



Artificial Intelligence using Machine and Deep Learning

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Abstract –The goal of the multidisciplinary field of artificial intelligence (A.I.) is to automate jobs that presently need human intelligence. Artificial intelligence (AI) is a technology that is transforming every part of life, despite the fact that it is not well known. This essay seeks to inform readers about artificial intelligence (AI) and persuade them to use it as a tool to reconsider several academic fields.

Keywords - Artificial Intelligence, Machine Learning, Deep Learning, Cognitive Computing, Computer Vision

I.INTRODUCTION

The ability of an artificial creature to use its own intelligence to solve complex issues is known as artificial intelligence, or AI. Artificial Intelligence is the combination of physiology and computer science. Simply described, intelligence is the computational aspect of a person's ability to achieve objectives in the real world. The definition of intelligence is the ability to reason, visualize, memorize, The goal of artificial intelligence is to make computers act more like humans at a fraction of the time it takes a human to accomplish so. It is therefore referred to as artificial intelligence. Additionally, pushing the limits of useful computer science in the field of artificial intelligence design of systems that are flexible, adaptive, and able to create their own analyses and methods of solution by using generic understanding to particular circumstances.

II.OVERVIEW OF AI

Artificial intelligence is the intelligence derived from machines or software. Knowing + Examining + Responding = Intelligence. Computer science's artificial intelligence is a field that is quickly gaining popularity since it has made life better for humans in many ways. The performance of industrial and service systems has been significantly improved by artificial intelligence in the previous twenty years. Expert systems are a rapidly developing field of technology that started with studies on artificial intelligence. machines with intelligence will eventually supplement or replace human abilities in many fields.

III.WORKING OF AI

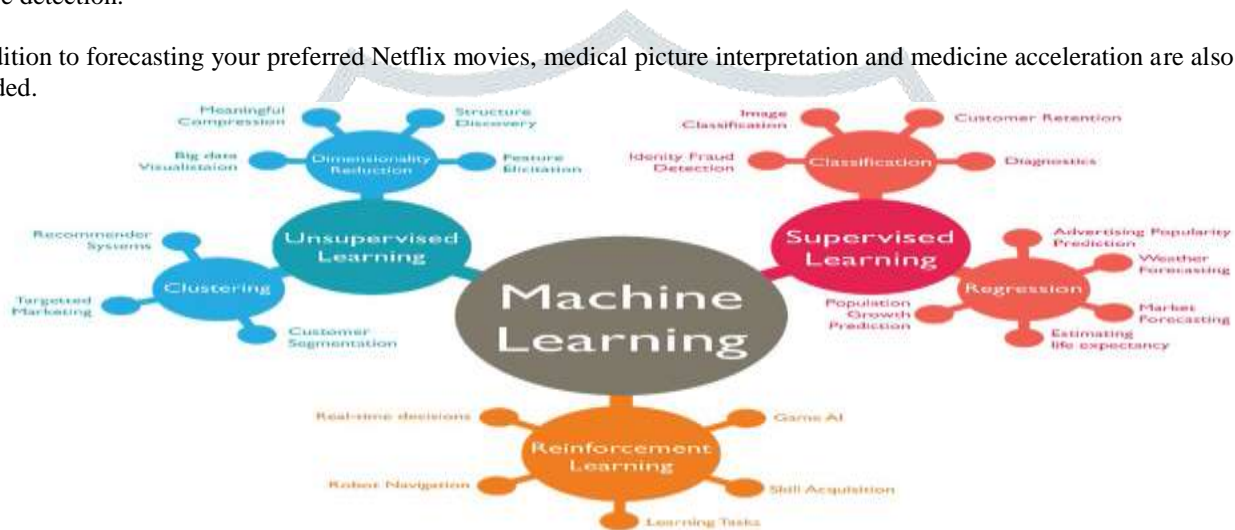
It's a common misconception that AI is out of place on an island with robots and self-driving automobiles. But this approach ignores one of the most significant real-world uses of artificial intelligence, which is the analysis of the enormous amounts of data generated daily. By carefully implementing AI to certain tasks, insight gathering and job automation can be completed at a previously unthinkable velocity and scale. specific actions. Artificial intelligence (AI) systems conduct complex searches through the vast amounts of data that people produce, understanding both text and images to locate patterns in complex data, then taking appropriate action based on their discoveries. Systems on computers that can comprehend the modern technology enable us to understand human language, draw lessons from past experiences, and forecast future events. Here are a handful of them: areas within artificial intelligence.



A. Machine Learning | Experience-based learning

An application of artificial intelligence called machine learning, or ML, enables computers to autonomously learn from their experiences and develop without the need for explicit programming. The creation of algorithms with the ability to evaluate data and provide forecasts. The life sciences, pharmaceutical, and healthcare industries are using machine learning to enhance disease detection.

In addition to forecasting your preferred Netflix movies, medical picture interpretation and medicine acceleration are also provided.

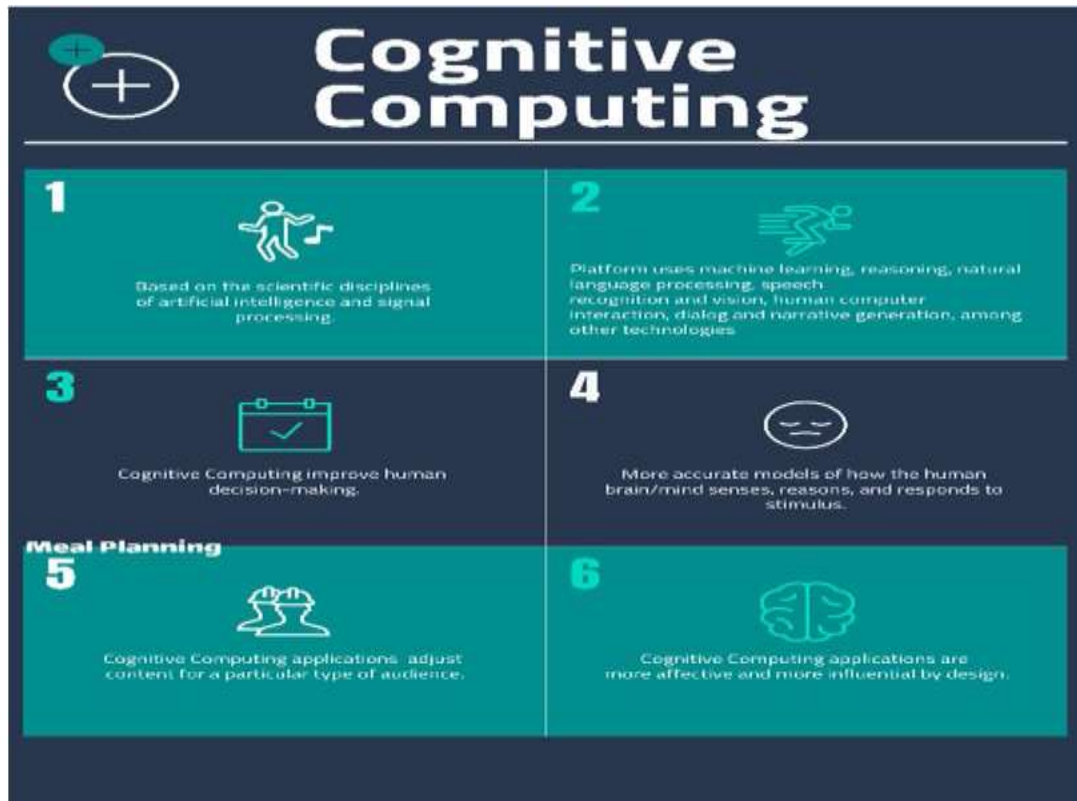


B. Deep Learning | Autonomous devices

Deep learning is a subset of machine learning that makes use of artificial neural networks that learn by studying data. The design of artificial neural networks is modeled after the organic neural networks seen in the brain. Multiple artificial neural network layers work together to generate a single output from a multitude of inputs, such identifying a face image from a tile mosaic. The Because machines learn by being rewarded and punished for the work they do, continuous processing is required. and support in order for them to progress.

C. Cognitive Computing | Drawing conclusions from the environment

Another crucial element of AI is cognitive computing. Its goal is to replicate and enhance human-machine interaction. In this scenario, cognitive computing aims to replicate human mental processes in a computer model by comprehending Image meaning and human language. Artificial intelligence and cognitive computing work together to give machines human-like traits and capacity for information processing. Speech recognition is another type of deep learning that allows the voice assistants on phones to comprehend queries such as "Hey Siri, what's the process of artificial intelligence?"



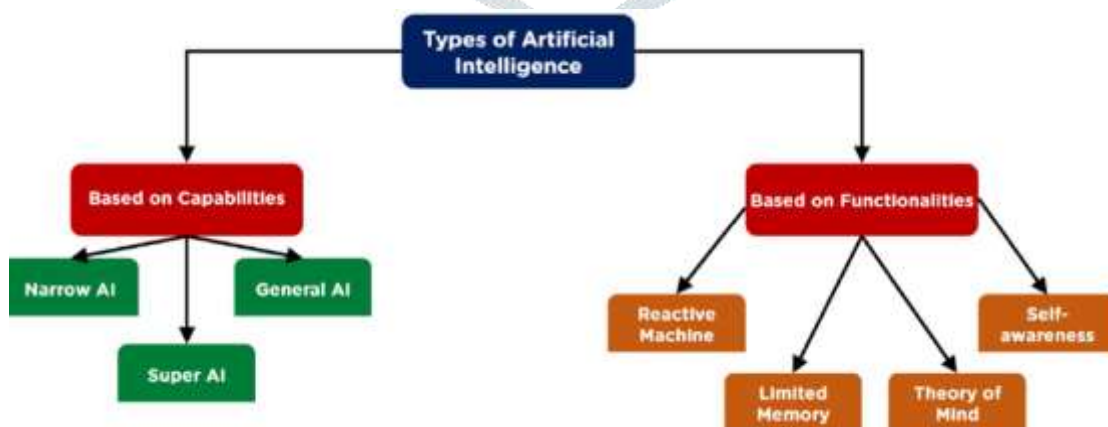
D. Image Understanding in Computer Vision

Computer vision is the application of deep learning and pattern recognition techniques to the interpretation of picture content, including graphs, tables, and photos found in PDF documents, along with other text and video. A subfield of artificial intelligence called computer vision enables computers to identify, evaluate, and comprehend visual data. Applications of this technology are already starting to change like healthcare and research and development. X-ray images of patients are being analyzed using computer vision and machine learning. photos to expedite patient diagnosis.

IV. TYPES OF AI

A. AI Type-1: Capabilities-Based

1) Limited AI One type of AI that can intelligently do a certain task is called narrow AI. Narrow artificial intelligence (AI) is the most common and easily available type of AI at the moment. Due to narrow AI's exclusive training for a specific task, it cannot function outside of its parameters or field. It is therefore also referred to as "weak AI." When limited AI reaches its bounds, it could malfunction in unanticipated ways. Although Apple Siri is a great example of narrow AI, it can only do a limited group of tasks. Chess, shopping recommendations from an online store, autonomous cars, voice recognition, and Among the applications of narrow AI are picture identification.



2) General AI: This type of intelligence can perform any intellectual task just as well as a person. The creation of a system with autonomous learning and reasoning capabilities is the aim of general artificial intelligence. There isn't yet a system that can perform every task on par with a human and be categorized as general artificial intelligence. Currently, scientists from all over the world are focusing their attempts to build robots capable of general AI tasks. Since the development of generic AI systems is still on going, It will require a lot of effort and time to create such systems.

3) Super AI: At this level of system intelligence, machines are capable of outwitting people and performing any task more effectively than people with cognitive abilities. It is a general outcome of AI. Strong AI is characterized by its basic abilities, which include the ability to comprehend, reason, solve puzzles, form opinions, plan, learn, and communicate on its own. Though yet futuristic, super AI concept of artificial intelligence. The development of such systems in the real world continues to be a global undertaking.

B. Type-2 AI According to Functionality

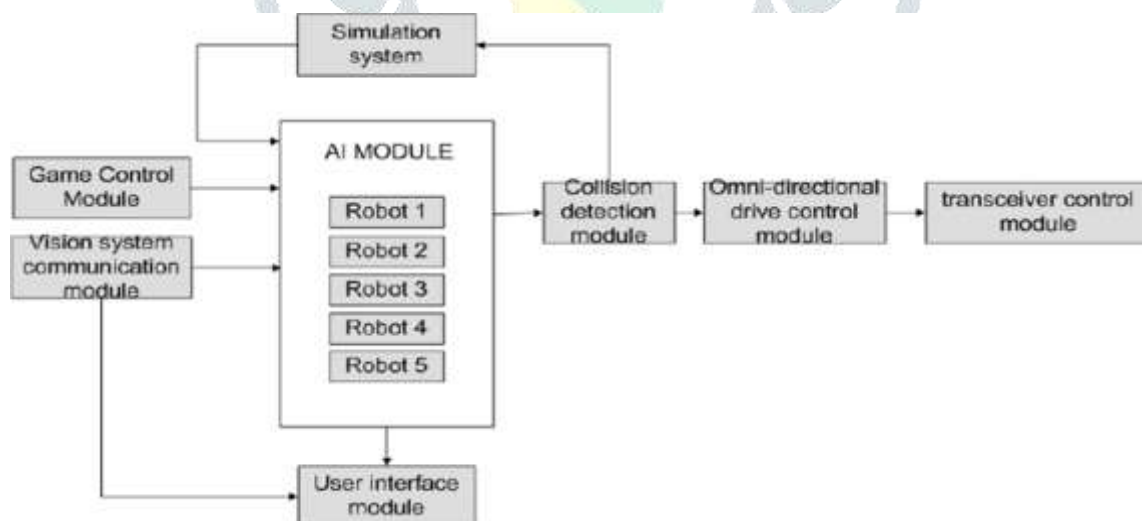
1) Reactive Machines: Purely reactive robots are the most fundamental kind of artificial intelligence. These AI systems don't use their past experiences or memories to guide their decision-making in the future. These robots only take the present situation into account. and react in the most practical manner. One example of a reactive machine is IBM's Deep Blue system. AlphaGo This is another example of a reactive machine, created by Google.

2) Limited Memory: Similar to Reactive Machines, this type of AI possesses memory, which enables it to use historical information and experience to make more intelligent decisions in the future. Most of the apps that we use on a regular basis fall into this category. These artificial intelligence apps could be trained with vast amounts of training data kept in a reference model in their recall. For instance, a lot of autonomous cars have inadequate memory technology. They save information such as GPS position, To drive like a human, you need to know things like nearby car speeds, the kind and size of barriers, and a hundred other sorts of information.

3) Limited Memory: The next two categories of AI are now only concepts or works in progress, whereas the previous two categories of AI have been and will continue to be widely used. Theory of mind AI is the next stage of AI systems that researchers are currently developing. AI system with a theory of mind level will be able to recognize the wants, feelings, convictions, and thought processes of the animals that it communicates with. Although artificial emotional intelligence is currently a growing industry and a priority for notable To get Theory of Mind AI, researchers studying AI would also need to make progress in other AI domains. Due to AI Computers will need to recognize people as unique individuals with potentially

4)The final stage of AI development, known as self-awareness, is now purely theoretical. AI that has developed to the point that it resembles the human brain so much that it has become self-aware is known as self-aware AI. The ultimate goal of all AI research is and will always be to build this sort of AI, which is decades, if not centuries, away from becoming a reality. This A type of AI will be able to identify and elicit emotions from people it interacts with, in addition to having its own own feelings, desires, opinions, and possibly objectives. And this is the kind of artificial intelligence that worries those who doubt the technology. Growing self-awareness can have both positive and negative effects on civilization, with the former potentially causing catastrophe. This is due to the possibility that, if self-aware, AI may have values such as self-preservation, which could signify the oblique extinction of humanity, since an organism with such intelligence could simply out maneuver any human brain and produce sophisticated plans to subjugate humanity. Technology is divided into Artificial General Intelligence (AGI), Artificial Narrow Intelligence (ANI), and Artificial Super intelligence (ASI) and Intelligence (AGI) constitute a more popular alternative classification scheme in technical speak (ASI).

V. AI SYSTEM ARCHITECTURE



The artificial intelligence system is operated by a main thread that calls all of the various modules in a loop. The main system thread first establishes a connection with the visual system in order to ascertain the position and orientation of robots. Apart from where the ball is. The referee's control over the game state is then verified by the system. The AI module function is then called by the system, providing the necessary robot movement position and additional steps must be taken. After the motion specifications are entered, the system computes paths for collision avoidance to keep robots from running into each other. Next, the robots' four wheel speeds are estimated by the algorithm. Lastly, the transceiver is used by the system to broadcast communication packets that correspond to commands to act. A detailed description of every module seen in the schematic above is provided below:

A. Communication Module for the Vision System

For the game scenario, this module provides vision system commands that correlate to robot and ball coordinates, as well as robot angles, via packets.

B. Control Module for Games

This module receives referee commands via a serial port and outputs the current state of the game.

C. The AI Module

The locations of the robots and the ball, their orientations, the game's status, their functions, the direction of fire, and the field configuration are all obtained via this module. All of this information is used by the system to determine the future positions and movements of each robot. The structure of a tree that contains every possible course of action dictates the strategy that is selected. Based on these categories, the activities regarding their importance. For every node in the tree, one or more assessments are used. Every assessment has a range of potential results. connected to a particular score. The tree is evaluated while the program is running. The highest score of each level's assessment result, as decided by the Best First Search approach, determines the path to take from root to leaf (final action). The system determines the robot's movement vector, rotational and linear velocity, and the use of the kicker and dribbler devices following accomplished a goal, such shooting, blocking, or passing. In order to facilitate joint coordination, the robots also have a roll motion. activities. The robots are coordinated by several positions, such as first, second, and third forward, goalkeeper, and defense. The goalie's role is to avoid having the ball enter the net. It follows a block path while the ball is far away and kicks it when it gets close. You can only move in the area surrounding the objective. The defense's duties also include working with the three strikers to create cooperative strategies and supporting the goalie in stopping long-range shots. Defenders cleanse the area when it gets close to their own. ball out and follow opposite robots to prevent a pass and goal. Though their priorities are different, all three forwards have the same objective. They traverse the whole field, arranging different passing and shooting scenarios. They might move in groups if needed.

D. Module for User Interface

For every robot in this module, real-time displays of their positions, orientations, motor speeds, desired positions, ids, actions, game status, and referee orders are provided. An OpenGL-based system displays the visual positions, orientations, desired locations, and activities of the robot. GUI.

E. System of Simulation

Without the need for actual robotics or vision systems, this module mimics the operation of an artificial intelligence system. Activities can be tested and debugged with the help of the AI module. The process of building intelligent objects by Intelligent object-based simulation is the term used to describe decision logic. For instance, Simio chooses tasks or resources using intelligent items that are brimming with decision-making reasoning. The item's intelligent behavior allows it to forecast future performances. The integration of rule-based AI into simulation models is emphasized by the use of intelligent objects in the context of AI in simulation. It takes a lot of effort to manually create complex rule-based reasoning, and the rule's effectiveness is also influenced by the level of expertise of the creator. Artificial Intelligence, mostly utilizing neural networks, removes the necessity for human construction. By hand It takes time to create complex rule-based thinking, and the rule's effectiveness is also influenced by the level of expertise of the creator.

F. Collision Sensing Unit

Without the need for actual robotics or vision systems, this module mimics the operation of an artificial intelligence system. Activities can be tested and debugged with the help of the AI module. A sensor for detecting obstacles in the infrared A programmable detection distance is designed for obstacle avoidance by wheeled robots. Comprising of one infrared transmitter and one detector, the section. The infrared light from the emitter is reflected back to the receiver when an obstruction occurs in front of the sensor. To create a digital signal, a comparator squares the input. When there are no barriers, output is high. When an impediment is within range, the output is low. The sensitivity may be adjusted with a potentiometer knob.

G. Module for Transceiver Communication

This module obtains the tasks that need to be completed in addition to the speed of each robot motor. The packets that are sent out by our transceiver are created by this module. It also guarantees that there is constant communication.

H. Module for Omni-Directional Drive Control

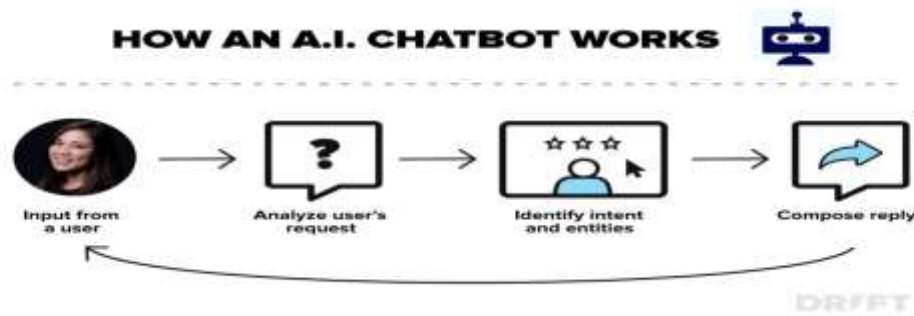
This module determines the speed of each of the four robot motors using the movement vector, which contains both linear and angular velocities. This module determines how fast each of the robot's four omnidirectional wheels should rotate in order for it to move in the accurate orientation.

VI. AI APPLICATIONS

The typical technology user interacts with artificial intelligence (AI) in many different ways throughout their day, yet most individuals are unaware of the exact technologies that leverage AI. These are a few instances of technologies using artificial intelligence. that a lot of people come across in their lifetimes.

A. Chat bots

Artificial Intelligence powers chatbots, such those you may have encountered on social networking platforms or websites. Since chat bots are just programmed to transmit messages in accordance with guidelines for how they should engage with users, they are among the more basic instances of artificial intelligence. Sort of the "if this, then that" variety of software.



B. Intelligent Helpers

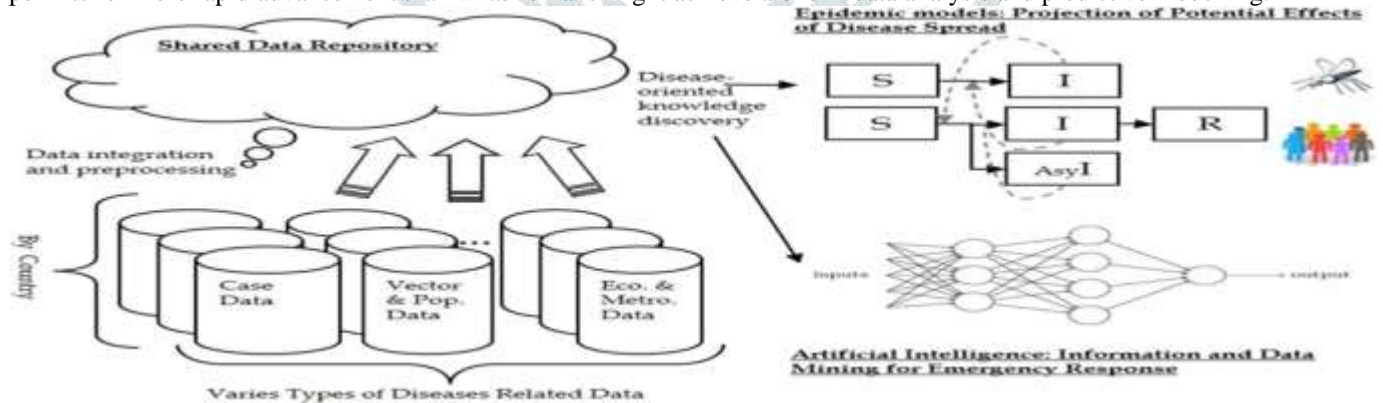
AI is exemplified by Siri, Alexa, and all the other virtual assistants. They are able to comprehend what people are saying to them, comply with instructions, and react appropriately. These are similar to chat bots on a higher level because they can recognize speech and are linked to search engines and other larger information sources.

Home & Beyond: Digital Assistants at Work

- Horus, Aira and BeMyEyes for visually-impaired patients**
 - Reads text
 - Recognizes objects and faces
 - Identifies obstacles on patients' path
- KidsMD through Amazon Alexa for parents of small children**
 - Educates user on symptoms of common illnesses
 - Recommends remedial solutions
 - Schedules doctor appointments
- Other Apps, Other Applications**
 - Monitors food intake for diabetics, makes personalized recommendations on what/how much to eat or drink, and provides reminders to measure blood glucose
 - Assists patients in booking rides to and from the hospital via ride-sharing services
 - Explains discharge instructions to patients for post-surgery care

C. Mapping and Predicting Diseases

Since the beginning of time, epidemiologists have attempted to anticipate and, ideally, prevent diseases by better understanding how they spread. The use of artificial intelligence is simplifying this. Here's an illustration of how artificial intelligence merely permits for more rapid advancement than what humans might achieve alone in data analysis and predictive modelling.



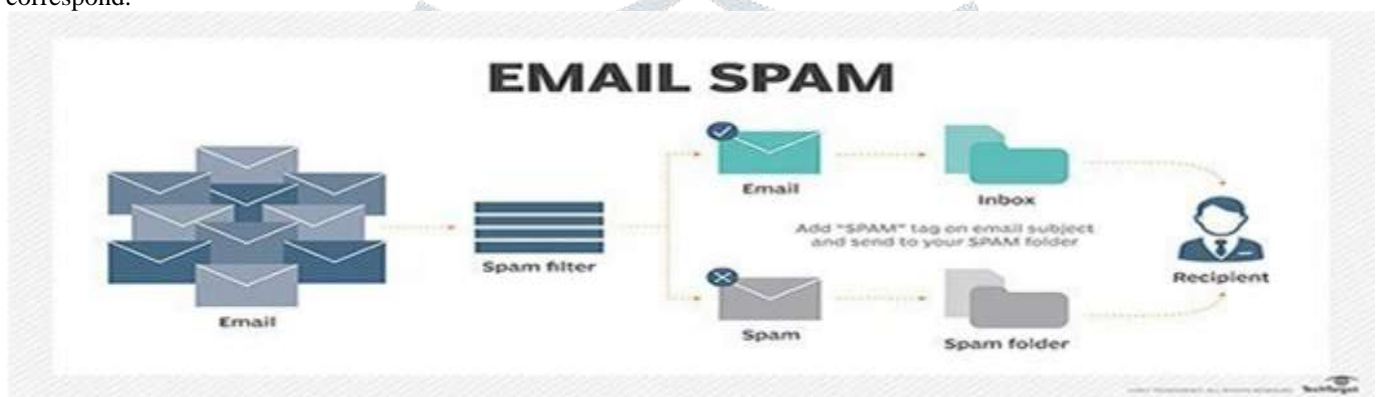
D. Medical Services

One of the most significant sectors in the broader big data landscape is healthcare, given its vital role in a prosperous and healthy society. The use of AI to medical data truly has the potential to save lives. Nurses, physicians, and other Artificial intelligence can help healthcare professionals in their daily work. AI in medicine could lead to better patient outcomes. through generating more precise diagnostic and treatment plans, enhancing quality of life and preventative care. By By examining data from the healthcare, government, and other sectors, artificial intelligence (AI) can assist predict and monitor the spread of infectious ailments. AI therefore has the potential to be a vital tool in the worldwide battle against illnesses and pandemics.



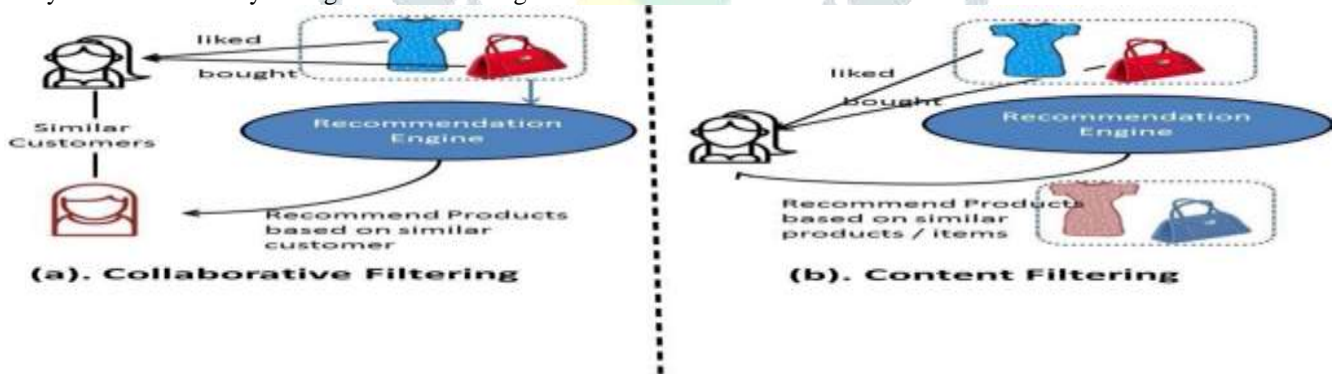
E. Filters for Spam

Spam filters are a familiar concept to all email users. In order to prevent users' inboxes from being overloaded with pointless communications, spam emails are filtered and sent to a different folder in email inboxes. There are phone call spam filters that can be used to weed out scammers and other unwanted calls. conversations on the phone. AI uses prior knowledge of what spam emails or phone calls look like from a data set to fuel these spam filters. viewpoint, then eliminating the ones that correspond.



F. Engines for Recommendations

Some of the most well-known are found in Netflix and Spotify's recommendation systems. They make recommendations for other shows or music you should listen to based on information about the shows or songs you've already viewed. Pay attention. These are but a few instances. Additionally, social media platforms have recommendation engines that suggest users or to present you with stuff that you might find interesting.



G. Lookup Engines

Because search engines have such large databases, artificial intelligence (AI) is the only method by which they can sift through all of the possible results to display the best results for your query. Among the best examples of robust algorithms are those found in search engine optimization systems. For instance, it's been reported that Google uses about 200 data points to decide how each result appears on each results page. Along with billions of pages stored in their database, a significant amount of data is analyzed by their algorithm for each query.



H. Autonomous vehicles

While completely autonomous vehicles are still a ways off, numerous businesses are working on developing them, and some self-driving technologies are already present in some vehicles. Businesses competing to be the first to create a consumer-ready product include Google and Uber. self-driving vehicle, but you can now purchase vehicles with sensors that can autonomously brake, warn you of approaching objects, and They park themselves in parallel. It seems likely that self-driving cars would do better in driving, just as AI is superior to the human eye in detecting cancer than many people as well.



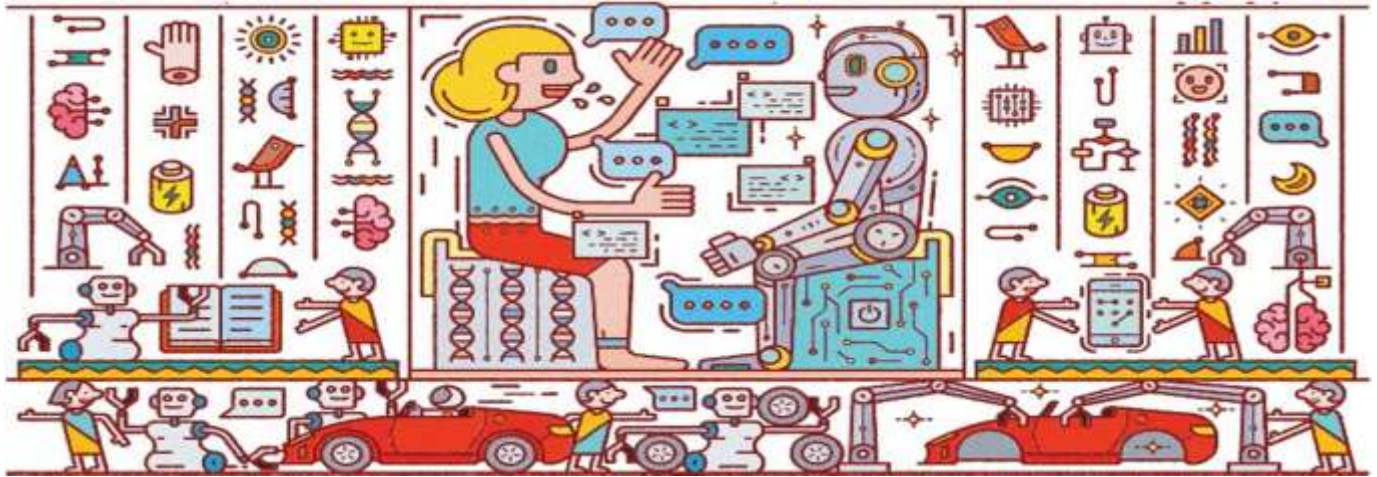
VII. THE BENEFITS OF AI

A. Decrease in Human Inaccuracy

It was decided to call this phenomenon "human error" because mistakes are made by people occasionally. However, if computers are properly programmed, they don't commit these mistakes. Artificial intelligence makes decisions using data that has already been collected and a set of algorithms. Errors are reduced as a result, and there is a greater chance of improving precision and accuracy. As an illustration, AI has largely eliminated human error in weather forecasting.

B. Accepts risks in place of people

This is one of the main benefits of artificial intelligence. We can overcome many of humanity's risky limitations by creating an AI robot that can perform the hazardous jobs for us. It may be effectively used in any kind of natural or man-made disaster. whether it be mining for coal and oil, traveling to Mars, disarming a bomb, or penetrating the deepest parts of the ocean. As an illustration, are you aware of the recent explosion at the Ukrainian nuclear power plant Chernobyl? Since any person who got close to the core of the fire perished in a matter of minutes, there were no AI-powered robots available at the time to help us minimize the impacts of radiation by controlling the fire early on. In the end, they dropped sand and boron from a safe location using helicopters.



C. Accessible around-the-clock

An average person works 4–6 hours a day without breaks. Humans are designed in a way that allows them to take breaks to refuel and be ready for a new workday. They can even take weekly days off to maintain their professional skills. Families lead different lives. Nevertheless, unlike humans, we can utilize artificial intelligence (AI) to program robots to operate nonstop for 24 hours a day, seven days a week, and they never get tired of it.

As an illustration, educational institutions and helplines receive a lot of requests and issues that AI can effectively handle.



D. Help with Digital

Some of the most cutting-edge businesses interact with customers using digital assistants, which minimizes the need for human staff. Digital assistants are being used by a lot of websites to deliver products that customers want. We can talk about our search for using them. Certain chat bots are designed in a way that makes it hard to identify if we are speaking with a computer or a human individual.

As an illustration, it is well known that companies employ customer service representatives who are in charge of responding to inquiries and grievances from clients. Businesses can utilize AI to build chatbots or speech bots that can answer all of the customers' questions. They are already being used by numerous businesses on their websites and mobile applications.

VIII. DISADVANTAGES OF AI

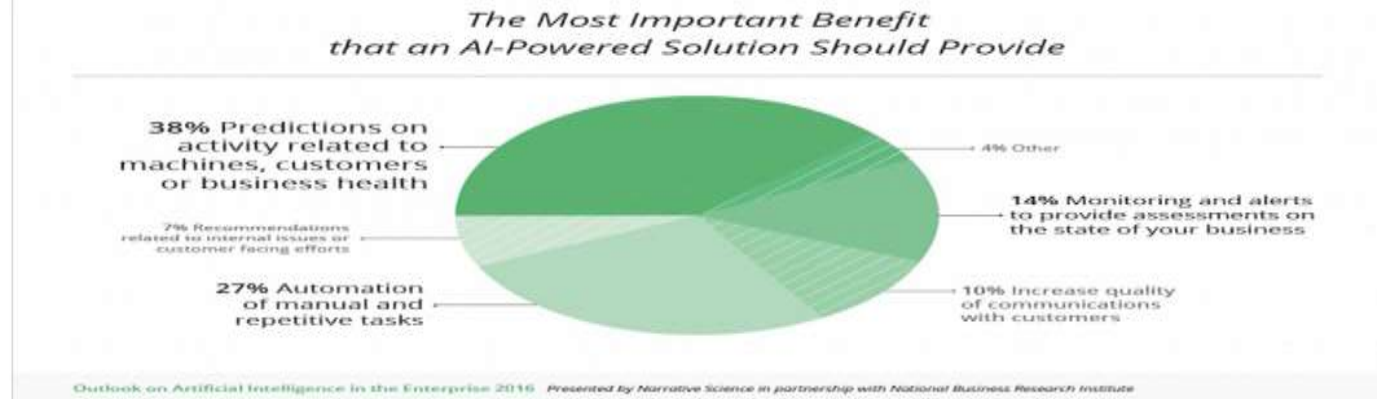
A. High Implementation Cost

Because developing an AI-based system or computer requires significant engineering, setting it up can be very expensive. Furthermore, the outrageous cost doesn't end there because thousands of dollars are needed for upkeep and repairs.



B. Doesn't Get Better With Practice

The capacity of human cognition to grow with age and experience is among its most remarkable features. But the same cannot be said of Because AIs are machines, they cannot get better with experience; instead, they deteriorate with time.



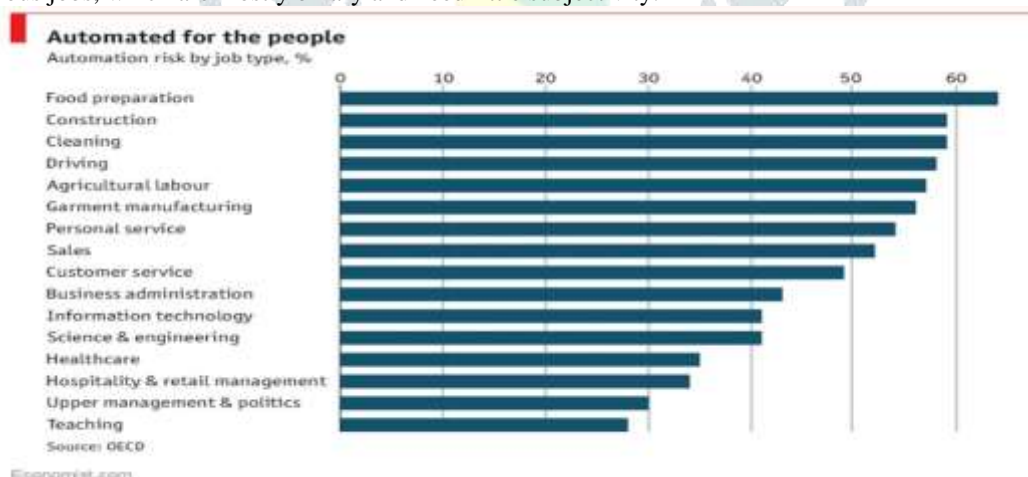
C. Isn't Creative

AIs are not designed for creative tasks, as was previously said. Therefore, it ought to be abundantly evident by now that AIs lack imagination and originality. They can assist you in developing and making something unique, yet they are still unable to rival the brain of a person. Their ingenuity is restricted to the imagination of the one who directs and programming them.



D. The Unemployment Risk

Our intuitive brain wonders if AI will eventually replace humans given how quickly the field is developing. To be honest, I have no idea if artificial intelligence will result in increased unemployment. However, AIs are probably going to take over most of the monotonous jobs, which are mostly binary and need little subjectivity.



Conclusions

In conclusion, it can be examined how artificial intelligence (AI) has advanced computer science by focusing machines' attention on philosophical debates through artificial psychology. Artificial intelligence (AI) completes tasks more quickly than humans, and its main objective is to develop technology intelligently. Artificial intelligence has been demonstrated to be computer knowledge. that possesses human characteristics, however these robots and computers support environmental growth and act logically to assist people. AI has already had an impact on people's lives in a variety of industries, and it will undoubtedly have more in the future.

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