DEVELOPMENT AND BENEFITS OF MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE

A SEMINAR REPORT

submitted by

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CMA18CS010

to

The APJ Abdul Kalam Technological University
in partial fulfilment of the requirements for the award of the Degree

of
Bachelor of Technology In
Computer Science and Engineering

CARMEL COLLEGE OF ENGINEERING AND TECHNOLOGY
ALAPPUZHA

Dec 2021

DECLARATION

I undersigned at this moment declare that the project report "Development And Benefits Of Machine Learning And Artificial " , submitted for partial fulfilment of the requirements for the award of the degree of Bachelor of Technology of the APJ Abdul Kalam Technological University, Kerala is a bonafide work done by me under supervision of Asst. Prof.Dr.Reji.R. This submission represents my ideas in my own words, and where ideas or words of others have been included, I have adequately and accurately cited and referenced the sources. I also declare that I have adhered to academic honesty and integrity ethics and have not misrepresented or fabricated any data, idea, fact, or source in my submission. I understand that any violation of the above will cause disciplinary action by the institute and/or the university and can also evoke penal action from the sources that have thus not been properly cited or from whom proper permission has not been obtained. This report has not been previously formed the basis for awarding any degree, diploma or similar title of any other University.

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CERTIFICATE

This is to certify that the report entitled **Development And Benefits Of Machine Learning And Artificial** submitted by **Aravind PB** to the APJ Abdul Kalam Technological University in partial fulfilment of the Computer Science and Engineering is a bonafide record of the seminar carried out by them under my guidance and supervision. This report in any form has not been submitted to any other University or Institute for any purpose.

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CONTENTS

Contents	Page No.
ACKNOWLEDGEMENT	i
ABSTRACT	ii
LIST OF TABLES	iii
LIST OF FIGURES	iv
ABBREVIATIONS	v
NOTATION	vi
Chapter 1. INTRODUCTION	1
Chapter 2. LITERATURE SURVEY	7
Chapter 3. DIFFERENCE BETWEEN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	13
3.1 Artificial Intelligence	13
3.2 Machine Learning	14
3.3 Key Differences Between Artificial Intelligence (AI) And Machine learning (ML)	16
Chapter 4. AREAS OF MACHINE LEARNING	18
4.1 Classification	18
4.2 Adaptive systems	18
4.2.1. Cybernetics	19
4.2.2. Conceptual clustering	19
4.3 Modeling	19
4.4 Speech And Image Processing	19
4.5 Automation	19
4.6 Solving Problems	20
4.7 Genetics	20
4.7.7 Anomaly Detection	20
4.7.2 Games	20
Chapter 5. APPLICATIONS OF ARTIFICIAL INTELLIGENCE	21
5.1 Artificial Neural Network	21

5.1.1 Feed Forward ANN 21
5.1.2. Feedback ANN 21
5.2 Applications In Medical Sciences 23
5. 3 Program Writing Assistance 24
5.4 Non Player Character (NPC) 26
5.4.1 Personality Model 26
5.4.2 Mood Model 26
5.4.3 Relationship Model 26
5.4.4 About Non Player Character 26
Chapter 6. CHALLENGES 28
6.1 Avoiding Negative Side Effects 28
6.2 Scalable Oversight 28
6.3 Safe Exploration 28
6.4 Replacing Humans 29
6.5 Self Destruction Of Mankind 29
Chapter 7. CONCLUSION 30
REFERENCES 31

ACKNOWLEDGEMENT

First and foremost, I thank god Almighty for giving me the opportunity, strength and wisdom to complete the seminar successfully.

I wish to express my sincere gratitude to **Fr. Mathew Arekalam CMI, Chairman CCET, Fr. Justin Alukkal CMI, Director CCET,** and to our beloved **Principal Dr. Paul K Mathew**, for their constant support and encouragement in preparation of this seminar report and for making available library and technical facilities needed to prepare this report.

My sincere thanks to **Dr. Reji R** Head of the Department of CSE for his valuable suggestions and guidance throughout the period of this report.

I would also like to express my boundless thanks and gratitude from the bottom of my heart to my guide, **Dr. Reji R**, Department of CSE, for his valuable guidance and suggestions throughout the period of this report.

I am very thankful to all my teachers and all the staff members of Computer Science and Engineering for their proper guidance and affection shown to me.

I express my sincere thanks to my classmates, family members and whole and sundry who had helped me during the course of for their wholehearted support.

Aravind PB

ABSTRACT

Lately, Artificial Intelligence and Machine Learning is a hot topic in the tech industry. Perhaps more than our daily lives Artificial Intelligence (AI) is impacting the business world more. There was about $300 million in venture capital invested in AI startups in 2014, a 300% increase than a year before.

AI is everywhere, from gaming stations to maintaining complex information at work. Computer Engineers and Scientists are working hard to impart intelligent behavior in the machines making them think and respond to real-time situations. AI is transiting from just a research topic to the early stages of enterprise adoption. Tech giants like Google and Facebook have placed huge bets on Artificial Intelligence and Machine Learning and are already using it in their products. But this is just the beginning, over the next few years, we may see AI steadily glide into one product after another.

Artificial intelligence (AI) brings with it a promise of genuine human-to-machine interaction. When machines become intelligent, they can understand requests, connect data points and draw conclusions. They can reason, observe and plan. Consider leaving for a business trip tomorrow? Your intelligent device will automatically offer weather reports and travel alerts for your destination city.

Planning a large birthday celebration? Your smart bot will help with invitations, make reservations and remind you to pick up the cake.

Planning a direct marketing campaign? Your AI assistant can instinctively segment your customers into groups for targeted messaging and increased response rates.

Clearly, we're not talking about robotic butlers. This isn't a Hollywood movie. But we are at a new level of cognition in the artificial intelligence field that has grown to be truly useful in our lives. We get it, though. You're still confused about how all these topics – AI, machine learning and deep learning – relate. You're not alone. And we want to help.

In this article we'll explore the basic components of artificial intelligence and describe how various technologies have combined to help machines become more intelligent [7].

LIST OF TABLES

No.	Title Page	Page No.
3.3	Difference between Artificial Intelligence (AI) and Machine learning (ML)	16

LIST OF FIGURES

No.	Title Page	Page No.
2.1	Evolution of AI	11
3	AI&ML	13
5.1.1	FeedForward ANN	22
5.1.2	FeedBack ANN	23
5.3	GitHub Pilot	25

ABBREVIATIONS

AI : Artificial Intelligence

NPC : Non Player Character

ANN : Artificial Neural Network

ML : Machine Learning

CHAPTER 1

INTRODUCTION

Machine learning is advancing at a rapid pace and has the potential to revolutionise computers,logical algorithm patterns, and the creation of complicated data structures. . The growing interest in machine learning, backed with artificial intelligence, influenced by the same factors that had made data mining and Bayesian analysis more popular than ever. It's quite possible to analyze a model which is even bigger, with more complex data capable of delivering faster accurate results at a very large scale.

Models are created using a complicated algorithm which would help achieve an adaptable system that would continuously grow intelligent depending on the nature of search hits, human interactions and the response it generates. Artificial intelligence makes computers both smarter and useful as it works on artificial neural network and mathematical & logical theorems. Machine learning and artificial intelligence are superior to natural intelligence because they are constant, trustworthy, and efficient while not being prone to mood swings, allowing them to perform tasks faster and better than the human brain.

Machine learning has evolved from the study of computational learning theory and pattern recognition. It is the most effective method used in the field of data analytics in order to predict something by devising some models and algorithms. These analytical models allow researchers, engineers, data scientists and analysts to produce reliable and valid results and decisions. It also helps to discover some hidden patterns or features through historical

learning's and trends in data. Feature selection is the most important task of machine learning. Model is created based on the results gathered from the training data that is why machine-learning algorithms are non-interactive. It studies the past observations to make precise predictions. It is a very difficult task to make an accurate prediction rule based on which algorithm can be developed [4].

In Machine Learning a computer program is assigned to perform some tasks and it is said that the machine has learnt from its experience if its measurable performance in these tasks improves as it gains more and more experience in executing these tasks. So the machine takes decisions and does predictions / forecasting based on data. Take the example of computer program that learns to detect / predict cancer from the medical investigation reports of a patient. It will improve in performance as it gathers more experience by analyzing medical investigation reports of wider population of patients. Its performance will be measured by the count of correct predictions and detections of cancer cases as validated by an experienced Oncologist. Machine Learning is applied in wide variety of fields namely : robotics, virtual personal assistants (like Google), computer games, pattern recognition, natural language processing, data mining, traffic prediction, online transportation network (e.g. estimating surge price in peak hour by Uber app), product recommendation, share market prediction, medical diagnosis, online fraud prediction, agriculture advisory, search engine result refining (e.g. Google search engine), BoTs (chatbots for online customer support), E-mail spam filtering, crime prediction through video surveillance system, social media services(face recognition in facebook). Machine Learning generally deals with three types of problems namely: classification, regression and clustering. Depending on the availability of types and categories of training data one may need to select from the available techniques of “supervised learning”, “unsupervised learning”, “semi supervised learning” and “reinforcement learning” to apply the appropriate machine learning algorithm.

There are three main classes of machine learning techniques

Supervised learning:

In supervised learning, the training set consists of pairs of input and desired output, and the goal is that of learning a mapping between input and output spaces. The inputs are points in the two-dimensional plane, the outputs are the labels assigned to each input (circles or crosses), and the goal is to learn a binary classifier. Applications include the channel decoder discussed above, as well as email spam classification on the basis of examples of spam/ non-spam emails.

Unsupervised learning:

In unsupervised learning, the training set consists of unlabelled inputs, that is, of inputs without any assigned desired output. Unsupervised learning generally aims at discovering properties of the mechanism generating the data. The goal of unsupervised learning is to cluster together input points that are close to each other, hence assigning a label – the cluster index – to each input point (clusters are delimited by dashed lines). Applications include clustering of documents with similar topics. It is emphasized that clustering is only one of the learning tasks that fall under the category of unsupervised learning [7].

Reinforcement learning:

Reinforcement learning lies, in a sense, between supervised and unsupervised learning. Unlike unsupervised learning, some form of supervision exists, but this does not come in the form of the specification of a desired output for every input in the data. Instead, a reinforcement learning algorithm receives feedback from the environment only after selecting an output for a given input or observation. The feedback indicates the degree to which the

output, known as action in reinforcement learning, fulfils the goals of the learner. Reinforcement learning applies to sequential decision making problems in which the learner interacts with an environment by sequentially taking actions – the outputs – on the basis of its observations – its inputs – while receiving feedback regarding each selected action. Most current machine learning applications fall in the supervised learning category, and hence aim at learning an existing pattern between inputs and outputs. Supervised learning is relatively well-understood at a theoretical level, and it benefits from well-established algorithmic tools. Unsupervised learning has so far defied a unified theoretical treatment. Nevertheless, it arguably poses a more fundamental practical problem in that it directly tackles the challenge of learning by direct observation without any form of explicit feedback. Reinforcement learning has found extensive applications in problems that are characterized by clear feedback signals, such as win/lose outcomes in games, and that entail searches over large trees of possible action-observation histories.

The use of a machine learning approach in lieu of a more conventional engineering design should be justified on a case-by-case basis on the basis of its suitability and potential advantages. The following criteria, inspired by, offer useful guidelines on the type of engineering tasks that can benefit from the use of machine learning tools.The traditional engineering flow is not applicable or is undesirable due to a model deficit or to an algorithm deficit. With a model deficit, no physics-based mathematical models exist for the problem due to insufficient domain knowledge. As a result, a conventional model-based design is inapplicable. With an algorithm deficit, a well-established mathematical model is available, but existing algorithms optimized on the basis of such model are too complex to be implemented for the given application. In this case, the use of hypothesis classes including efficient “machines”, such as neural network of limited size or with tailored hardware implementations and references therein), can yield lower-complexity solutions.

A sufficiently large training data sets exist or can be created. The task does not require the application of logic, common sense, or explicit reasoning based on background knowledge.The task does not require detailed explanations for how the decision was made. The trained machine is by and large a black box that maps inputs to outputs. As such, it does not provide direct means to ascertain why a given output has been produced in response to an input, although recent research has made some progress on this front. This contrasts with engineered optimal solutions, which can be typically interpreted on the basis of physical performance criteria. For instance, a maximum likelihood decoder chooses a given output because it minimizes the probability of error under the assumed model. The phenomenon or function being learned is stationary for a sufficiently long period of time. This is in order to enable data collection and learning. The task has either loose requirement constraints, or, in the case of an algorithm deficit, the required performance guarantees can be provided via numerical simulations. With the conventional engineering approach, theoretical performance guarantees can be obtained that are backed by a physics-based mathematical model. These guarantees can be relied upon insofar as the model is trusted to be an accurate representation of reality. If a machine learning approach is used to address an algorithm deficit and a physics-based model is available, then numerical results may be sufficient in order to compute satisfactory performance measures. In contrast, weaker guarantees can be offered by machine learning in the absence of a physics-based model. In this case, one can provide performance bounds only under the assumptions that the hypothesis class is sufficiently general to include “machines” that can perform well on the problem and that the data is representative of the actual data distribution to be encountered at runtime. The selection of a biased hypothesis class or the use of an unrepresentative data set may hence yield strongly suboptimal performance.

In the presence of modelling or algorithmic deficiencies in the conventional engineering flow based on the acquisition of domain knowledge, data-driven machine learning tools can speed up the design cycle, reduce the complexity and cost of implementation, and improve over the performance of known algorithms. To this end, machine learning can leverage the availability of data and computing resources in many engineering domains, including modern communication systems. Supervised, unsupervised, and reinforcement learning paradigms lend themselves to different tasks depending on the availability of examples of desired behaviour or of feedback. The applicability of learning methods hinges on specific features of the problem under study, including its time variability and its tolerance to errors. As such, a data-driven approach should not be considered as a universal solution, but rather as a useful tool whose suitability should be assessed on a caseby-case basis. Furthermore, machine learning tools allow for the integration of traditional model-based engineering techniques and of existing domain knowledge in order to leverage the complementarity and synergy of the two solutions [4].

CHAPTER 2

LITERATURE SURVEY

This thesis elaborated the concept, significance and main strategy of machine learning as well as the basic structure of machine learning system. By combining several basic ideas of main strategies, great effort are laid on introducing several machine learning methods, such as Rote learning, Explanation-based learning, Learning from instruction, Learning by deduction, Learning by analogy and Inductive learning, etc. Meanwhile, comparison and analysis are made upon their respective advantages and limitations. At the end of the article, it proposes the research objective of machine learning and points out its development trend. Machine learning is a fundamental way that enable the computer to have the intelligence ; Its application which had been used mainly the method of induction and the synthesis， rather than the deduction has already reached many fields of Artificial Intelligence. AI science is the only way that raises the machine intelligence level . Only improve the machine- learning function continuously, can we make the machine close to or surpasses the humanity's intelligent level. To the ML discussion and the ML research progress, will certainly make the artificial intelligence and the entire science and technology further development.

According to the Merriam Webster dictionary, “Artificial intelligence is a branch of computer science dealing with the simulation of intelligent behavior in computers.” When a machine can make intelligent decisions, it can be referred to as being intelligent- artificially. We mostly see people using the terms of machine learning, deep learning, and AI synonymously.

However, deep learning is a subset of machine learning, and machine learning is a subset of AI.

When did the AI surge begin?

Back in the 1800s, AI was limited in myths, fiction, and speculation. Classical philosophers envisioned machines integrated into human beings. However, they were just portrayed in fiction work like Mary Shelly's "Frankenstein" then. The real initiation in AI began in 1956. The seed that led towards an AI future was a workshop in Darthmod College, attendees of which were claimed as AI leaders for decades to come [13].

The AI surge began with six major design goals as follows:

Teach machines to reason in accordance to perform sophisticated mental tasks like playing chess, proving mathematical theorems, and others.

Knowledge representation for machines to interact with the real world as humans do — machines needed to be able to identify objects, people, and languages. Programming language Lisp was developed for this very purpose. Teach machines to plan and navigate around the world we live in. With this, machines could autonomously move around by navigating themselves. Enable machines to process natural language so that they can understand language, conversations and the context of speech. Train machines to perceive the way humans do- touch, feel, sight, hearing, and taste.

General Intelligence that included emotional intelligence, intuition, and creativity. All these goals set the foundation to build a machine with human capabilities. Millions of dollars were invested in bringing their vision to life. However, soon, the US government realized the absence of powerful computing technologies needed to implement AI. The funds were withdrawn, and the journey took the first halt in the late 80s.

The need for a massive amount of data and enormous computing power disrupted the progress in the 80s. The 21st century, however, brought the concept quickly back to life proving Moore's law. The heavy processing power that tiny silicons hold today has made AI feasible in the current context, also enabling to build improved algorithms.

There have been four successive catalysts in the AI rebirth and revolution:

The democratization of AI knowledge that began when world-class research contents were made available to the masses- starting with MOOCs from Stanford University with Andrew NG and Intro to ML by Sebastian Thurn and Katie Malone from Udacity.

Data and Computing Power (cloud and GPU) that made AI accessible to the masses without enormous upfront investment or being a mega-corporation. Even with access to data and computing power, you had to be an AI specialist to leverage it. However, in 2015, there was a proliferation of new tools and frameworks that made exploring and operationalizing production-level AI feasible to the masses. You can now build on the backs of giants like Google (Tensorflow), and Facebook(PyTorch). Numerous organizations have been founded with the democratization of AI like FastAI and OpenAI.

In the past two years, AI as a service has taken this a step further, enabling easier prototyping, exploration, and even building sophisticated and intelligent use-case specific AI's in the product. There are platforms like Azure AI, AWS AI, Google Cloud AI, IBM Cloud AI, and many more that provides AI as a Service.

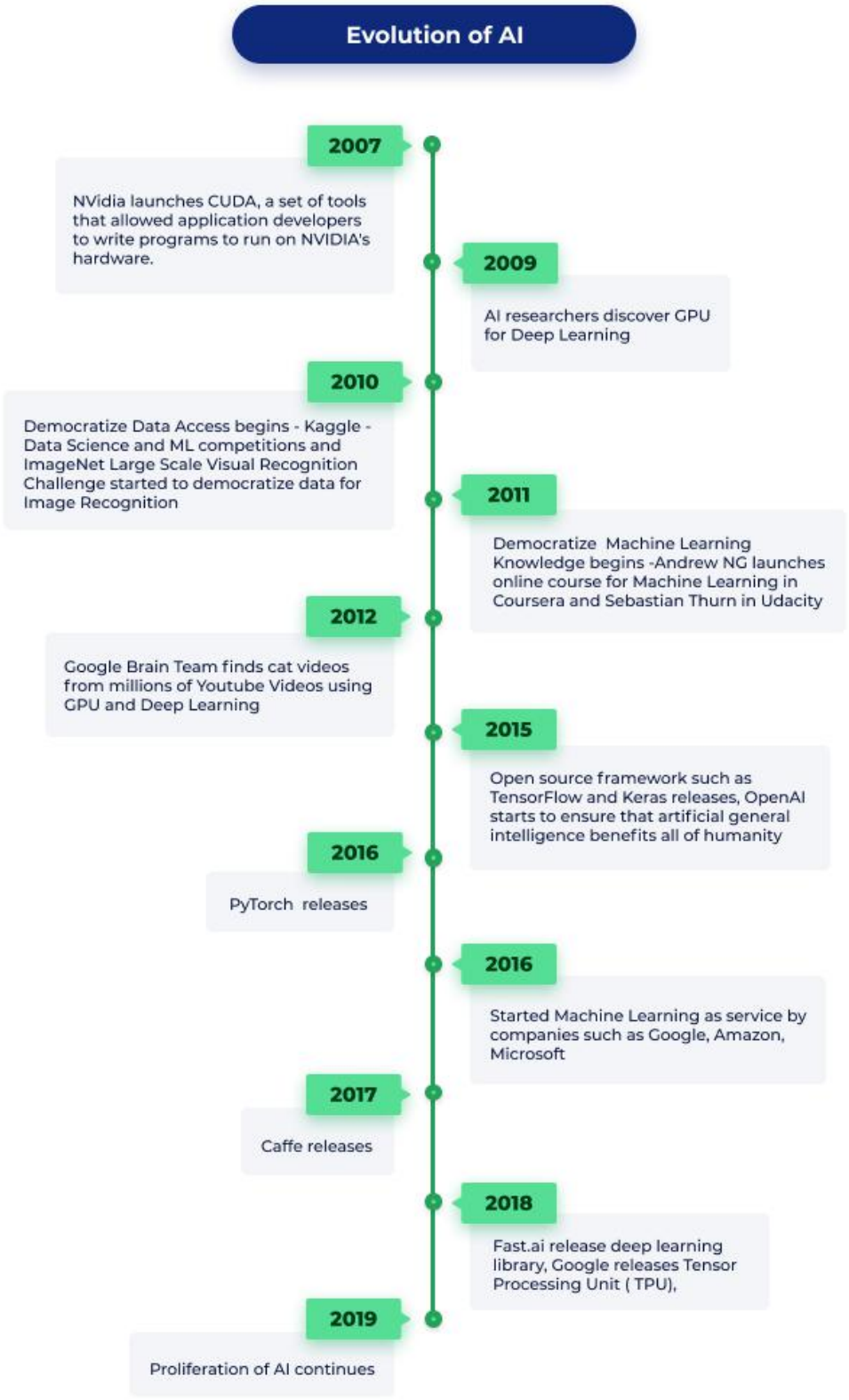

Fig 2.1 Evolution of AI

Humankind has witnessed AI identifying cat videos to the invention of self-driving cars. More companies are trying to apply AI to solve problems and build an AI strategy in the organization. The journey of AI, which began with six goals, is gradually being achieved today. With further advancement in technology, a future with humans and machines living together seems possible. Now, we can either choose to observe the trend or start planning our AI strategy to create an impact in a world driven by technology [13].

CHAPTER 3

DIFFERENCE BETWEEN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

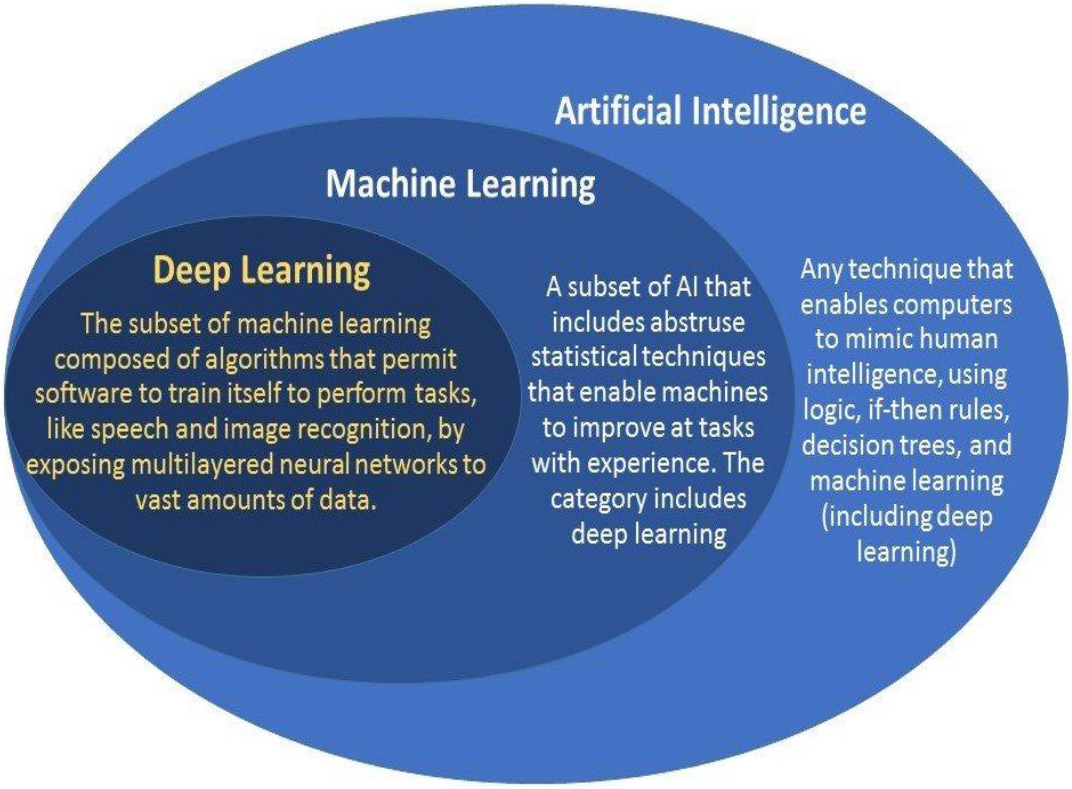

Fig 3 AI&ML

3.1 ARTIFICIAL INTELLIGENCE

Artificial intelligence is a field of computer science which makes a computer system that can mimic human intelligence. It is comprised of two words "Artificial" and "intelligence", which means "a human-made thinking power." Hence we can define it as,

Artificial intelligence is a technology using which we can create intelligent systems that can simulate human intelligence.

The Artificial intelligence system does not require to be pre-programmed, instead of that, they use such algorithms which can work with their own intelligence. It involves machine learning algorithms such as Reinforcement learning algorithm and deep learning neural networks. AI is being used in multiple places such as Siri, Google's AlphaGo, AI in Chess playing, etc.

Based on capabilities, AI can be classified into three types:

Weak AI

General AI

Strong AI

Currently, we are working with weak AI and general AI. The future of AI is Strong AI for which it is said that it will be intelligent than humans.

3.2 MACHINE LEARNING

Machine learning is about extracting knowledge from the data. It can be defined as, Machine learning is a subfield of artificial intelligence, which enables machines to learn from past data or experiences without being explicitly programmed.

Machine learning enables a computer system to make predictions or take some decisions using historical data without being explicitly programmed. Machine learning uses a massive amount of structured and semi-structured data so that a machine learning model can generate accurate result or give predictions based on that data.

Machine learning works on algorithm which learn by it?s own using historical data. It works only for specific domains such as if we are creating a machine learning model to detect pictures of dogs, it will only give result for dog images, but if we provide a new data like cat image then it will become unresponsive. Machine learning is being used in various places such as for online recommender system, for Google search algorithms, Email spam filter, Facebook Auto friend tagging suggestion, etc.

It can be divided into three types:

Supervised learning

Reinforcement learning

Unsupervised learning [7].

3.3 KEY DIFFERENCES BETWEEN ARTIFICIAL INTELLIGENCE (AI) AND MACHINE LEARNING (ML):

Table 3.3 Difference between AL and ML

Artificial Intelligence	Machine learning
Artificial intelligence is a technology which enables a machine to simulate human behavior.	Machine learning is a subset of Al which allows a machine to automatically learn from past data without programming explicitly.
The goal of Al is to make a smart computer system like humans to solve complex problems.	The goal of ML is to allow machines to learn from data so that they can give accurate output.
In Al, we make intelligent systems to perform any task like a human.	|In ML we teach machines with data to perform a particular task and give an accurate result.
Machine learning and deep learning are the two main subsets of Al.	Deep learning is a main subset of machine learning.
Al has a very wide range of scope.	Machine learning has a limited scope
Al is working to create an intelligent system which can perform various complex tasks.	Machine learning is working to create machines that can perform only those specific tasks for which they are trained.
Al system is concerned about maximizing the chances of success.	Machine learning is mainly concerned about accuracy and patterns.
The main applications of Al are Siri, customer support using catboats, Expert System, Online game playing, intelligent humanoid robot, etc.	The main applications of machine learning are Online recommended system, Google search algorithms. Facebook auto friend tagging suggestions, etc.
On the basis of capabilities, Al can be divided into three types, which are, Weak Al, General Al, and Strong Al.	Machine learning can also be divided into mainly three types that are Supervised learning Unsupervised learning, and Reinforcement learning

It includes learning, reasoning, and self-correction.	I t includes learning and self-correction when introduced with new data.
Al completely deals with Structured, semi-structured, and unstructured data.	Machine learning deals with Structured and semi-structured data.

CHAPTER 4

AREAS OF MACHINE LEARNING

Machine Learning is the process of fine-tuning a system through the use of configurable parameters. It offers a wide range of applications and can solve a variety of real-world challenges. Some of the applications include:

Face Detection and Recognition - Cameras can detect when someone smiles more accurately now better than it used to before because of advances in machine learning. Similarly because of machine learning, an individual's photo can be identified due to a computer program.
Visual Perception - Analyzing and interpreting visual information surrounding us sums up the visual perception of an individual. This has two more sub-categories:
Pattern Recognition
Scene Analysis

4.1 CLASSIFICATION

The modeling algorithms used in Machine Learning help in segregating the piece of information received based on the content it has. It is based on training set of data containing observations that leads to classification according to the problem asked for.

4.2 ADAPTIVE SYSTEMS

Adaptive systems are systems that adapt behaviour depending on previous experiences and establish rules based on that. This includes:

4.2.1. Cybernetics

Communication between automatic control systems .

4.2.2. Conceptual clustering

Models of concept formation that increments and clusters according to that.

4.3 MODELING

A collection of transformational rules has been established to forecast the behaviour and relationship between real-world objects or entities.

Problem solving systems

Hobot world Modeling(Perceptual and Functional Representations)

4.4 SPEECH AND IMAGE PROCESSING

Another subset of machine learning, deep learning, plays an important role in speech recognition as well as image categorization and processing. Machine learning also helps in:

Language and Speech understanding

Semantic Information Processing

Retrieval of information

4.5 AUTOMATION

The capacity to move over terrain and manipulate items, as well as a combination of most or all of the above talents.

Transportation

Industrial Automation

Military

AI in Household (Smart Homes)

4.6 SOLVING PROBLEMS

The ability to prepare a solution based on the formulation of the given problem .

Interactive Problem Solving

Heuristic Search

Inference

4.7 GENETICS

Clustering algorithms or data mining are employed to aid in the discovery of genes linked to a specific disease.

4.7.1 Anomaly detection

Insider trading in a stock market can be detected; thanks to machine learning. Fraudulent transaction in high volume business can be tracked because of machine learning

4.7.2 Games

Translating the rules into a structure that helps in reaching adequate level of performance. Games like Chess, Bridge [4].

CHAPTER 5

APPLICATIONS OF ARTIFICIAL INTELLIGENCE

5.1 ARTIFICIAL NEURAL NETWORK

ANNs or simply Neural Networks refer to a type of learning model that functions the way synapses works in human brain. While traditional computing is dependent on logic statements to perform tasks, neural networks use nodes (neurons) and edges (synapses) to process the given data.

Series of outputs are generated depending on the inputs run in the background.

The output generated is then compared to known data.

System checks the pathways through the neural network that led to the correct answer. The results become more and more accurate over time.

There are two types of ANN topologies :

FeedForward

Feedback

5.1.1 FeedForward ANN

A Feed Forward Neural Network is an artificial neural network in which the connections between nodes does not form a cycle. The opposite of a feed forward neural network is a recurrent neural network, in which certain pathways are cycled. The feed forward model is the simplest form of neural network as information is only processed in one direction. While

the data may pass through multiple hidden nodes, it always moves in one direction and never backwards [10].

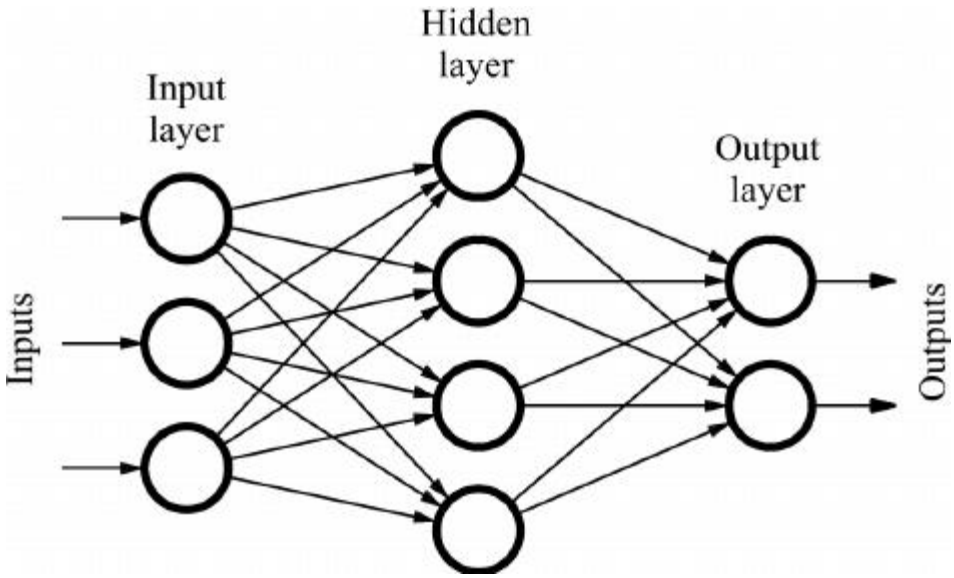

Fig 5.1.1 Feedforward ANN

5.1.2. FeedBack ANN

Signals can travel in both the directions in Feedback neural networks. Feedback neural networks are very powerful and can get very complicated. Feedback neural networks are dynamic. The ‘state’ in such network keep changing until they reach an equilibrium point. They remain at the equilibrium point until the input changes and a new equilibrium needs to be found. Feedback neural network architecture is also referred to as interactive or recurrent, although the latter term is often used to denote feedback connections in single-layer organisations. Feedback loops are allowed in such networks. They are used in content addressable memories [11].

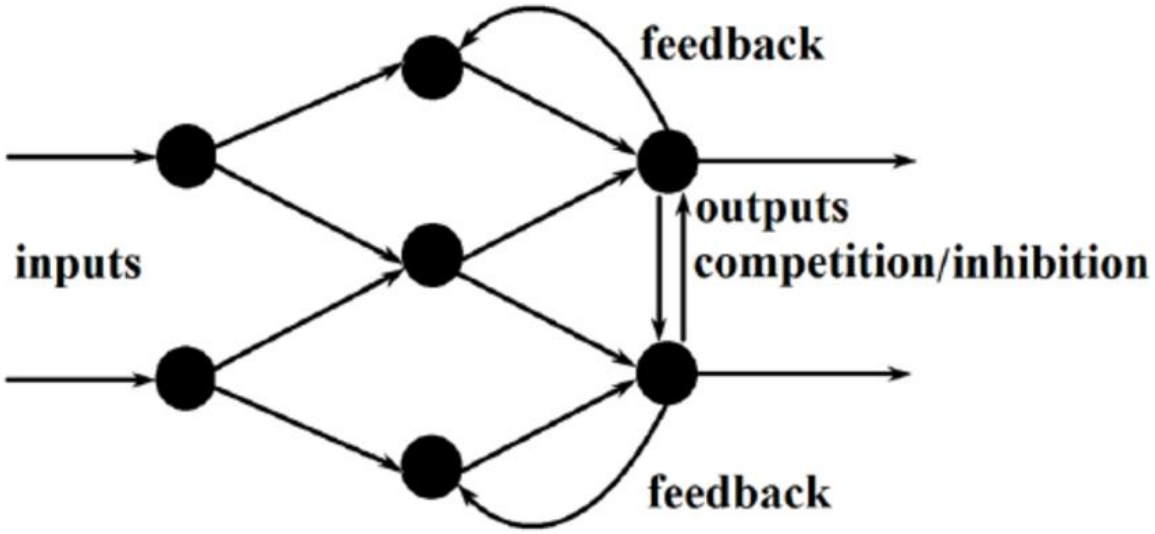

Fig 5.1.2 Feedback ANN

5.2 APPLICATIONS IN MEDICAL SCIENCES

AI in healthcare and medicine could help in planning better treatment for patients and it can also provide more accurate information to the physicians about the patient. Some applications include:

Usage in genomics and genetics that helps in identifying huge data sets of genetic information about the patient.

Drug creation using AI takes lesser time than what it could have taken through clinical trials.

Image recognition and analysis can be now easily done because of AI. Complex images can be automatically interpreted that subsequently helps in MRI scanning [3],[8],[11].

5.3 PROGRAM WRITING ASSISTANCE

AI technology allows programmers to determine errors in their code as these are written. Ubisoft, a French software developer, is a pioneer in this space. It created the AI tool,Commit Assistant, to check for incorrect codes using a software library of usual coding errors encountered in previous projects. Commit Assistant thus prevents programmers from making the same mistakes they once did, consequently saving them time and effort correcting errors later on in the process [1].

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Other examples of AI tools that ease programmers' lives include GitHub Copilot is powered by Codex, the new AI system created by OpenAI. GitHub Copilot understands significantly more context than most code assistants. So, whether it's in a docstring, comment, function name, or the code itself, GitHub Copilot uses the context you've provided and synthesizes code to match. Together with OpenAI, we're designing GitHub Copilot to get smarter at producing safe and effective code as developers use it [2],[9].

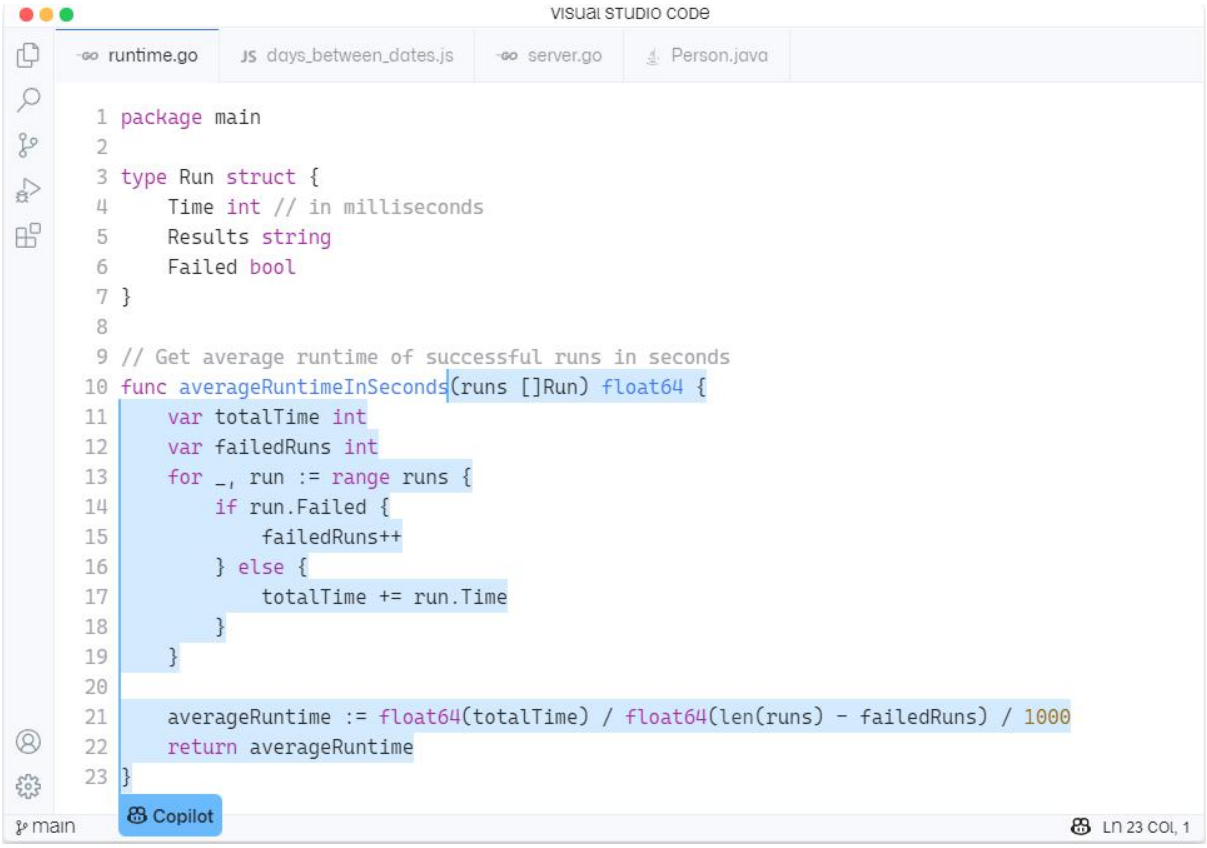

Fig 5.3 GitHub Pilot

5.4 NON PLAYER CHARACTER (NPC)

Artificial intelligence has a great importance in computer games when a user plays with the computer itself. The system needs to be designed to achieve an adaptive model of networks. A NPC or a non player character is sometimes known as a non-person character which is not controlled by any player. In order to achieve the important aspects of NPC's personae the following psychological models are used:

5.4.1 Personality Model

Personality plots across two orthogonal axes introversion-extroversion and neuroticismstability, allowing the creation of characters with personality types such as aggressive, timid or defensive.

5.4.2 Mood Model

Moods are measured based on valance and arousal, where valance is referred to a positive or negative mood and arousal refers to the intensity of the mood.

5.4.3 Relationship Model

This is a technique in which the model plots the relationship between four axes: character liking among each other, physical attraction, dominance or submissiveness and intimacy. This helps in realizing the interest level of a particular character indicating that characters share a number of common subjects of interests and are thus more likely to converse.

Non Player character is based on a “Realistic” & “Reactive” model which has a cognitive thinking capability as per the adaptive algorithm created by the developers matched with the player’s thoughts and his inputs made during the time of game-play. The efficient process of decision making is achieved through artificial intelligence controllers in games which are achieved by using a reactive intelligence bound by the underlying relationship with the players and the objects in the gaming world. Relationship modelling finds a key role in the development of the smart algorithm as it is based on several attributes. The attributes include origin, regularity, strength, polarity and validity. Relationships are usually affected in many ways. Filtered and processed gaming events are one of the direct methods where one entity in the gaming world observes the actions of another, those actions can directly impact the relationships which must be added, updated or removed. Indirect events are triggered through various relationships within the network which are inter-dependent on each other.

CHAPTER 6

CHALLENGES

Artificial intelligence has a bright and magnificent future in the world of technology, but it also poses an insidious menace that has the ability to threaten humanity.

6.1 AVOIDING NEGATIVE SIDE EFFECTS

An AI system that would not disturb its own environment while performing its task is one of the most bugging questions. For example a robot cleaning a vase should not knock it off as it can clean faster by doing so.

6.2 SCALABLE OVERSIGHT

To ensure a given AI system that respect aspects of the objective are too expensive to be frequently evaluated during training. For eg: If an AI system gets human feedback during its task operation, the feedback utilization should be done efficiently as re-asking would be too annoying.

6.3 SAFE EXPLORATION

It’s quite difficult to prevent an AI system to control its own self exploratory movements. For example: May be a cleaning robot should experiment with mopping strategies, but clearly it shouldn’t try putting a wet mop in an electrical outlet.

6.4 REPLACING HUMANS

As more and more research goes into machine learning, artificial intelligence would gradually become very smarter and self developing on its own. This has a potential to replace humans in almost every dimension and moreover be a serious threat in the job market.

6.5 SELF DESTRUCTION OF MANKIND

Scientists and mathematicians feel that when the cognitive sense of thinking over rules the data models, it would result into a serious threat to the existence of mankind.

CHAPTER 7

CONCLUSION

Despite many hurdles, Machine Learning today has the ability to develop at a rapid speed, as significant research is being invested in its development. Every single person on the planet wishes to live in a smart city with a smart home. To do this, the majority of the technology we employ must be automated in order to decrease human friction as much as feasible. One of the few reasons why machine learning combined with artificial intelligence is such a popular issue is because of these factors. Artificial intelligence (AI) has the potential to replace humans in practically every aspect of our lives, but when we understand that it is one of the only ways to improve our quality of life, we succumb to AI's benefits.

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