Futuristic Trends in Artificial Intelligence

Putta Durga
Research Scholar, Computer Science and Engineering
VIT-AP University, Amaravati, Andhra Pradesh, India
Pdurga593@gmail.com

Dr. T. Sudhakar
Associate Professor, Computer Science and Engineering
VIT-AP University, Amaravati, Andhra Pradesh, India
Sudhakar.t@vitap.ac.in

ABSTRACT

Artificial Intelligence (AI) is the domain that is used to design and develop several complex applications that are used to solve various issues. AI is playing an undeniably significant job in our general public. From vehicles, cell phones, planes, shopper applications, and, surprisingly, clinical hardware, the effect of AI is impacting our general surroundings. In this paper, we start with a prologue to the general field of computerized reasoning, then progress to the birth, history, and ascent of man-made brainpower. We then, at that point, investigate the standards in the field, alongside the headway, advancement, and applications for different parts of our life. The paper will cover focal and momentum research connected with man-made brainpower, including support learning, advanced mechanics, PC vision, and emblematic rationale. Inequality, we feature the special benefits of future advancements, zeroing in on open doors, constraints, and moral inquiries. We conclude with a description of several active research areas in the area and suggestions for additional study. This chapter covers a wide range of applications as well as fresh approaches, difficulties, and openings in this intriguing field.

Keywords—Artificial Intelligence; Machine Learning; Deep Learning

I. INTRODUCTION

Artificial intelligence (AI) is the field of computer science that tries to develop machine intelligence. To improve success an intelligent agent is used to take required actions. This field focuses on the study and creation of intelligent agents.

The science and engineering field of AI is concerned with developing intelligent computers by computationally comprehending intelligent behavior. Neural networks (NN), genetic algorithms (GA), symbolic AI, and deep learning are only a few of the tools, techniques, and algorithms that make up AI. These key sectors are expanding rapidly and having a big impact on a variety of fields, including robotics, health care, space exploration, and the military. Future technologies will become more efficient and sophisticated thanks to AI thanks to the growing amount of data, all-pervasive networking, high-performance processing, and different algorithms at our disposal.

The main aim of AI is to provide autonomous intelligent agents that communicate with their platforms, find abnormal behavior and increase the over time by analyzing the errors like humans. Based on the range of the robots, the reaction is observed around the world and converted to agents based on software that can connect with multimedia and natural language. Presently all the technologies are used in driving, aviation, medical, and recognition of images and advertising online.

In particular industrialization and commercialization projects, AI is applied increasingly frequently, demonstrating newly designed tendencies. (1) Deep Learning (DL) combined with Big Data is used to develop standard AI applications. Robots can learn and think like people thanks to artificial neural networks (ANNs), which also help them manage more difficult tasks. (2) Artificial intelligence has progressively moved into the R&D stage for experimental research. In areas like national language processing (NLP), predictive analysis, and picture and audio recognition, it has developed commercial products. (3) The use of AI is steadily spreading from the manufacturing and agricultural sectors to the commercial and service industries, which increases the prominence and distribution of AI's underlying technology.

A. **What is AI**

AI is more potential to control the robot by using the computer to overcome the tasks that frequently require the knowledge and wisdom of humans.

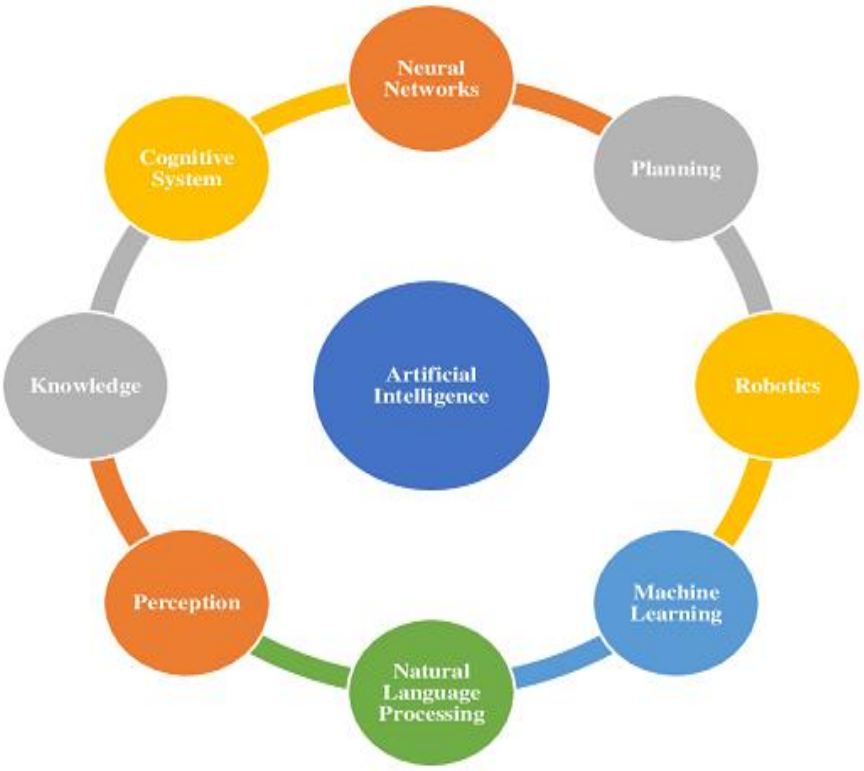

Figure 1: Goals of Artificial Intelligence

B. **History of AI**

The field of artificial intelligence (AI), which has only been for 60 years, consists of a variety of sciences, theories, and methods that try to replicate human cognitive abilities. This considers several logical subjects such as computer science, nano-science statistics, etc. From the start of World War II, various advanced research going to improve the solving of various complex applications and this field increases the jobs that are more suitable for humans.

In general, human intelligence is better than automation systems which are criticized by the experts. The best part of this research is not to compare with several enhancements. Research is going on AI which is not yet completed needs basic advances in research which can model the world. Since 2010, this field increasing very rapidly considering the advanced computing power and utilizing a large amount of data.

i. Birth of AI (1940-1960)

From 1940 to 1960 was powerfully set apart by the combination of innovative improvements among the aspiration to comprehend how to get the working of systems and humans. For Norbert Wiener, an explorer in computer science, the point was to bind together numerical hypothesis, hardware, and robotization as "an entire hypothesis of control and correspondence, both in creatures and machines". Firstly, the initial numerical and PC model of the traditional neuron (formal neuron) is created by Warren McCulloch and Walter Pitts in 1943.

Herbert Simon, financial expert and social scientist, estimated in 1957 that the AI would prevail with regards to beating the person by playing chess game in the coming 10 years; after entry into the first winter. The vision of Simon's ended up with the correct prediction... after 30 years.

ii. 1980-1990: Expert Frameworks

In the film "2001 Space Odyssey" the system - HAL 9000 (one word different from IBM) encapsulate itself as overall questions posted by AI: this will initialize the high level of experience, the theme of the film is to provide the knowledge based on the scientific reasons. The author Philip K. Dick, who is the director of science fiction, will wonder about the emotions based on the machines.

In 1970, the first ended up with the microprocessors in advance that AI taken and started in the golden age of the expert system.

Generally, the path is opened at MIT in 1965 with DENDRAL an expert system and in 1972 at Stanford University, the MYCIN is developed to detect diseases belonging to blood and also drugs. These frameworks

depended on the "deduction motor," which was modified to be a consistent reflection of human thinking. By entering information, the automation system gave replies to the expert systems.

The promises predicted a significant advancement, but by the end of 1980 or the beginning of 1990, the enthusiasm would have peaked. It took a lot of work to implement such information, and between 200 and 300 rules, there was a "black box" effect that obscured the machine's logic. Thus, creation and management became incredibly difficult, and - most importantly - there were numerous other, quicker, less difficult, and more affordable options available. In 1990s, the phrase "artificial intelligence" had all but disappeared from academic vocabulary and that more moderate forms, such as "advanced computing," had even crept in.

The commitments predicted a huge improvement yet the popularity will fall in the future toward the finish of 1980, mid-1990. The information of the program is extracted from 200 to 300 standards, in this program the impact of the "black box" is observed and it is not satisfied with the machine. Advancement support along with these lines turned out to be very tricky and - most importantly - quicker and in numerous others less mind-boggling and more affordable ways conceivable. It ought to be reviewed that during the 1990s, the term man-made consciousness is nearly become untouchable, and huge unobtrusive varieties had entered into college language, for example, "high-level processing".

iii. Since 2010: another blossom gave huge information & unique processing power

In 2010, two elements explain the new boost.

- Most importantly, admittance to monstrous volumes of information. To have the option to involve calculations for image classification and feline acknowledgment, for instance, completing testing yourself was already important. Today, a straightforward pursuit on Google can track down millions.
- To calculate the learning algorithms, a high and efficient system is required for the processing of computer graphics card processors. This process is an iterative process that takes weeks before 2010 to complete the overall example. The calculating power of these cards (it is more compatible to complete thousands of transactions per second) which enables the little expensive (> 1000 € per card).

This new mechanical hardware has empowered a few critical public victories and has supported financing: in 2011, Watson, IBM's IA, will dominate the matches against 2 Jeopardy champions! ». In 2012, Google X (Google's hunt lab) will want to have an AI perceive felines on a video. More than 16,000 processors have been utilized for this last errand, however, the potential is exceptional: a machine figures out how to recognize something. In 2016, AlphaGO (Google's AI accomplished in Go games) will beat the European boss (Fan Hui) and the title holder (Lee Sedol) and then, at that point, herself (AlphaGo Zero).

From the ML algorithms, DL algorithms can develop the most promising algorithms with more applications (consider image or voice recognition). The authors 2003, Geoffrey Hinton, Yoshua Bengio, and Yann LeCun started research work on neural networks (NN). Companies such as Microsoft, Google, and IBM have taken help from Hinton to recognize the errors in speech recognition. The same results are obtained by the author's image recognition team.

II. THE EMERGENCE OF ARTIFICIAL INTELLIGENCE

A. Data and Analytics

Big data is a domain that processes a large volume of data with speed and efficiency. This domain collects huge data from several sources and arranged the data by using indexes. The data is collected from various collections (which counts data belonging to the various companies and managers, including details about an organization's internal operations, market dynamics, competitive landscape, supply chain, consumer preference trends and outer functionalities between the users and objects, authorities and web entries) can use in backward or straight looking calculations. The technical methods generated to analyze the data by utilizing the system numeric models. Backward-looking techniques may be categorized as descriptive (data analysis, creation of synopsis, and visible representations of significant trends), or diagnostic (looking at past data to determine what went wrong). Predictive or, at their best, prescriptive techniques are two types of forward-looking methodologies.

B. Algorithms

To extract useful information from data sets, data analytics uses algorithms. An algorithm is a description of the actions used to finish a task. To locate your automobile in a parking lot, for instance, you might follow a set of procedures. You may first see if it is in your line of sight. Second, see if you have a slip or receipt that lists the location of your car. Third, until you find your car, you might proceed methodically down the rows of the parking lot. These three procedures may be turned into an algorithm if you programmed them into your phone.

Choosing the appropriate algorithm to address a certain issue might provide a company with a strong competitive edge.

C. Machine Learning Algorithms

While an organization can gain a lot by utilizing the right algorithm to evaluate a certain type of data, algorithms that get better over time can be exponentially more helpful.

Algorithms for supervised machine learning are "trained" using data that has had its fields "labeled." They then order newly received data by their training. For instance, an algorithm may be trained to translate from Vietnamese, identify spam emails in the inbox, or identify the manufacturer of an automobile from a labeled set of the vehicle's characteristics. Nowadays, supervised learning techniques are used by the vast majority of machine learning algorithms.

Unsupervised learning, semi-supervised learning, and reinforcement learning are further categories of algorithms. Unsupervised machine learning algorithms directly work with "unlabeled" data, identifying patterns and extracting the knowledge they deem relevant. For instance, an unsupervised machine learning algorithm may examine all of the kinds of plants and animals that exist in the world and group them according to any trait that it deems crucial.

D. Artificial Intelligence

Artificial intelligence refers to machine abilities that, in theory, should require intellect from a human. Since this definition is arbitrary, it's possible that as our expectations of computers change, so will the question of whether a particular machine feature qualifies as artificial intelligence. Since computers have been able to complete some specialized activities (such as adding or subtracting numbers) better than humans for ages, we do not view these as requiring human intellect.

E. Chips and Supercomputers

A proper machine learning method, data, and processing power are necessary for artificial intelligence. Neural networks are a common component of the most promising artificial intelligence systems of today. Both modest and powerful neural networks are possible. The power of a neural network increases with size. It takes the use of powerful computer chips to push neural networks, and by extension, current artificial intelligence, to their performance limits. Nvidia, Google, and other companies are competing to create chips designed for DL and other applications of AI, even though Intel has long held the top spot in the market for supercomputer CPUs.

F. Quantum Computing

Although Moore's law continued to properly predict exponential increases in calculating power increased in the 21st century, the leading market Intel is developing new chips. Because of this, several analysts are unsure if Moore's law will still apply to chip development. Intel has responded that while the development of their processors is taking longer, once they are delivered, the capabilities are by Moore's law's forecasts. However, researchers are concerned that Moore's law is reaching its limit in traditional computing and that the next chip shrinking is challenging and possibly not financially possible.

Some experts believe that the next wave of computing power advancements will come from quantum computers. The development of quantum computers has been ongoing for many years. Although experts do not believe these are actual quantum computers, Canadian business D-Wave is currently selling what it calls them. For the majority of applications, these computers are likely no quicker than conventional computers.

G. A Transformative Technology

The generation of data has increased, and algorithms are fed by data. Machine learning algorithms are becoming more complex and potent owing to improvements in processing power. These algorithms will eventually rival or perhaps surpass human intellect in several areas as they develop. They will have uses in every sector, including manufacturing and biotech (where they will interact with genomics). A lot of weak artificial intelligence is projected to change human culture, even if it is unclear when a powerful artificial intelligence will appear. As with fire or electricity before it, artificial intelligence will undoubtedly have a transformational effect on humanity.

III. TRENDS IN ARTIFICIAL INTELLIGENCE

There have been computers for a long time. Every day brings with it new projects and innovations. We must keep an eye on the new trends if we want to comprehend the technologies that are already in use and have a clearer understanding of the changes taking place all around us. More new technologies are introduced every day. Some technologies failed to prove and timely vanished. Some are more improved over time and registered with new users. Modern technologies that gain popularity and start a new trend among consumers are

considered emerging trends. We will learn about several new developments in this chapter that, in the future, will have a significant impact on how people engage in digital societies and the economy.

A. **Machine Learning**

A component of artificial intelligence called machine learning enables computers to learn from data using statistical methods without explicit human programming. It includes algorithms that can learn on their own and forecast the future based on data. These models, or algorithms, are firstly trained in the data and then tested the data. Once these models have undergone several training cycles and can produce results with a respectable level of accuracy, they are utilized to forecast new and unrecognized data.

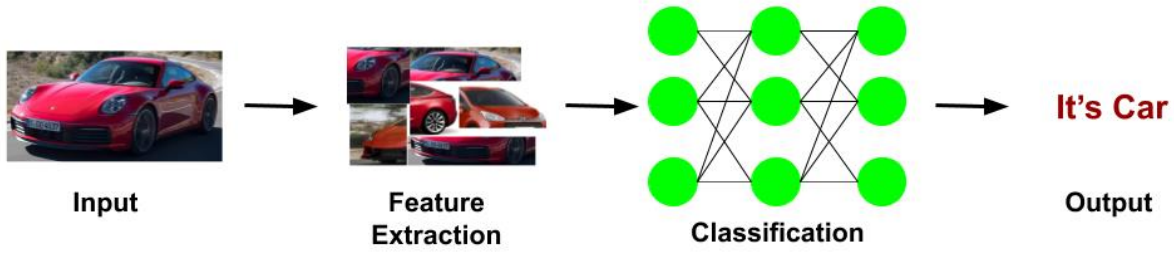

Figure 2: Machine Learning

B. **Neural networks (Deep Learning)**

Machine learning techniques based on the brain's network of nerve cells use artificial neural networks as their foundation. They are made up of data nodes connected by weighted connections. By altering different network parameters, machine learning techniques can be applied. Deep learning refers to neural networks having a significantly greater number of levels, allowing for the solution of new types of problems.

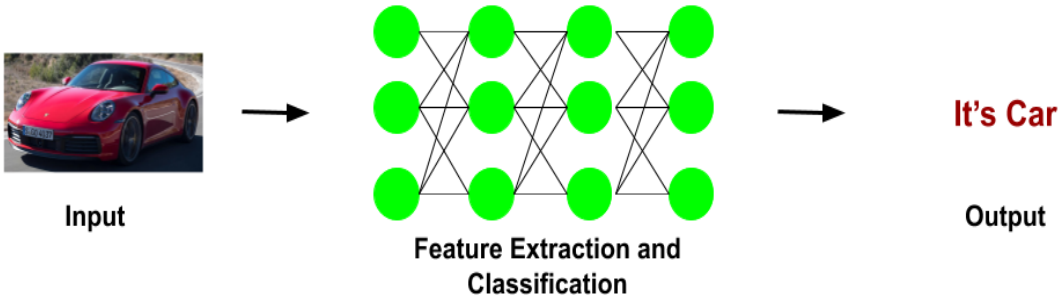

Figure 3: Deep Learning

C. **Black-box, gray-box and white-box models**

Whether and to what extent the algorithm is aware of the physical model of the problem to be solved and incorporates it into its learning process is what separates black-box, gray-box, and white-box models from one another. White-box models have the most precise knowledge of the model. Contrarily, black-box methods provide no consideration to the model at all. These two methods are combined in gray-box models.

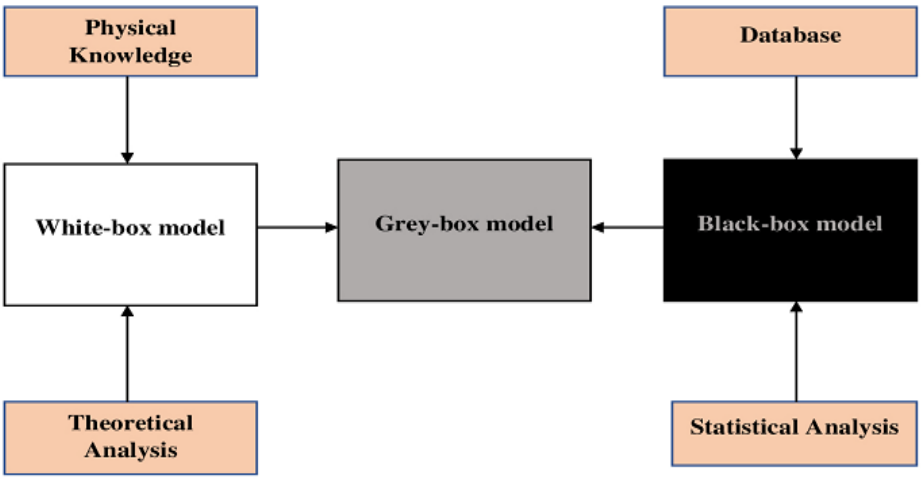

Figure 4: Three forms of feasible models for complex dynamic systems: black-, Gray-, and white-box models

D. **Neuromorphic Chips**

Microchips known as neuromorphic chips mimic the structure and functions of brain cells at the hardware level. These "neuron-like" elements mimic the brain's learning and association abilities, which can speed up the recognition of patterns in images or large data structures.

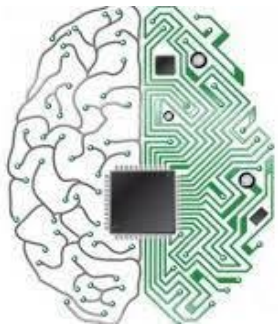

Figure 5: Neuromorphic chips

E. **Natural Language Processing (NLP)**

Examples of NLP include the estimated function in search engines which assists us by recommending the next term in a phrase as we type keywords and the spell checking capabilities (NLP). It deals with how people communicate with systems by utilizing human-spoken languages like Hindi, English, etc. Using our voice to conduct a web search, use a device, or control another device is conceivable. NLP has made all of this feasible. Both text-to-speech and speech-to-text conversion can be done by an NLP system.

In the fast-developing field of machine translation, texts can be accurately translated from one language to another by machines. Automated customer service is a new application field where computers can communicate with customers to respond to their inquiries or complaints.

Figure 6: NLP (Natural Language Processing

F. **Immersive Experiences**

The three-dimensional (3D) videography, the excitement of going to the movies has increased significantly. Additionally, immersive gaming experiences are being created for video games. By stimulating our senses, immersive experiences enable us to perceive, feel, and respond. Our engagement and interaction are improved, becoming more realistic and compelling. The field of training has used immersive experiences before, such as driving simulators, flight simulators, and other similar tools. Virtual reality and augmented reality may create an immersive experience.

i. Virtual Reality

Our senses allow us to perceive all we encounter in our reality. This gave rise to the hypothesis that if we could trick our senses into receiving false or imaginary information, our perspective of reality would likewise change as a result. A three-dimensional, computer-generated scenario called virtual reality (VR) imitates the actual world. By immersing themselves in the environment and engaging with the items and other user-generated behaviors, the user can explore and interact with it. Currently, VR headsets are used to do this.

Figure 7: Virtual Reality

ii. Augmented Reality

The term "augmented reality" refers to the superimposition of computer-generated perceptual information over the actual physical surroundings (AR). They can learn more about locations and make decisions based on user feedback. Travelers can receive real-time information on historic locations with the aid of location-based augmented reality (AR) apps by merely aiming their camera viewfinder at the objects, as shown in Figure 8 The majority of AR apps are location-based.

Figure 8: Augmented Reality

G. **Robotics**

A robot is essentially a machine that can complete one or more activities accurately and precisely on its own. A robot is an automated component, and that implies that it can submit to guidelines given through PC programs, in contrast to different devices. Robots were initially intended to perform work in serious, monotonous modern positions that are tedious or troubling for individuals. One of a robot's key parts is its sensors. There are various types of robots, including wheeled robots, legged robots, controllers, and humanoids. Humanoids are robots that look like humans. Robots are utilized in a variety of fields, including the military, bionics, science, and industry. Examples include:

The robotic space which is a more automatic and advanced version is called Mars Exploration Rover (MER) which is launched by NASA to understand more about the planet Mars.

- The robotic space which is a more automatic and advanced version is called Mars Exploration Rover (MER) which is launched by NASA to understand more about the planet Mars (Figure 9).
- Figure 10 depicts Sophia, a humanoid that mimics human facial emotions and gestures while also using artificial intelligence, visual data processing, and facial recognition.
- Unmanned aircraft that may be remotely piloted or flown autonomously using software-controlled flight plans in embedded systems in conjunction with onboard sensors and GPS is known as a drone (Figure 11).

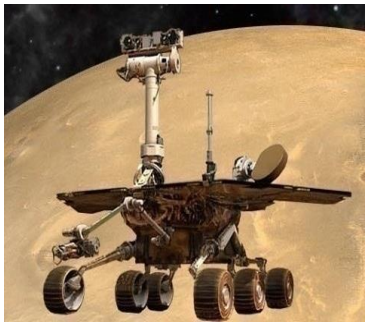

Figure 9: Mars Exploration Rover

Figure 10: Sophia Humanoid Robot

Figure 11: Drone Camera

H. **Artificial Intelligence and Cloud Computing**

Cloud computing and AI combined by developing better applications that can be used in various research applications. It is known that AI can achieve great potential applications that are developed in the future. Some techniques are also adopted with AI and give better applications. Thus cloud computing will get the assistance for helping AI applications. Companies are earning more money by developing these applications.

AI can also be used to monitor and handle problems in the cloud at the same time. Some experts believe that AI will soon be able to autonomously design working scenarios that are more effective after initially being used to automate the fundamental workflow of both private and public cloud computing systems.

The most well-known providers of cloud services today who use AI in their offerings include Amazon Web Service (AWS), Google, IBM, Alibaba, Oracle, etc. These are anticipated to expand even further in the future as cloud computing and artificial intelligence become more and more common.

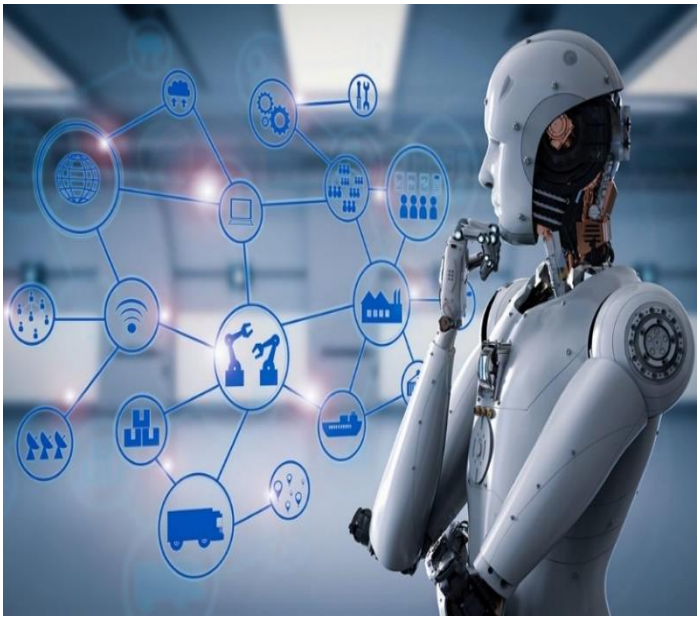

Figure 12: AI and Cloud Computing

I. **Automated Machine Learning (Auto ML)**

Automated machine learning (AutoML) is the sub-field of ML that develops the automation, to some expand, all phases of the plan of an ML framework. With regards to supervised learning, AutoML is worried about including extraction, pre-handling, model plan, and post-handling. An ever-increasing number of associations are moving toward Automated Machine Learning before long. It is very muddled and costly to apply conventional AI models in reality for all business issues. So an improved arrangement is to utilize Automated Machine Learning which permits even ML non-specialists to utilize ML algorithms and strategies without being an ML tech wizard!

This implies that in the future, solutions like Google Cloud AutoML, which can be used to train high-quality, custom ML models without requiring the bare minimum of a machine learning experience, will become highly popular. These technologies allow for as much customization as is necessary without requiring a thorough understanding of the intricate machine learning workflow. Nevertheless, setting additional parameters as necessary with AutoML still requires some ML experience. BlackLocus, Zenefits, Nationstar Mortgage, and other prominent US businesses all use AutoML.

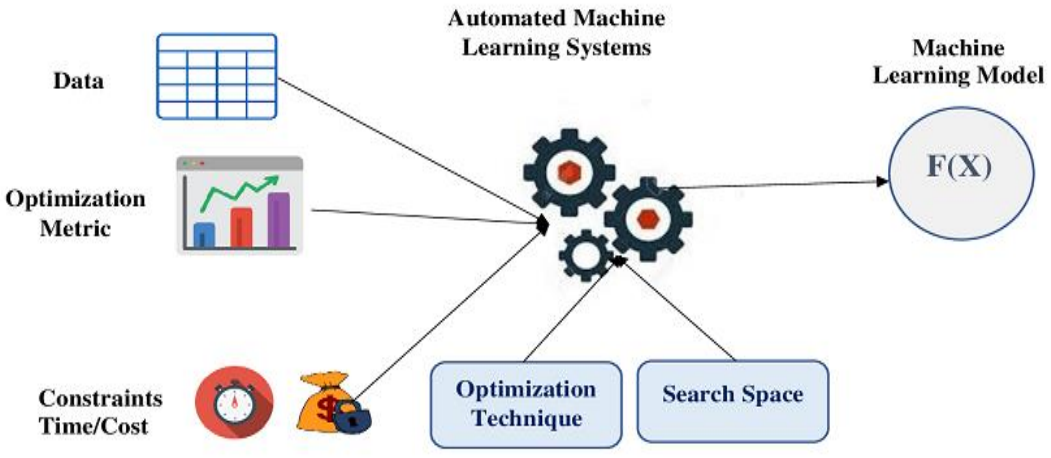

Figure 13: Automated Machine Learning

J. **Artificial Intelligence and Internet of Things**

AI and the Internet of Things (IoT) together developed the best technical applications. Combining these two technologies gives a better way for the research applications. An IoT device generates a lot of data that

requires mining the needful data. Before making any conclusion, the AI algorithms are utilized. IoT devices can then further implement the valuable outcomes produced by AI algorithms using the data that was acquired by IoT.

Smart home appliances are one example of this, which are rising in popularity. In fact, by 2021, 28 percent of all US houses might be smart homes. Additionally, businesses are utilizing smart gadgets more and more because they are cheaper and more effective. The most well-known brand in this industry is Nest, which is owned by Google and makes smart goods including thermostats, alarm systems, doorbells, etc.

Cities like New York are becoming more intelligent as a result of the Internet of Things and artificial intelligence coming together. The Automated Meter Reading (AMR) system, which tracks water consumption, and solar-powered smart bins, which track trash levels and coordinate timely waste pickup, are available here. And when new inventions emerge, this intelligence integration is only expected to grow in the future.

Figure 14: AI and IoT

K. **Artificial Intelligence with CyberSecurity**

AI becoming more popular and it is most powerful by applying cyber security. AI can help in cybercrime analysis, comprehension, and prevention. To make businesses safe and secure, it can also improve their cybersecurity measures. But it is also expensive and challenging to use in all situations. Additionally, fraudsters employ AI as a tool in their arsenal to strengthen and advance their cyberattacks.

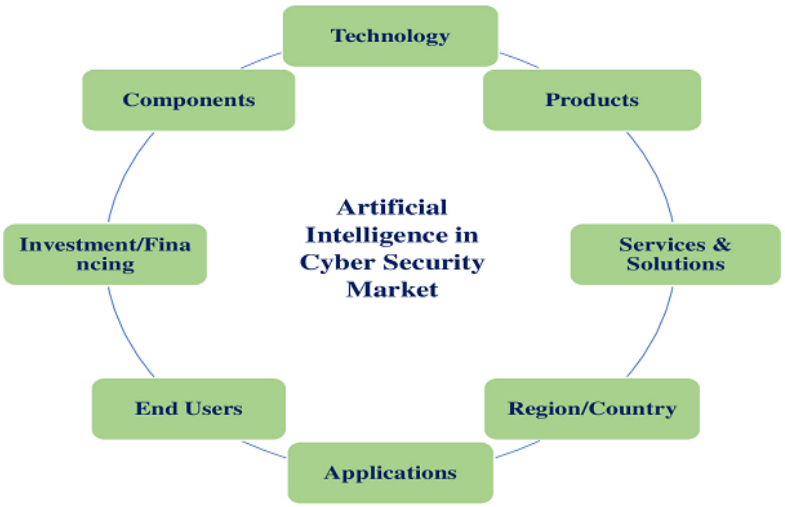

Figure 15: AI and Cyber Security

IV. ARTIFICIAL INTELLIGENCE IS EVERYWHERE

We presently live in the time of "Big Data," an age wherein we can gather colossal amounts of data excessively bulky for an individual to process. The use of man-made consciousness in such a manner has previously been very productive in a few ventures like innovation, banking, showcasing, and diversion. We've seen that regardless of whether algorithms work on a lot, large information and huge registering essentially permit man-made consciousness to learn through beast force. There might be proof that Moore's regulation is dialing back a bit, however, the expansion in information positively hasn't lost any force. Leap forwards in software engineering, math, or neuroscience all act as possible outs through the roof of Moore's Law.

V. APPLICATIONS OF ARTIFICIAL INTELLIGENCE

AI applications in industries

After automation, electrification, and informationization, AI has emerged as the pillar of Industry 4.0. Education, banking, manufacturing, the medical industry, security, and other areas have all benefited greatly from the innovative technological advancements of AI.

A. **AI in Agriculture**

We now have a fantastic opportunity to combine cutting-edge industrial and information technologies when designing and constructing agricultural facilities, which will help us progressively accomplish the aim of industrializing, customizing, and personalizing agricultural output. AI creates a method that is equivalent to human intelligence by simulating intelligence, successfully combining several applications using numerous issues in the field of agriculture using high-speed computing, and putting the findings into practice.

The appropriate nutrient level of the soil, the type of crop fit for each plot, and other preliminary analytics can be carried out by AI before planting crops. It was impossible to optimize the advantages without the backing of real scientific evidence. Crop production can become more productive and profitable with the help of AI.

B. **AI in Autonomous Driving**

Autonomous driving is a robotic system. Perception, path planning, and control decisions are the three key technologies at play. The cornerstone is intelligent perception, and the last two pieces of content rely on the study and use of artificial intelligence (AI) and related technologies. Deep learning is the current, successful method for optimizing driving behavior in autonomous cars. Large volumes of data are produced as a result of the various traffic conditions and unforeseen circumstances that the moving cars encounter. After extensive training and learning, you will get both your own driving experience as well as the outcomes of other cars' training and learning. The drive technology will be modified by the continued expansion of sample training, considerably enhancing autonomous driving technology. Meanwhile, there are other obstacles to autonomous driving, including technical problems, expenses, rules, and legislation.

C. **AI in Education**

The integration of AI and education at this time resulted in significant changes to the nature of education, from AI education to educational AI. The idea of collaborative, people-oriented education is the main focus of the curriculum. Objects used in education can be both people and machines. For both machines and people, educational AI research objects are transformed into educational activities and rules.

Some of the innovative applications are born from the marriage of AI and education. The intelligent network learning space is the ultimate goal of educational AI with the combination of AI and education. Collaborating with the government, universities, businesses, and other multi-party intelligent network learning channels.

D. **AI in the Financial Industry**

Digital financial services have been made possible through the deployment of AI in the financial sector. The entire banking sector has gained additional development power as a result. Many people are aware of the potential uses of AI in the financial sector. AI adaptation takes place over time. The evolution of the financial industry is significantly impacted by the use of AI. AI is a service for the financial sector as well as an analysis of financial data.

E. **AI in Governance**

The early applications of AI were in fields with abundant data resources and well-defined scenarios. The discipline of intelligent governance is still in its infancy, but because of AI's growing popularity, it offers a

wide range of potential applications in areas including virtual government assistants, intelligent conferences, robot process automation, document processing, and decision-making. Government service and efficiency will increase thanks to AI, which will also help with the shortage of workers.

F. **AI in Intelligent Robotics**

In general, robots are computer-controlled electromechanical devices that are employed to perform repetitive, difficult jobs in place of humans. They can replicate different athletic abilities. The basic parts of the robot are control devices, sensor devices, driving devices, and power supply devices. Intelligent robots enhance standard robots with sensing, pattern recognition, deep learning, and autonomous decision-making, allowing them to develop intelligent brains that are comparable to those of humans. Industrial robots, service robots, and specialty robots are all examples of intelligent robots.

G. **AI in Intelligent Robotics**

In general, robots are computer-controlled electromechanical devices that are employed to perform repetitive, difficult jobs in place of humans. They can replicate different athletic abilities. The basic parts of the robot are control devices, sensor devices, driving devices, and power supply devices. Intelligent robots enhance standard robots with sensing, pattern recognition, deep learning, and autonomous decision-making, allowing them to develop intelligent brains that are comparable to those of humans. Industrial robots, service robots, and specialty robots are all examples of intelligent robots.

H. **AI in Manufacturing**

The application of AI and manufacturing integration has raised economic and manufacturing productivity, made up for labor shortages, increased production flexibility, and reduced costs. Mass customization, better supply and demand matching, more precise market forecasting, the promotion of manufacturing service transformation, and enhanced manufacturing quality control. Complex system engineering is encouraging the deep integration of AI and manufacturing further. The development and use of compound skills, Internet technology, information security, and the standardization of AI are only a few of the issues and difficulties that all nations in the world face. Smart plants, intelligent management and service, intelligent supply chain management, intelligent monitoring, and intelligent decision-making are a few examples of intelligent products and facilities.

I. **AI in the Healthcare Industry**

There are still many issues with the medical industry's progress. Medical science and intelligence are provided by AI, which recognizes the successful marriage of medicine and technology. Technology and medicine can work together to make the medical procedure digital, electronic, quick, and accurate. For instance, NLP for the electronic medical record, deep learning for gene prediction, and picture recognition and visual technologies for radiography.

VI. CONCLUSION

In computer applications, AI is one of the areas that can be used in several real-time applications such as pattern recognition and data mining techniques to develop AI models for refining, pre-processing, and other advanced models. Based on the Industry 4.0 applications, IoT and big data with AI are applied in several domains. AI gives better support for people's work and life and this more efficiently encourages the automated smart city.

This paper provides a thorough introduction to the state of AI development, explains its primary technology and applications, and forecasts its future development trajectories, motivating both researchers and practitioners.

REFERENCES

[1] Chen et al. Autonomous Driving using Safe Reinforcement Learning by Incorporating a Regret-based Human Lane-Changing Decision Model. 2019. arXiv: 1910.04803 [cs.RO].

[2] P. Palanisamy. Multi-Agent Connected Autonomous Driving using Deep Reinforcement Learning. 2019. arXiv: 1911.04175 [cs.LG].

[3] S. Wang et al. "Deep Reinforcement Learning for Autonomous Driving". In: arXiv preprint arXiv:1811.11329 (2018).

[4] D. Ross et al. Proceedings of the Artificial Intelligence for Cyber Security (AICS) Workshop 2020. 2020. arXiv: 2002.08320 [cs.CR].

[5] C. Conati et al. AI in Education need interpretable machine learning: Lessons from Open Learner Modelling. 2018. arXiv: 1807.00154

[6] M. Ghassemi et al. A Review of Challenges and Opportunities in Machine Learning for Health. 2018. arXiv: 1806.00388 [cs.LG].

[7] M. van Hartskamp et al. "Artificial Intelligence in Clinical Health Care Applications: Viewpoint". In: Interactive Journal of Medical Research 8.2 (2019), e12100. ISSN: 1929-073X. DOI: 10.2196/12100. URL: http: //dx.doi.org/10.2196/12100.

[8] Dinesh G. Harkut, Kashmira Kasat and Vaishnavi D. Harkut, "Artificial Intelligence - Challenges and Applications" 2019.

[9] E. Bryndin, ''Development of artificial intelligence by ensembles of virtual agents with mobile interaction,'' Autom., Control Intell. Syst., vol. 8, no. 1, p. 1, 2020, doi: 10.11648/j.acis.20200801.11

[10] U. Pawar, D. O'Shea, S. Rea, and R. O'Reilly, ''Explainable AI in healthcare,'' in Proc. Int. Conf. Cyber Situational Awareness, Data Anal. Assessment (CyberSA), Jun. 2020, pp. 1–5, doi: 10.1109/ CyberSA49311.2020.9139655.

[11] N. Sharma, N. Chauhan, and N. Chand, Smart logistics vehicle management system based on internet of vehicles, presented at 2016 4th Int Conf. Parallel, Distributed and Grid Computing (PDGC), Waknaghat, India, 2016, pp. 495–49.

[12] https://www.techaheadcorp.com/blog/latest-trends-of-artificial-intelligence-technologies/

[13] https://www.forbes.com/sites/forbestechcouncil/2022/03/25/six-ai-trends-to-watch-in-2022/?sh=61f641382be1

[14] https://emeritus.org/in/learn/emerging-ai-and-machine-learning-trends-to-watch-out-for-in-the-next-3-years/