

Artificial Intelligence and its Models

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Abstract—Artificial Intelligence (AI) is the fastest growing field of computer science and technology. It has achieved a great success in very short span of time. It is basically the process of mirroring human intelligence to machines. In this paper, we have discussed the concept and the models of Artificial Intelligence along with its future scope.

Keywords—big data, theory of mind, supervised learning, intelligent machines, machine learning, regression problems, support vector.

I. INTRODUCTION

Artificial Intelligence is the brand new era of computer science which deals with the development of machines that can take decisions like humans on their own. As its name indicates it comprises of the words artificial and intelligence, artificial means something which is unnatural and is made by humans and the meaning of intelligence is the ability to understand, learn and think so artificial intelligence is basically the process of making intelligent machines. The use of AI is increasing rapidly in our day to day life i.e., from reading our emails to getting directions for driving vehicles, as it is very fast, reduces our efforts and makes our life easy.

II. HISTORY OF AI

At first AI was introduced in the summer of 1956 at the workshop held in Dartmouth College of New Hampshire. AI is also known as machine intelligence. In most of the cases AI is much better than natural intelligence, as it is more consistent, accurate, cheaper and faster as compared to natural intelligence. But making of AI was very difficult in recent days of its development as government stopped their funding for AI. During 1980s government again started its funding but stopped during 1987 to 1993. In 1997 Deep Blue (chess computer) became the first AI based computer that defeated a chess champion Garry Kasparov. And in the year 2011 an AI based computer won the quiz show.

III. TYPES OF AI

A. Narrow AI

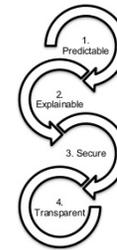
The systems with narrow AI is used only for some selective tasks, these systems are programmed for limited work and can't take decisions on their own. It is used for single task only and is also known as weak AI.

Applications of narrow AI is increasing rapidly in our daily routines i.e., in detecting spam emails, music recommendations and many more.

Apple's Siri is one of the widely used examples of narrow AI which uses ML algorithms in mobiles. Face

recognition, share predictions, weather forecasts and Google assistant are also the result of Artificial Intelligence.

4 Steps to Good Narrow AI



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B. General AI

General AI is also known as Artificial General Intelligence (AGI) and is strong AI which has the ability to read and analyze the problems like human beings. But till now there is no such systems exists with AGI. Humans just see and differentiate the things, control their imagination scientists finds it very difficult task to define these aspects for a machine because it is a very tough task to define what a human intelligence is. General AI has broader field of its execution and can imitates human intelligence.

So far it has not been achieved researchers are continuously working to find AGI and can be achieved till 2040.

C. Super AI

It is the separate perception of AI, which surpasses the human intelligence it can perform all the activities better than humans using cognitive properties. Till now it is only a hypothetical concept of AI which believes that it can have the ability to think, make judgements like humans.

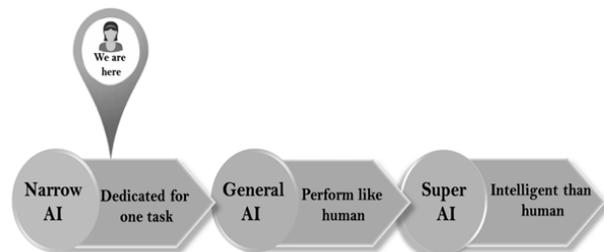


Fig. 1 Types of AI

IV. TYPES OF AI BASED ON FUNCTIONALITIES

A. Reactive Machines

These are the most basic type of AI these systems doesn't uses the past experience for making any decisions all the decisions are based on the current situation. These machines do not have any storage device for its experiences. IBM's chess program is an example of reactive machines.

B. Limited Memory

The machines with limited memory have data storage capacity these uses past experience for making current decisions. These are mostly used in self driving cars to detect the movement of nearby vehicles, to detect the condition and curve of the roads all these information get added to the memory of machine.

C. Theory of Mind

This is one of the advance types of AI which has the ability to act and express feelings like humans. This advance form of AI is not yet developed but the day is not so far when we have machines with "Theory of Mind" around us.

D. Self Aware AI

This is an extended version of "Theory of Mind" and can be said as future of AI. These machines will have the ability to understand thoughts and feelings of humans and act accordingly. This is still a hypothetical concept and takes lot of time to build a Self aware AI.

V. MODELS AND ALGORITHMS USED TO BUILD AI

There are various models and algorithms which are used to build an effective AI some of them are mentioned below.

A. Deep Learning

It is the subset of AI which imitates the working and functionality of a human brain in data processing and making patterns to make decisions.

Why deep learning and where is it used? Raw data from all over the world is increasing rapidly on various internet sources like e-commerce websites, social media etc. This data is also known as Big Data which is unstructured and can take decades by humans to extract useful information from it. Here the concept of deep learning is used to learn and extract the useful data.

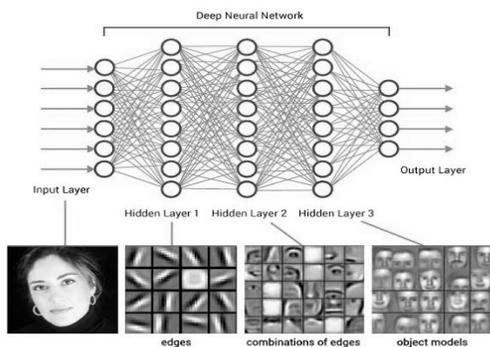


Fig. 2 Layers of Deep Learning

B. Machine Learning

Machine learning algorithms are used to increase the accuracy of predictions made by AI. There are two types of machine learning algorithms.

1) *Supervised learning*: Learning which requires a trainer called data scientist to train the machines with input-output pairs of data is known as supervised learning.

2) *Unsupervised learning*: Learning process which doesn't requires any trainer or data set to make any decision is known as unsupervised learning. It uses the concept of deep learning to retrieve data and make decisions on their own.

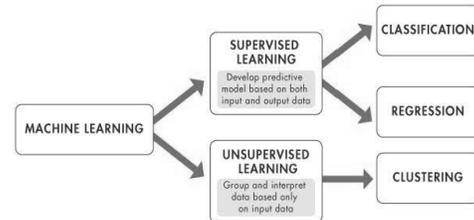


Fig. 3 Categories of problems of machine learning

C. Support Vector Machine (SVM)

Support vector machines are the models of supervised learning and are also referred as support vector networks. It performs the classification of data points by using maximize margin known as optimal hyperplane. N-number of hyperplanes are used for separation of two data points but only the most optimal hyperplane which has the maximum distance between their data points is used.

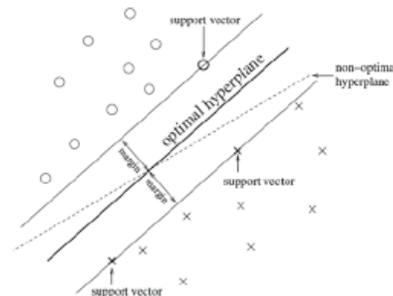


Fig. 4 Classification by hyperplane

D. Decision Trees

It is one of the simplest algorithms for supervised learning which solve both classification and regression problems. It resembles natural intelligence and is very easy to understand the data and make decisions. In decision trees nodes represents attribute, branches to which these nodes are connected represents rule and leaf node shows the outcomes.

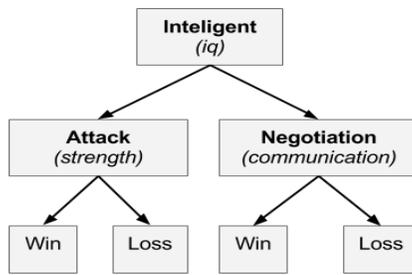


Fig. 5 Decision Tree

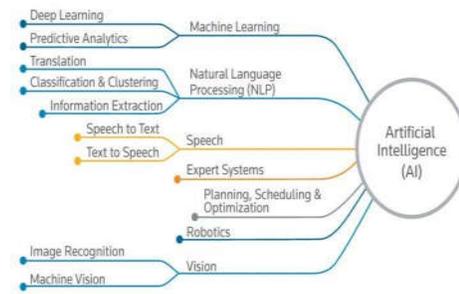


Fig. 6 Fields of Applications of AI

VI. APPLICATION

The field of AI has increased enormously from the day it was introduced and now its many applications can be seen around us some of them are listed below.

- Apple’s Siri: A virtual assistant application created by Apple that can send messages, make calls or read messages on voice commands.
- Google map: It tells us the fastest route to reach our destination, shows traffic on the road and tells the amount of time in which we reach our destination all these calculations are done by with the help of AI.
- Tesla: An American automotive company that uses AI to build self driving electric cars.
- Product recommendation: Songs, videos and product recommendations at online platforms uses the ML algorithms to analyze the user’s activity and recommend products on its basis.
- Google prediction: Google shows prediction while typing any search keyword on it, these predictions are based on previous searches of the users.
- Smart replies by Gmail: Smart replies are simple phrases recommended by Gmail to ease the effort of user.
- In Robotics: In robotics Artificial Intelligence is used to program the behavior of robots which gives it a separate perception like humans.
- In Medical Science: It takes years of training for doctors to diagnose a disease correctly but machine learning algorithms (Deep Learning) made it very fast, simple and cheaper.

Various other fields in which AI has its wide range of applications are depicted by the diagram below:

VII. FUTURE SCOPE

In various researches it has been proved that AI works much better and faster than humans. Lots of companies like retail, financial, and manufacturing are turning their head towards AI machines instead of humans. Entrepreneurs and researchers are working hard for the development of Artificial Intelligence and help it to get a better space in future.

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