Artificial Intelligence

AI is nothing but writing the program such that the machine think itself

Intelligence

↑

Learning

↑

Artificial Neural Network (ANN)

Here to gain knowledge we have to learn we need Neural Network

ANN Learning Intelligence

A Machine to gain intelligence we should learn for that we implant Artificial Neural Network into the Machine

Cloud Computing

Making use of someones computational power and paying service bills is called as cloud compute

History of Artificial Intelligence

→ In 1911 computer has initially started
→ In 1949 the stored program computer came into existance

→ In 1951 first AI based programs was written
→ In 1955 first self learning game playing program was developed

Ex: Online chess game

→ In 1956, Introduced LISP
→ In 1959 MIT get their AI lab
→ In 1964 we saw the first device of AI with understandable language
→ In 1965 the first chatbot
→ In 1974 the first automatic driving car was created
→ In 2009 google started building self driving car
→ In 2011 Siri google Assistant etc become main stream chatbox

Intelligent System

The System which has Intelligence is known as Intelligent System

Ex: Eliza

Let us see the conversation between human and Machine (Eliza)

U: Men are all alike.

E: In what way?

U: They are always bugging us about something

E: Can you think of a specific Example?

U: My boyfriend told me come here

E: Your boyfriend made you come here?

U: He says I'm depressed much of the time

E: I'm sorry to hear that you are depressed

U: It is true I'm unhappy

E: Do you think coming here will help you not be unhappy?

The appointment time is completed, thus the conversation is ended.

Ex: Siri

Let us see the conversation b/w user and Siri

U: Hi Siri

S: Hi

U: How is weather today?

S: It is currently cloudy and 78F

U: I love you Siri.

S: You are the wind beneath my wings.

U: How are you Siri?

S: I'm happy to be here

Ex: Alexa, Google Assistance

Trends in AI

→ Huge uptrend in AI analysing data:

Here unstructured data is converted to structured data and analyse that data for future prediction.
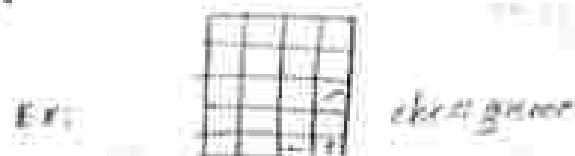
Conversational AI

conversational AI is chat bot

Ex: Siri, Alexa, Eliza, Google Assistant

Healthcare

With the help of AI, diagnosis is done faster

Reinforcement learning on rise

Re-enforcement learning Algorithm is nothing but taking input and produce output based on state.

Ex:

 chess game

Realtime traffic assessment and recommendation

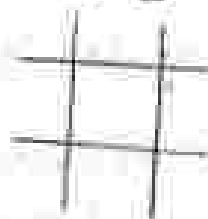the GPS systems which was fed in our cars we analyse the past data and give recommendation about traffic situation and suggest alternative roots if any

Sentiment Analysis

the latest version machines fed with AI is able to predict whether the humans are happy and unhappy

Tic-Tac-Toe

Here we have assigned initially

there will be 2 players for playing this game namely X and O

the winning criteria's are

These are winning criteria's of X

The winning criteria's of O's are

Heuristic function

It is probability of x's win - probability of o's win

∴ $H = P$ x's win $- P$ O's win

At current state the game is as shown below

Here probability of X winning the game is

Here probability of x's wins = 2

The probability of O winning the game is

placing of 0's

H = 1

H = 1

H = 0

H = 1

H = 1

H = 1

H = 1-1
= 0

H = 0-1
= -1

H = 1-1
= 0

reading #

$$\begin{array}{|c|c|c|} \hline O & O & X \\ \hline X & O & O \\ \hline & & X \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline O & O & X \\ \hline X & O & O \\ \hline X & & X \\ \hline \end{array} \qquad \begin{array}{|c|c|c|} \hline O & O & X \\ \hline X & O & O \\ \hline & & X \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline O & O & X \\ \hline X & O & O \\ \hline X & & X \\ \hline \end{array} \quad \begin{array}{|c|c|c|} \hline O & O & X \\ \hline X & O & O \\ \hline O & X & X \\ \hline \end{array} \quad \begin{array}{|c|c|c|} \hline O & O & X \\ \hline X & O & O \\ \hline & & X \\ \hline \end{array} \quad \begin{array}{|c|c|c|} \hline O & O & X \\ \hline X & O & O \\ \hline X & & \\ \hline \end{array}$$

$$\#=1 \qquad \#=0 \qquad \#=1 \qquad \#=1$$

$$\#=1-0=1 \qquad\qquad \#=1-1=0$$

$$\begin{array}{|c|c|c|} \hline O & O & X \\ \hline X & & O \\ \hline O & & X \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline O & O & X \\ \hline X & X & O \\ \hline O & & X \\ \hline \end{array} \qquad \begin{array}{|c|c|c|} \hline O & O & X \\ \hline X & & O \\ \hline O & X & X \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline O & O & X \\ \hline X & X & O \\ \hline O & X & X \\ \hline \end{array} \quad \begin{array}{|c|c|c|} \hline O & O & X \\ \hline X & X & O \\ \hline O & O & X \\ \hline \end{array} \quad \begin{array}{|c|c|c|} \hline O & O & X \\ \hline X & X & O \\ \hline O & X & X \\ \hline \end{array} \quad \begin{array}{|c|c|c|} \hline O & O & X \\ \hline X & O & O \\ \hline O & X & X \\ \hline \end{array}$$

$$\#=0 \qquad \#=0 \qquad \#=0 \qquad \#=0$$

$$\#=0-0=0 \qquad\qquad \#=0-0=0$$

H = 1   H = 0   H = 1   H = 1

H = 1 + 0 = 1   H = 1 - 1 = 0

Tic-Tac-Toe using Magic Square

Magic Square one shown below

8	3	4
1	5	9
6	7	2

Here the winning criteria is a player who places the elements sequentially such that the sum is 15 wins the game as shown below

Tic-tac-Toe using Magic Square gaming steps

we have a 3×3 empty grid as shown below

Moves between human and Machine are shown below

Human   Machine

                                           move ①   5

move ②   8

                                           move ③   5,4

move ④   8,6

                                           move ⑤ $5+4=9$
                                                            $15-9=6$
                                                            6,4,1

move ⑥   8,6,3

                                           move ⑦   5,4,1,9

Applications in AI

1. **AI In Gaming:**

   The games where the machine should think itself there we need a software called AI

   Ex: ludo, Online-Badminton, chess, ludo...

2. **AI In NLP (Natural language process):**

   NLP which makes the machine to understand Natural language spoken by humans thus NLP is a module in AI.

3. **Expert System:**

   Here expert system will provide advices as per the requests made by humans.

4. **Speech Recognition:**

   A Machine can recognize our speech with the help of AI

5. **Computer Vision:**

   With the use of AI computer/Machine is able to recognize the real world.

6. **Robotics:**

   Robo's are of two types.

   1. humanoid
   2. pre programmed robos to do their particular tasks.

Languages used to develop AI :

1. Python:

We can learn easily and develop the AI software easily by using python programming language

Ex: To print Hello world in python as

```
print ("Hello world")
```

2. Java:

Java is a Object Oriented programming language

Ex: To print Hello world in Java as follows

```
class HelloWorld
{
    public static void main (String args[])
    {
        System.out.println("Hello world");
    }
}
```

3. C:

C is a procedure Oriented language which may have some difficulties and complexity to develop AI software

Ex: To print hello world in c as follows

```
#include <stdio.h>
int main()
```

```
{
    printf ("Hello world");
}
```

C++:

It is object oriented programing language we can phase difficulties to develop AI software

Ex: To print Hello world in c++ as follows

```
# include <iostream.h>
    int main()
    {
        std :: cout << "Hello world";
    }
```

5. prolog:

prolog is old programming language which was first used to build AI

Ex: To print Hello world in prolog as follows

```
consult ('filename').
```

6. R-programming

This language is mainly used for statistical analysis.

Ex: To print Hello world in R as follows

```
print ("Hello world");
```

7. Lisp:

It is old programming language used to develop AI

Ex. To print Helloworld in LISP as follows

```
$ vim helloworld - lisp
   (print "Helloworld")
```

Foundations of AI

philosophy

→ How does the mind arise from a physical brain
→ How does knowledge come from
→ How does knowledge lead to action

Mathematics

→ what can be computed
→ How do we reason with uncertain recognition & Information

Neuroscience

It is the study of human neurons and communication b/w them

Psycology

→ How do humans and animals think and act