneously.

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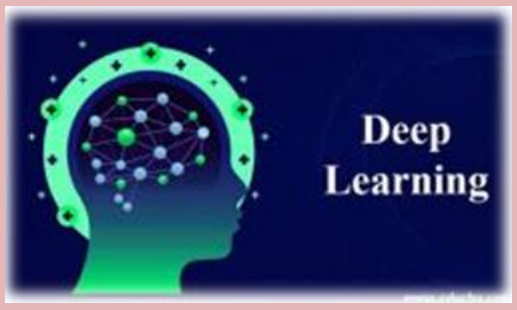
DEEP LEARNING

Introduction:

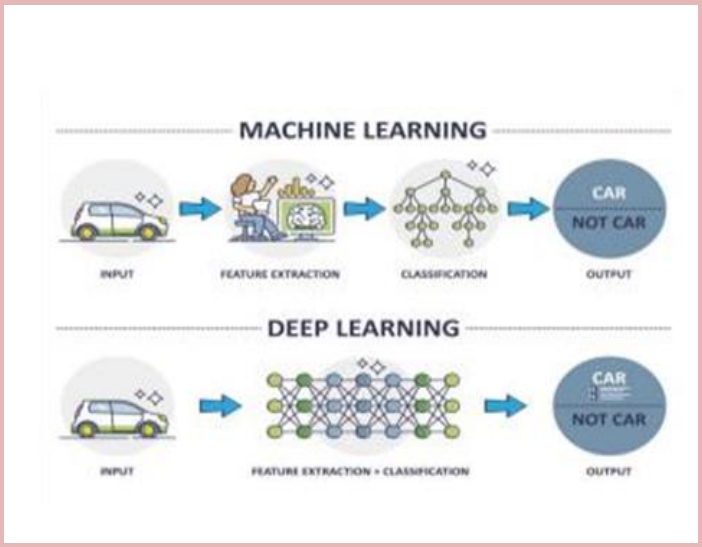
Deep learning is a machine learning technique that teaches computers to do what comes naturally to humans: learn by example. Deep learning is a key technology behind driver less cars, enabling them to recognize a stop sign, or to distinguish a pedestrian from a lamp post. It is the key to voice control in consumer devices like phones, tablets, TVs, and hands - free speakers. Deep learning is getting lots of attention lately and for good reason. It's achieving results that were not possible before.



How does deep learning attain such impressive results?

In a word, accuracy deep learning achieves recognition accuracy at higher levels than ever before. This helps consumer electronics meet user expectations, and it is crucial for safety-critical applications like driver less cars. Recent advances in deep learning have improved to the point where deep learning out performs humans in some tasks like classifying objects in images. While deep learning was first theorized in the1980s, there are two main reasons it has only recently become useful:

- Deep learning requires large amounts of labeled data. For example, driver less car development requires millions of images and thousands of hours of video.
- Deep learning requires substantial computing power. High performance GPUs have a parallel architecture that is efficient for deep learning. When combined with clusters or cloud computing, this enables development teams to reduce training time for a deep learning network from weeks to hours or less.



Example of Deep Learning at Work

Let's say the goal is to have a neural network recognize photos that contain a dog. All dogs don't look exactly a like–consider a Rottweiler and a Poodle, for instance.

Furthermore, photos show dogs at different angles and with varying amounts of light and shadow. So, a training set of images must be compiled, including many examples of dog faces which any person would label as "dog," and pictures of objects that aren't dogs, labeled (as one might expect),"not dog."

The images, fed into the neural network, are converted into data. These data move through the network, and various nodes assign weights to different elements. The final output layer compiles the seemingly disconnected information–furry, has as not, has four legs, etc.–and delivers the output: dog.

Universal classifier, but that a network with a non polynomial activation function with one hidden layer of un bounded width can. Deep learning is a modern variation which is concerned with an unbounded number of layers of bounded size, which permits practical application and optimized implementation, while retaining theoretical universality under mild conditions.

In deep learning the layers are also permitted to be heterogeneous and to deviate widely from biologically informed connectionist models, for the sake of efficiency, trainability and understand ability, hence the "structured" part.

What are the advantages of deep learning?

While machine learning requires data scientists or users to extract and build features, deep learning automatically performs feature extraction and modeling processes after data training. Deep learning models can tackle problems that traditional machine learning models cannot.

What Are The Limitations Of Deep Learning?

Deep learning works only with large amounts of data. Training it with large and complex data models can be expensive. It also needs extensive hardware to do complex mathematical calculations.

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STAFF ARTICLE

MACHINE LEARNING IN AGRICULTURE

Importance of Machine Learning in agriculture

- Food is a basic need of human beings that is now satisfied through farming. Machine learning in agriculture can optimize the way food gets to our table and revolutionize one of the most critical sectors of the economy.

- Machine learning seems to be a perfect tool for this purpose. It can help us increase efficiency and accuracy in decision-making while simultaneously minimizing risks and costs associated with agricultural operations.

- Some companies make use of AI software in agriculture by utilizing machine learning for various processes. These tools can make a real difference in agricultural productivity and profitability by reducing waste while enhancing product quality.

- Today, we'll have a closer look at machine learning and artificial intelligence in agriculture projects and applications. We'll also touch upon crucial ML benefits for business and the current state of artificial intelligence and machine learning in agriculture.

How machine learning can be used in agriculture: main drivers

- Agriculture is an essential sector for any economy. Unfortunately, its market is volatile. Thus, the drought can easily impact future commodity prices and have serious repercussions on all food prices. Moreover, farming is an extremely challenging undertaking.

- Climate change, soil erosion, and biodiversity loss can cripple the business, as are customers' shifting tastes in food.

- The natural environment with which farming interacts continues to present its own set of problems.

- In addition to a growing population, sustainable agriculture is also threatened by urbanization.

- And the only way to meet the growing food demand is to keep track of crops, the environment, and the market.

Source: Unsplash

This is when machine learning applications in agriculture step on the scene. By analyzing real-time sensor data and historical trends, machine learning and agriculture can empower farming decision-making. With artificial intelligence used in agriculture, manufacturers can better predict demand, improve crop yields and reduce food production costs.

How can machine learning be used in farming

Machine learning can be applied to farming in various ways to optimize processes, increase efficiency, and improve outcomes. Here are several ways machine learning can be used in farming:

- Crop monitoring and management
- Predictive analytics for yield optimization
- Precision agriculture
- Livestock monitoring and management:
- Supply chain optimization
- Crop disease detection and management
- Market forecasting price prediction, and so on.

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PHOTOGRAPHY

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you