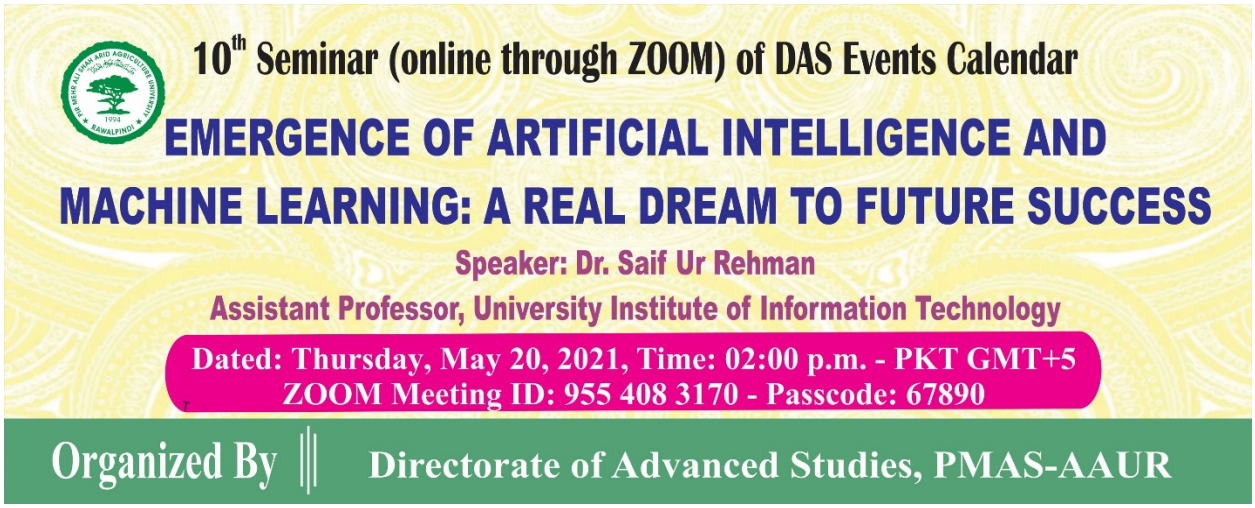
DIRECTORATE OF ADVANCED STUDIES
EVENT CATALOGUE
2021

10TH SEMINAR OF DAS EVENTS CALENDAR – 2021

Emergence of Artificial Intelligence and Machine Learning: A Real Dream to Future Success



ACTIVITIES

Discussion Points

Part-1 AI Overview in General

Part-2 AI in Agriculture Domain

Part-1 AI Overview in General

What Is Artificial Intelligence (AI)

History of AI

Types of AI

Branches of AI

Pros and Cons of AI

Intelligence is…

"the capacity to learn and solve problems" **(Websters dictionary)**

In particular,

Ability *to solve novel problems*

Ability *to learn and to adapt*

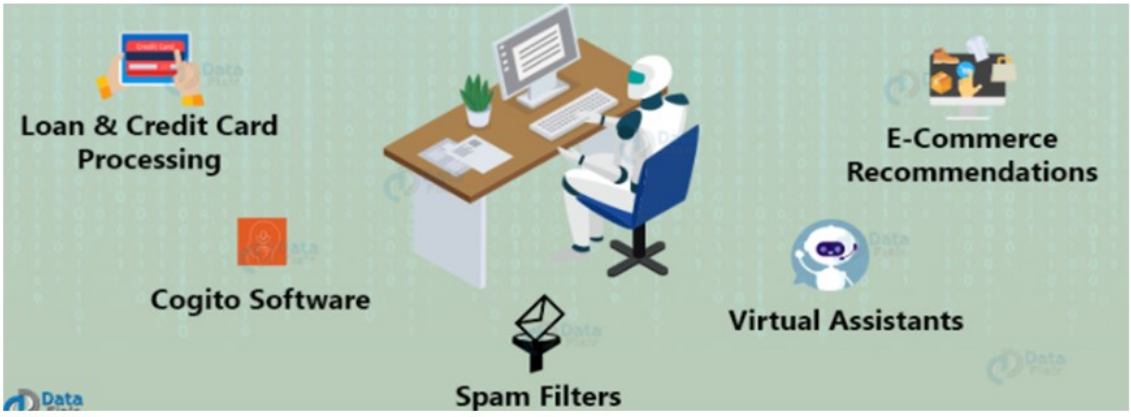
Ability *to interact with the world*

(speech, vision, motion, manipulation)

Ability *to model the world and to reason about it*

Artificial Intelligence is…

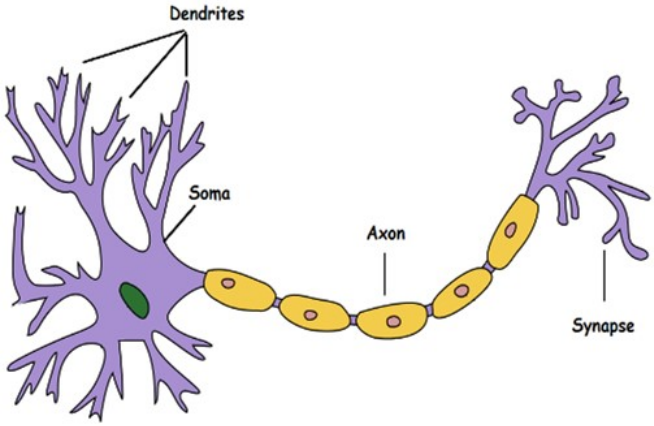
A way of making a Computer, Robot, or software think and act like a human



Brief History of AI

1943: McCulloch and Pitts propose a model of artificial neurons

1956 Minsky and Edmonds build first neural network computer, the SNARC



Goals in AI

To build machines that exhibit intelligent behavior

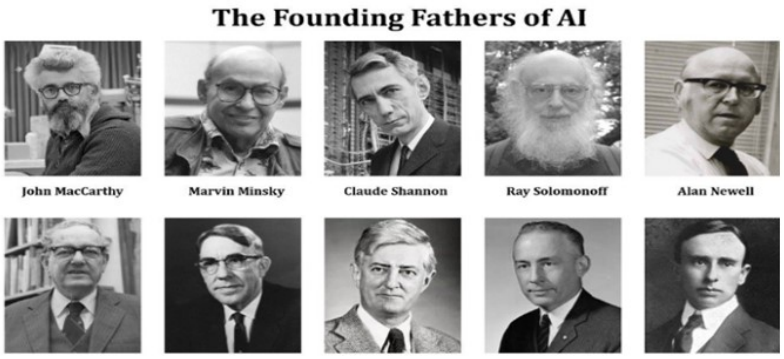
To understand intelligence in order to model it

Brief History of AI

The Dartmouth Conference (1956)

John McCarthy organizes a two-month workshop for researchers interested in neural networks and the study of intelligence

Agreement to adopt a new name for this field of study: **Artificial Intelligence**



1966-1974 Reality:

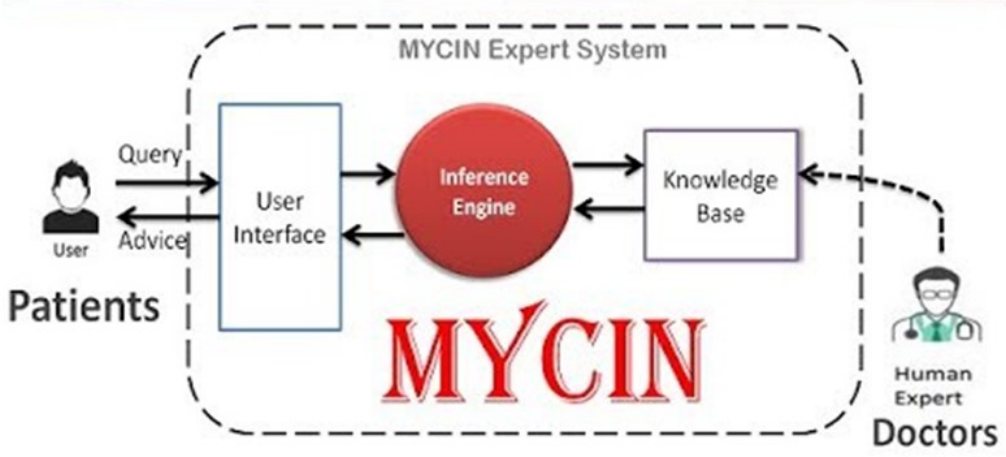
- AI problems appear to be too big and complex
- Computers are very slow, very expensive, and have very little memory (compared to today)

1952-1969 Enthusiasm:

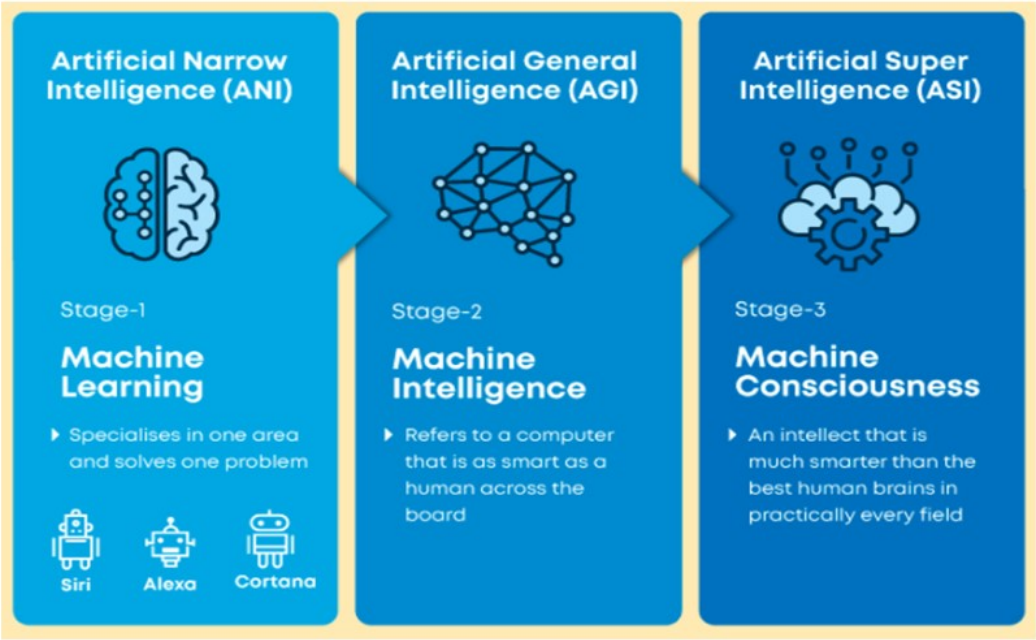
- Arthur Samuel's checkers player
- Shakey the robot
- Lots of work on neural networks

1969-1979 Knowledge-based systems

- Birth of expert systems
- Idea is to give AI systems lots of information to start with



Types of Artificial Intelligence



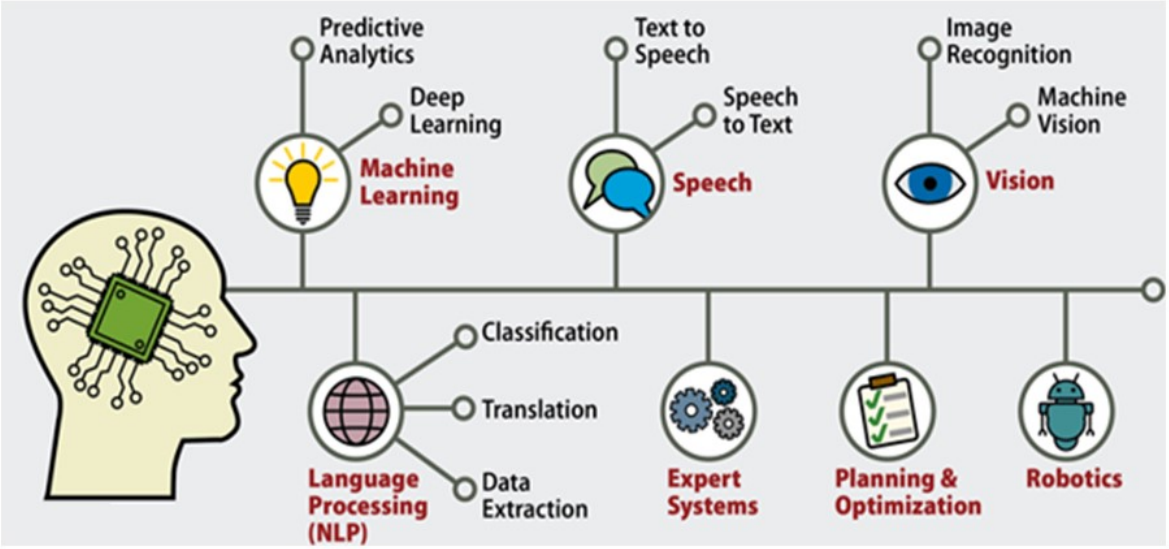
1990s to the present:

- Increases in computational power (computers are cheaper, faster, and have tons more memory than they used to)
- An example of the coolness of speed: Computer Chess

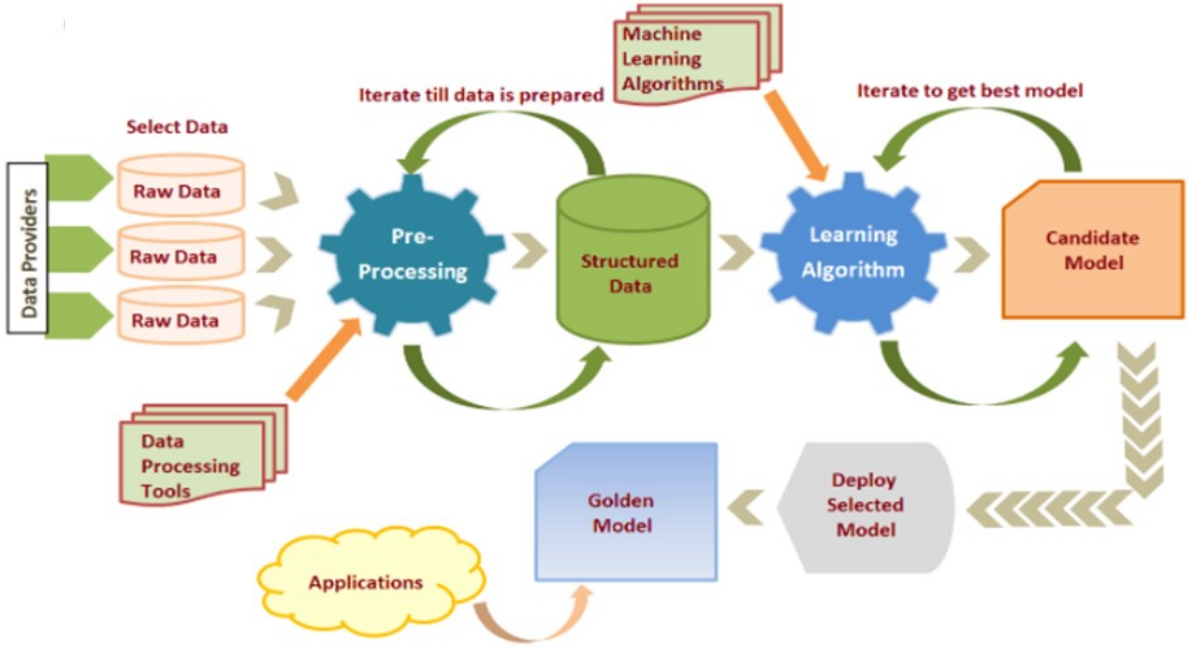
1980-1988 AI in industry:

- R1 becomes first successful commercial expert system
- Some interesting phone company systems for diagnosing failures of telephone service

AI Branches



Machine Learning Process



Machine Learning (ML) is…

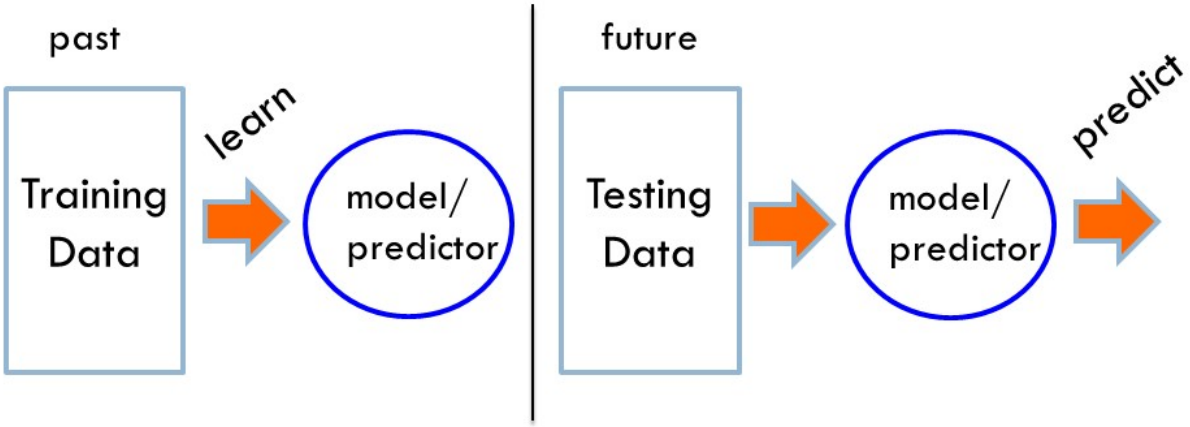
ML, a branch of AI, concerns the construction and study of systems that can learn from data.

ML goal is to develop methods that can automatically detect patterns in data, and then to use the uncovered patterns to predict future data or other outcomes of interest.

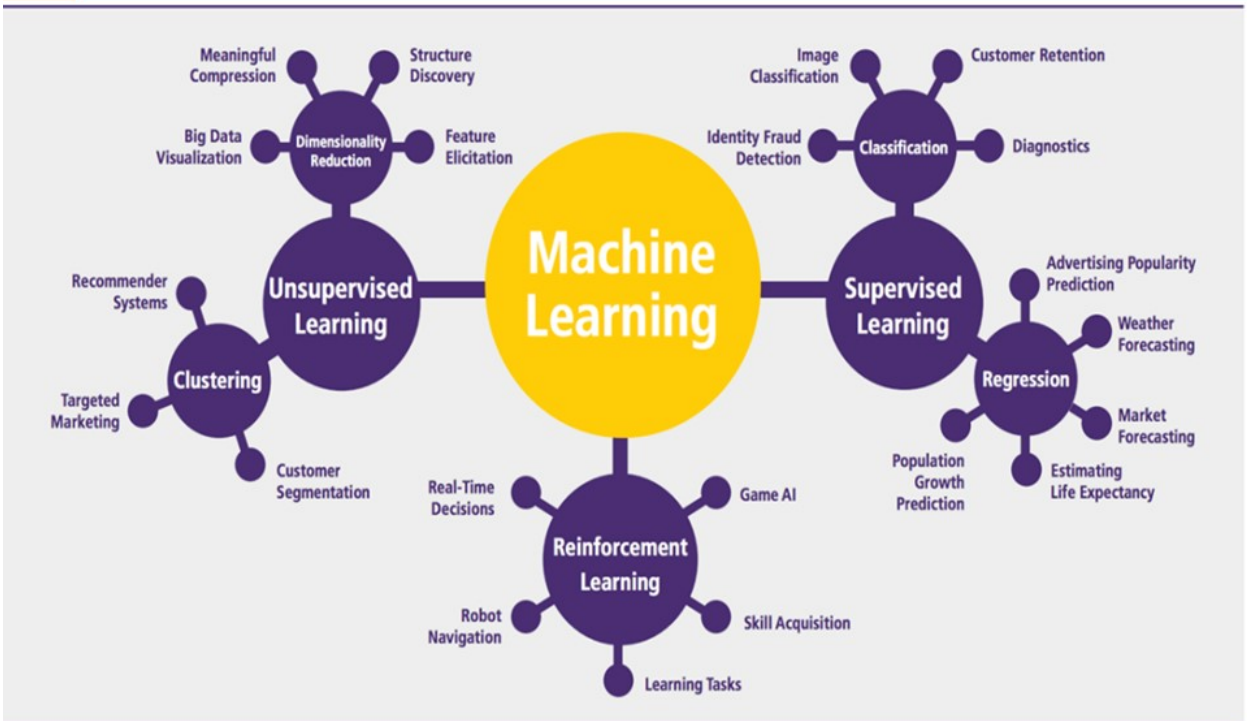
-- Kevin P. Murphy

Machine Learning is…

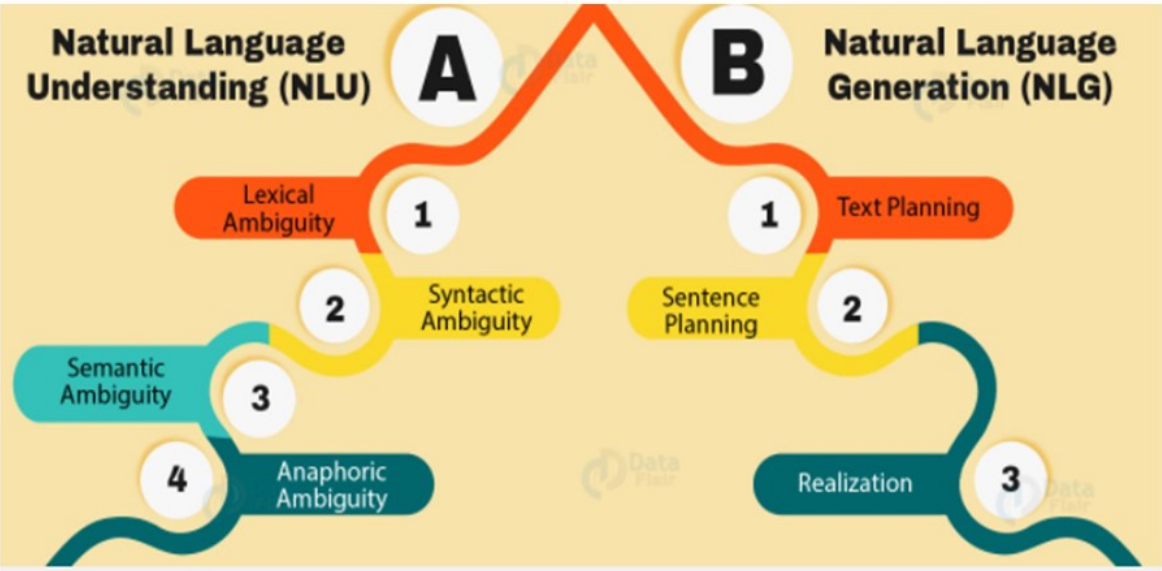
Machine learning is about predicting the future based on the past. -- Hal Daume III



Machine Learning Algorithms



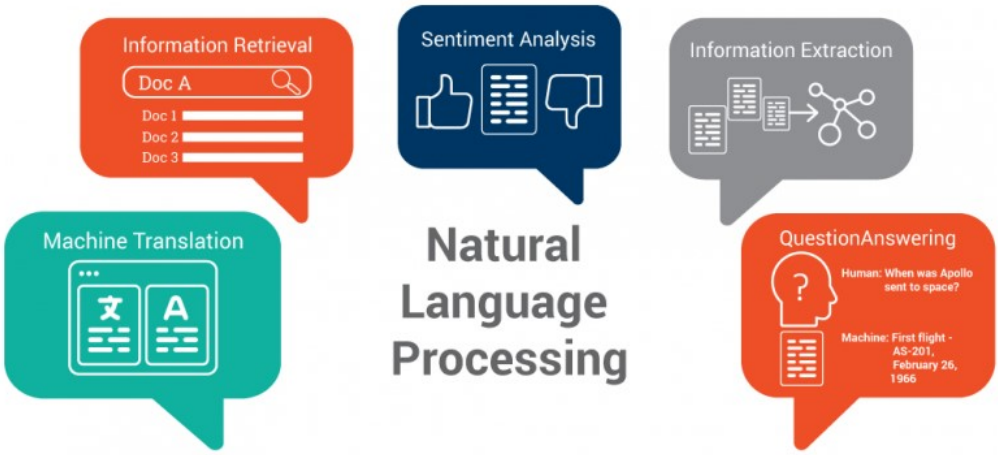
NLP Process...



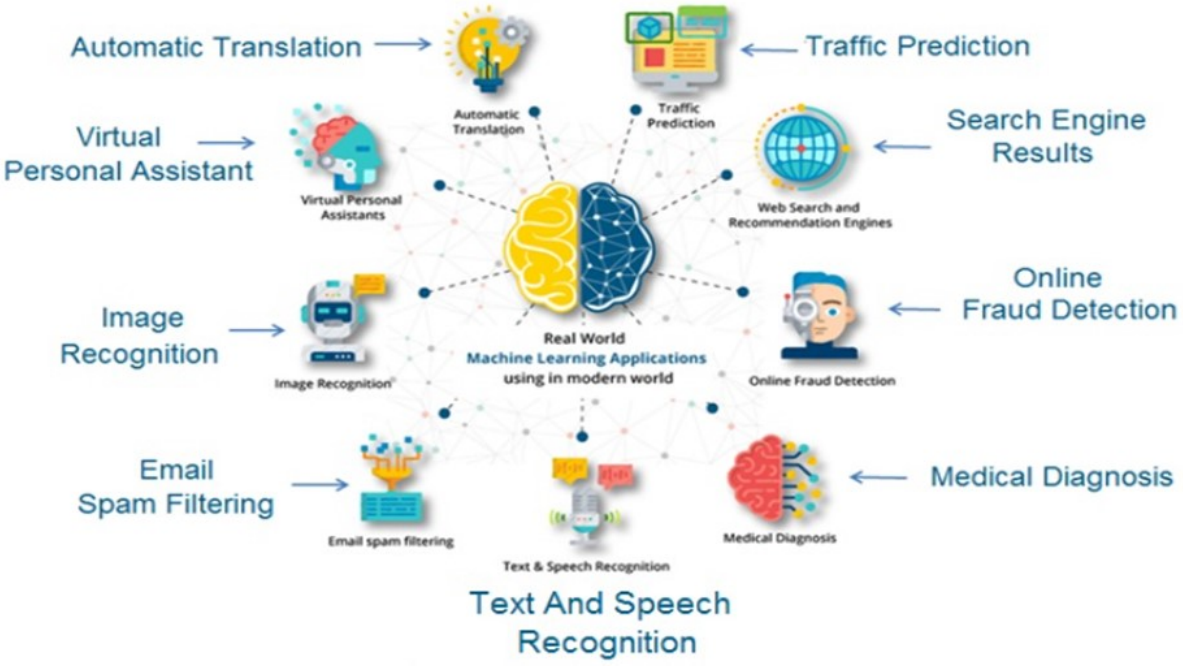
Natural Language Processing (NLP)...

Helps computer to understand human language as it is spoken

An ongoing attempt to capture all the details from the natural languages.



Machine Learning Applications

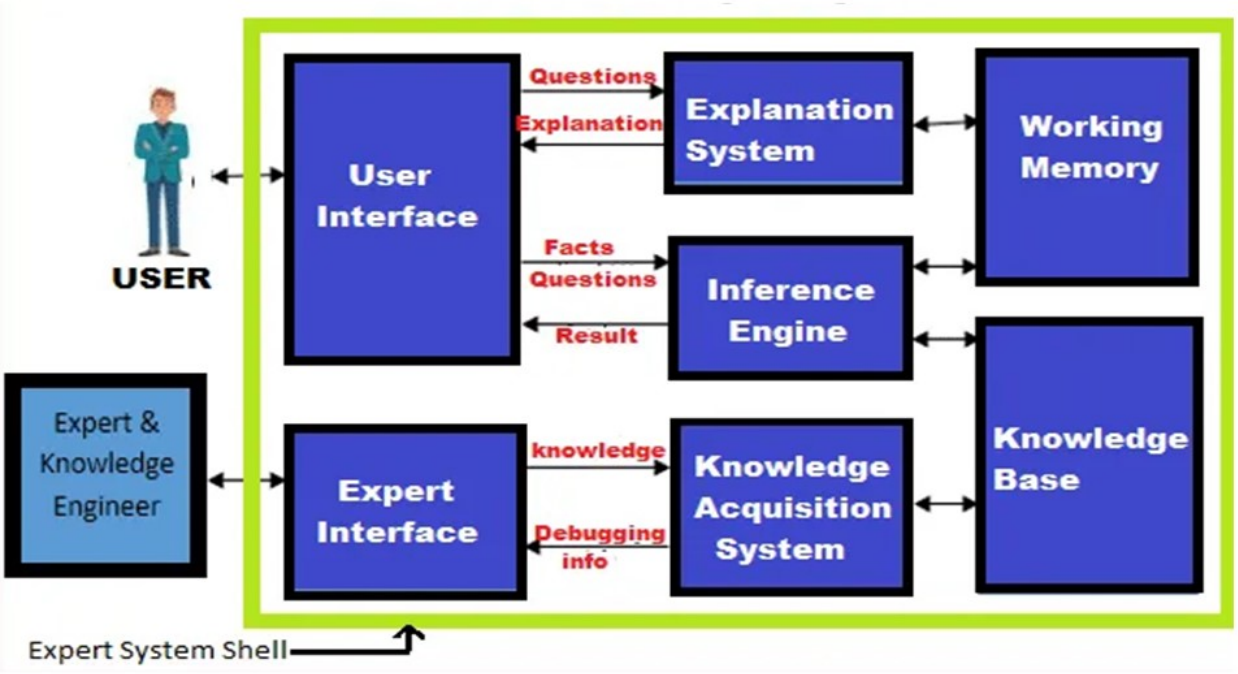


NLP Applications...

Expert Systems Applications

- Rice-Crop Doctor
- Rapeseed-Mustard Expert System
- EXOWHEM, wheat expert system
- Maize Expert System
- Expert System on Mushroom
- Weed control systems
- Expert System for Sugarcane
- Banana Expert system
- Expert system for cattle and buffalo,
- Expert system on Sheep and Goat,
- Expert system on poultry
- IGFRI Expert system
- Disorder remediation expert system

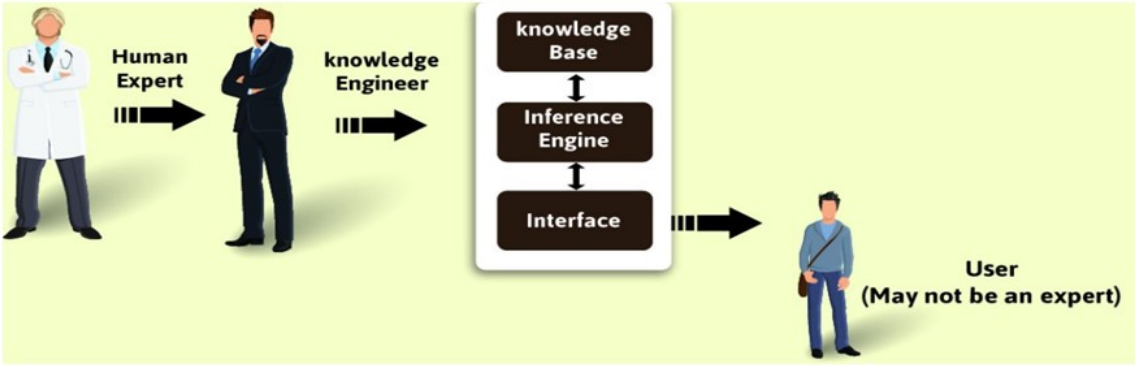
Expert Systems Components



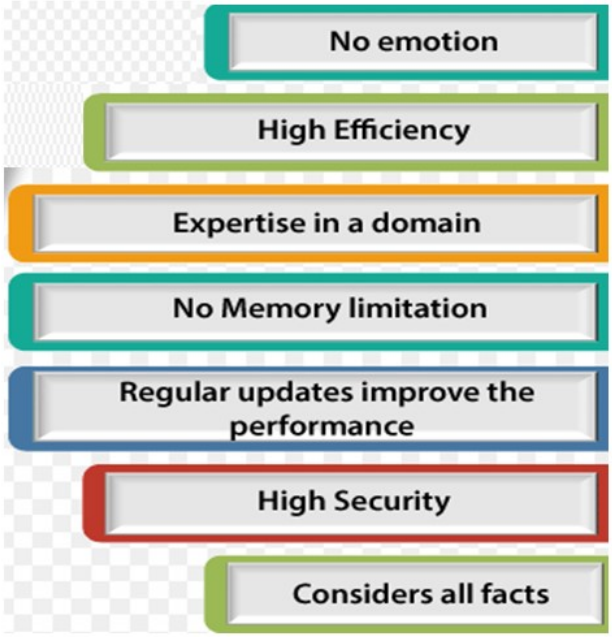
Expert Systems (ES)

A computer system emulating the decision-making ability of a human expert.

ES are designed to solve complex problems by reasoning through bodies of knowledge, represented mainly as if–then rules rather than through conventional procedural code.



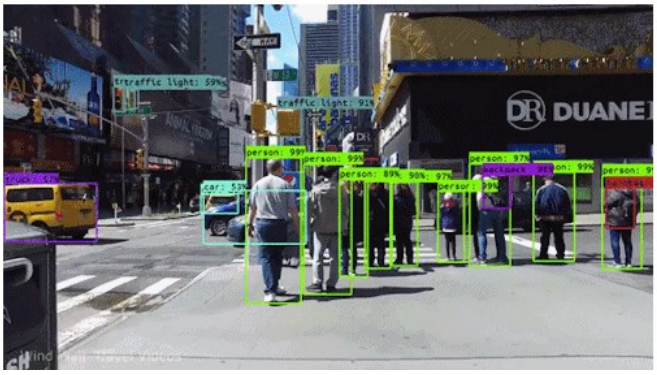
Why Expert Systems??

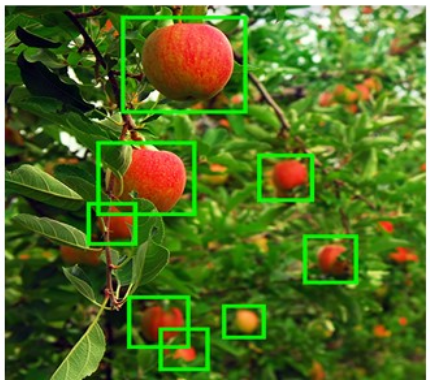


Applications of Vision

Vision

It enables computers and systems to derive meaningful information from digital images, videos and other visual inputs — and take actions or make recommendations based on that information





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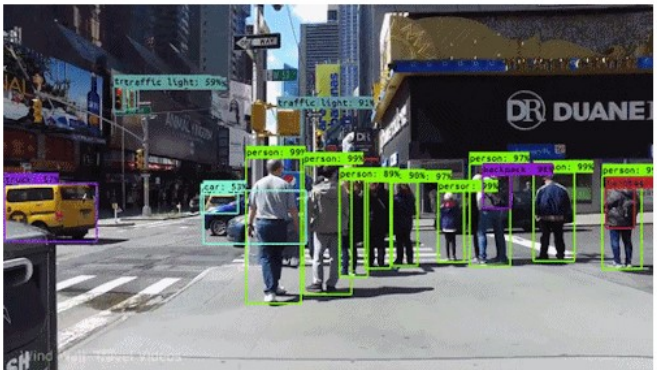
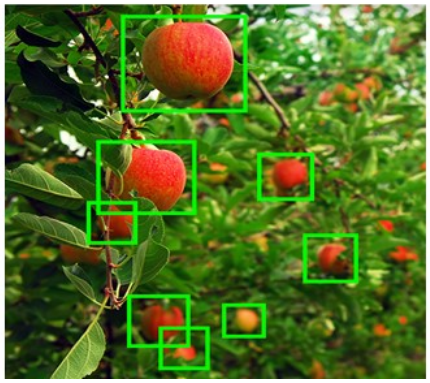
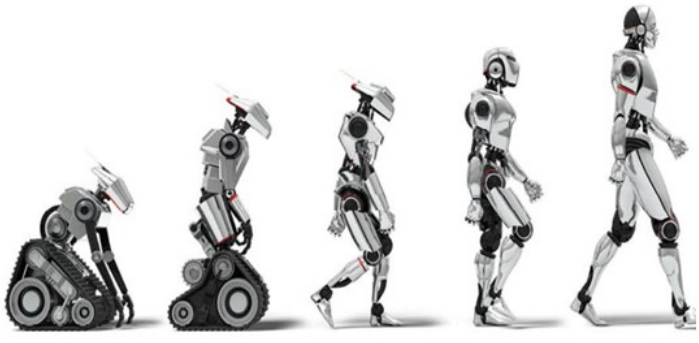
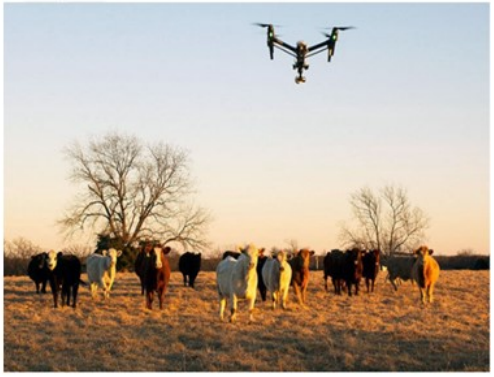




Robotics

Robotics is a branch of AI, which is composed of Electrical Engineering, Mechanical Engineering, and Computer Science for designing, construction, and application of robots.

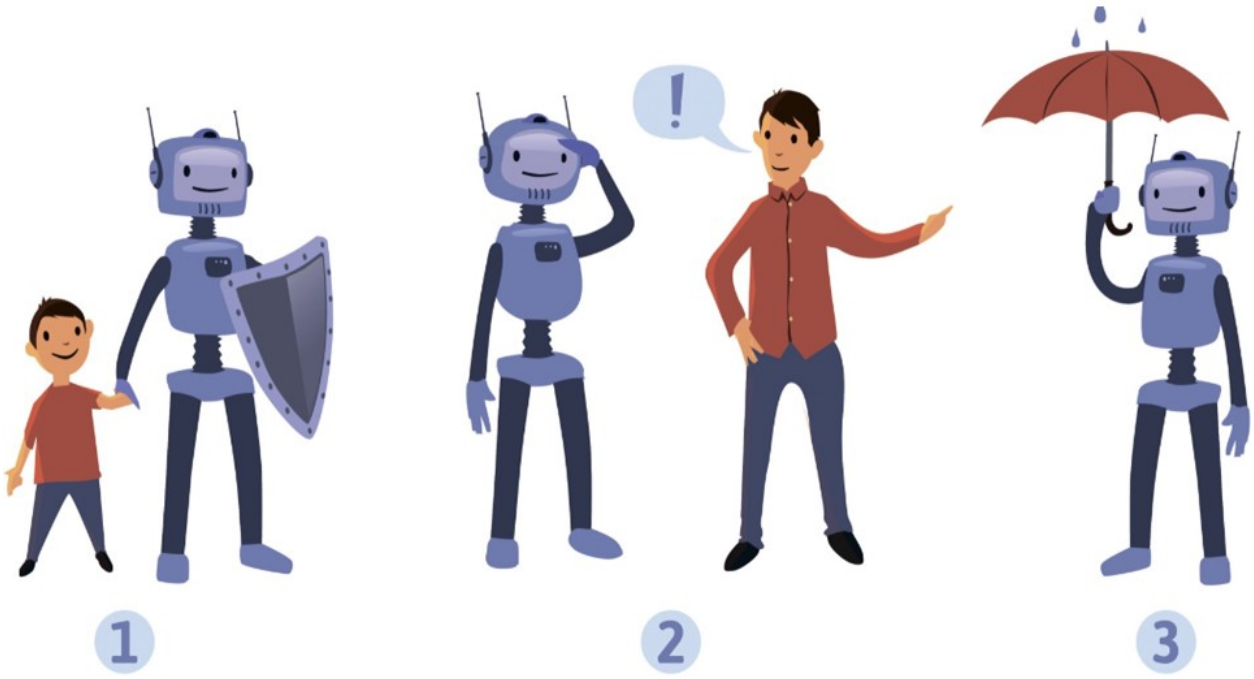




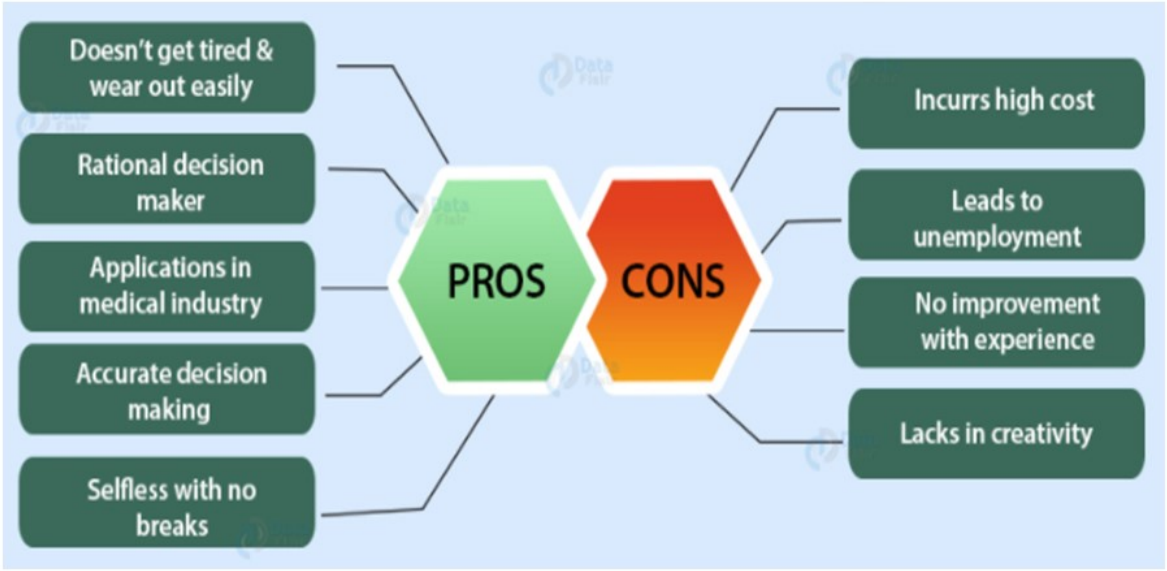
Robot Example

Robot Example

Robotics Laws



Pros & Cons of AI– A Threat or a Blessing



Is AI the future of Agriculture?

- World population is likely to reach nine billion in next 30 years
- A boost in agricultural production by 70% to meet rise in demand
- Increase in population, land, water and other resources are becoming scarce.
- Need for an intelligent approach to farming, to make it efficient and more productive, as conventional methods used by farmers are not enough to meet the growing demands.

AI and Agriculture

AI/ML is everywhere throughout the whole growing and harvesting cycle.

It begins with a seed being planted in the soil — from the soil preparation, seeds breeding and water feed measurement — and it ends when robots pick up the harvest determining the ripeness with the help of computer vision.

Part-2 AI in Agriculture Domain

Is AI the future of Agriculture?

- AI is a growing trend in the Agricultural industry.
- Role and applications of AI in agriculture are immense.
- It includes irrigation techniques, weed control, climate prediction, water management, soil management.
- It also includes the use of robotics for manual works.
- AI is progressing as the Agricultural industry's technological advancement.

Is AI the future of Agriculture? **Agricultural Robotic**

2. Crop Harvesting

- Autonomous machines and robot can navigate and take plant-specific action.
  - Autonomous & self-driven tractor and machines have enormous labour saving capabilities.

  - They can cut, collect and even stack and pack crops.

Is AI the future of Agriculture? **Agricultural Robotic**

1. Weed Control

- Assist in the precise spraying of herbicides on the plants and not on the weeds.
- It reduces the usage of chemicals and increases crop productivity.
  - It also reduces damage caused by herbicides

Is AI the future of Agriculture?

Application of AI in agriculture into three categories

(a) Agricultural Robotic

(b) Crop and Soil Monitoring

(c) Predictive Analysis

Is AI the future of Agriculture? **Agricultural Robotic**

3. Seed Planting and Aerial Imagery.

- Remote-controlled drones are capable of spreading seeds in the farmlands.

Is AI the future of Agriculture?

Predictive Analysis

- With the help of satellites, AI can predict environmental changes.
- It also brings out the effect it will have on the crops. AI assesses information about climatic conditions well in advance.
- The farmer uses this information to plan his complete cultivation cycle. It can predict the climatic impact on crop yield with the change of weather conditions.
- AI provides information about suitable crops for the season. It even informs about the ideal planting period and correct place for farming.

Is AI the future of Agriculture?

Crop and Soil Monitoring

2. Crop Monitoring

- Satellites and drones capture images of the farmland.
- AI-enabled computer systems and experts in this field compare and analyse these images.
- This assessment brings out a detailed analysis of the health of the existing crop. Farmer uses this assessment to identify the problems.
- Farmer than applies suitable methods to prevent crops from pests and other diseases.

Is AI the future of Agriculture?

Crop and Soil Monitoring

1.Soil Monitoring

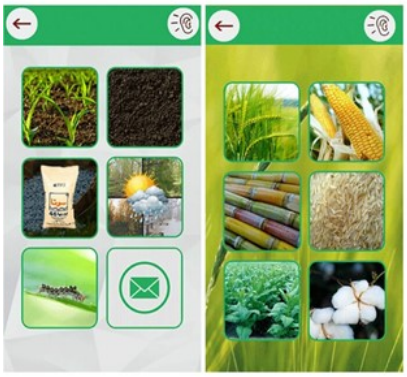
- Drones and satellites capture the images of the crops and soil of the farmlands.
- Image processing and comparing with the existing database is then carried out. This process gives out the assessment of crop and soil health conditions.
- It can detect nutrient deficiencies in the soil.
- It assesses fertilizer and other nutrients for improving soil health. That in turn improves the quality of the harvest.

AI Advantages To Agriculture

- Identification and Detection of Pests and weeds
- Speed and Efficiency.
- Economy
- Cost Effective.
- Relentless.
- Reduce manual labour.
- Less cost of crops.
- Future Planning.

The Future trends of AI

Mobile Applications



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The Future trends of AI

Mobile Applications. Many mobile applications are available which connects farmers to the agricultural database. This AI-enabled system helps them in giving information related to all field of Agricultural. These mobile applications offer a range of support. This help from better trading opportunities to regulating and enhancing crop yields.`

AI Disadvantages Agriculture

- Very expensive.
- Heavy maintenance.
- Unemployment
- Research
- Limited Development.
- Limited Reach.
- It cannot replace humans.
- Lacks Creativity.

The Future trends of AI

(b) See and Spray model. Technological companies have developed AI machines that can distinguish between plants and weeds. These machines then spray chemicals/herbicides as required. This technology claims to reduce the use of chemicals on crops by 80 per cent.

The Future trends of AI

(e) Solar powered Drones. Solar-powered drones are proficient in seeing and spraying pesticides and other chemicals.

The Future trends of AI

(d) Trimming robots. Robotic arms with the capabilities to trim vineyards and trees are in existence.

The Future trends of AI

(c) Fruit picking System. Robots have the capability of plucking and picking up fruits from trees. They also have the skills to distinguish between ripe and raw fruits.

The Future trends of AI

(f) Drone Monitoring. New drones can keep track of a large area of crops. They collect crop data and passes real-time information. It can capture and records images. The build-in sensors differentiate healthy crops from diseased ones.

The Future trends of AI

(i) **Soil Analysis.** AI-based companies have come up with mobile applications for the analysis of soil. This analysis based on the images of the soil and the crops.

(j) Precision Farming. AI-enabled machines today are capable of distinguishing between the crop and the weed. they can also differentiate between ripe and raw fruits. This helps them take precise action on the crops.

The Future trends of AI

(k) Weather prediction Applications. These phone applications connect the farmer to Satellite imagery of the area. They analyze climatic conditions likely to prevail in the area and their impact on the crops.

(l) Computer-Based Assessments. A very huge amount of database is build up in the computer systems. Companies updates and improves this database regularly. These computer systems examine the images and equate them with the existing database. These systems do real-time analyses of the problem.