MACHINE INTELLIGENCE

Introduction to AI and ML

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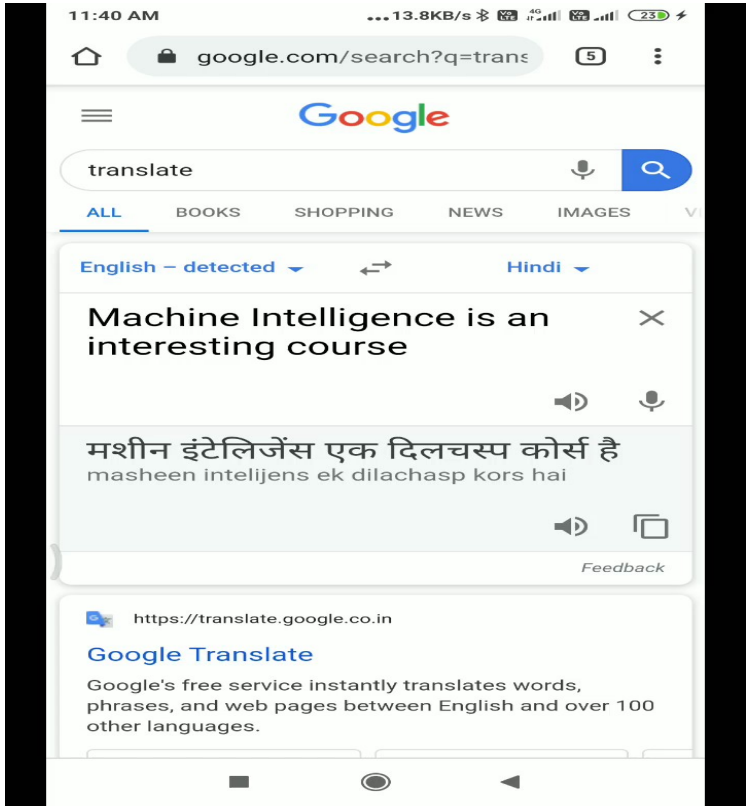
Machine Intelligence is Omni Present



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Introduction

A news item went as follows: **'Apple buys** machine learning firm **Perceptio** Inc., a startup, in an attempt to bring advanced image-classifying artificial intelligence to smartphones by reducing data **overhead** which is typically required of **conventiona**l methods'.

Source: https://appleinsider.com/articles/15/10/05/apple-buys-machine-learning-firm-perceptio-smartphone-ai

Sundar Pichai, the CEO of software giant Google, on being asked ***what is the next thing*** at the company, said "I can't quite tell exactly but advances in **AI and machine learning**, ***we are making a big bet*** on that. Advances in machine learning will bring a difference in many many fields." while interacting with students at his alma mater IIT-Kharagpur.

Source:http://imorphosis.com/category/artificial-intelligence/

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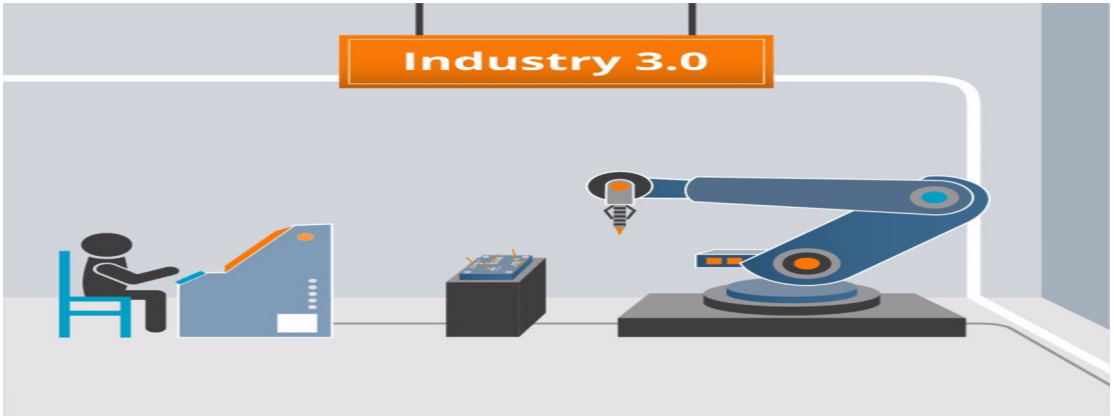
Machine Intelligence a working definition

- Machine intelligence “enables a machine to interact with an environment in an intelligent way.”
- Its good to look at this term from the perspective the two other terms that are proliferating today
  - Artificial Intelligence
  - Machine Learning



Source: https://humans-machines-progress.com/reportage/work-4-0-humans-at-its-heart/

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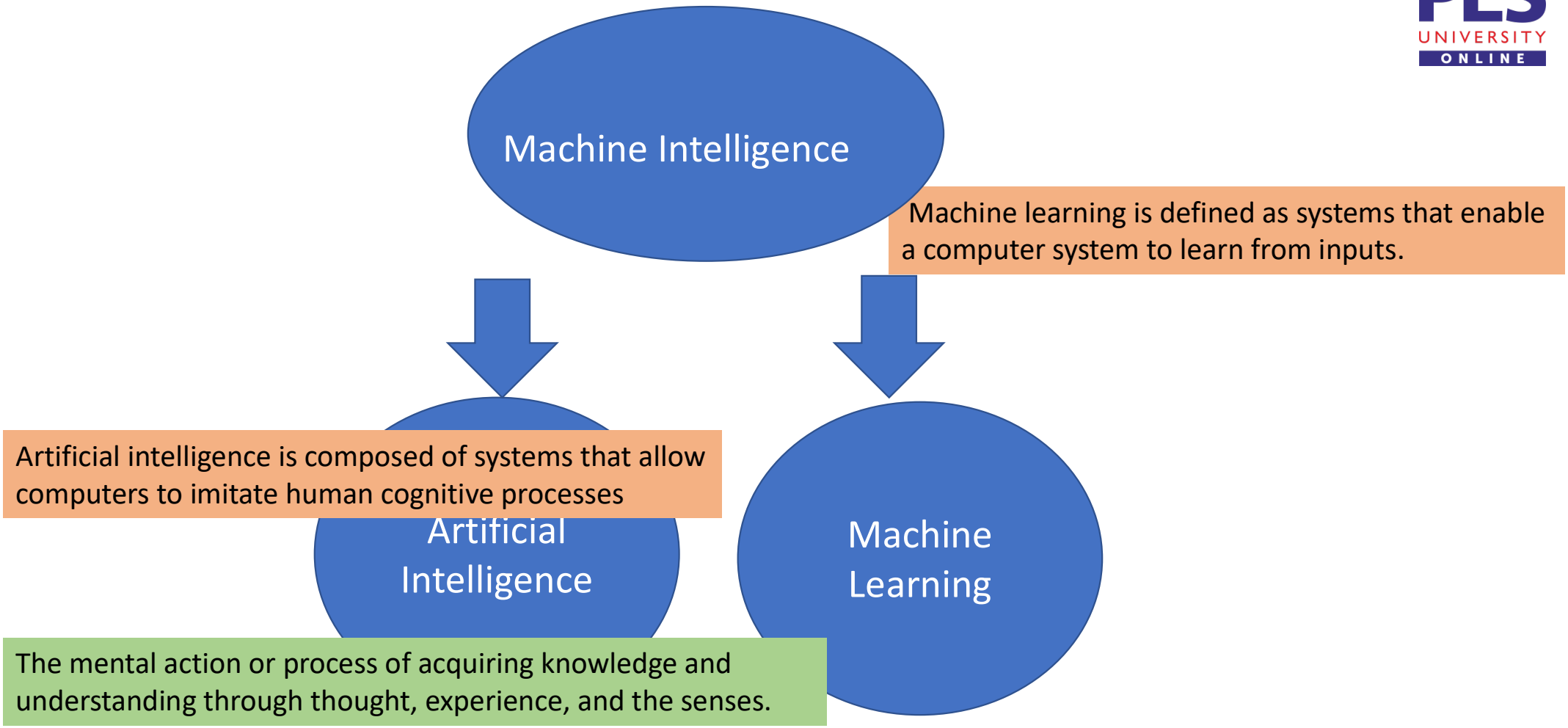
Definitions of Artificial Intelligence and Machine Learning



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Intelligence – A computer Science Perspective

Intelligence is broadly broken into 3 parts

1. Reasoning or Considering – Thinking
2. Seeing, Hearing or Being Understood – Perception
3. Taking Action

We would therefore define Artificial Intelligence as building models that perceive , think and act on the thoughts processed

My definition of AI is any algorithm that is new in computer science. Once the algorithm becomes accepted then it's not AI, it's just a boring algorithm.

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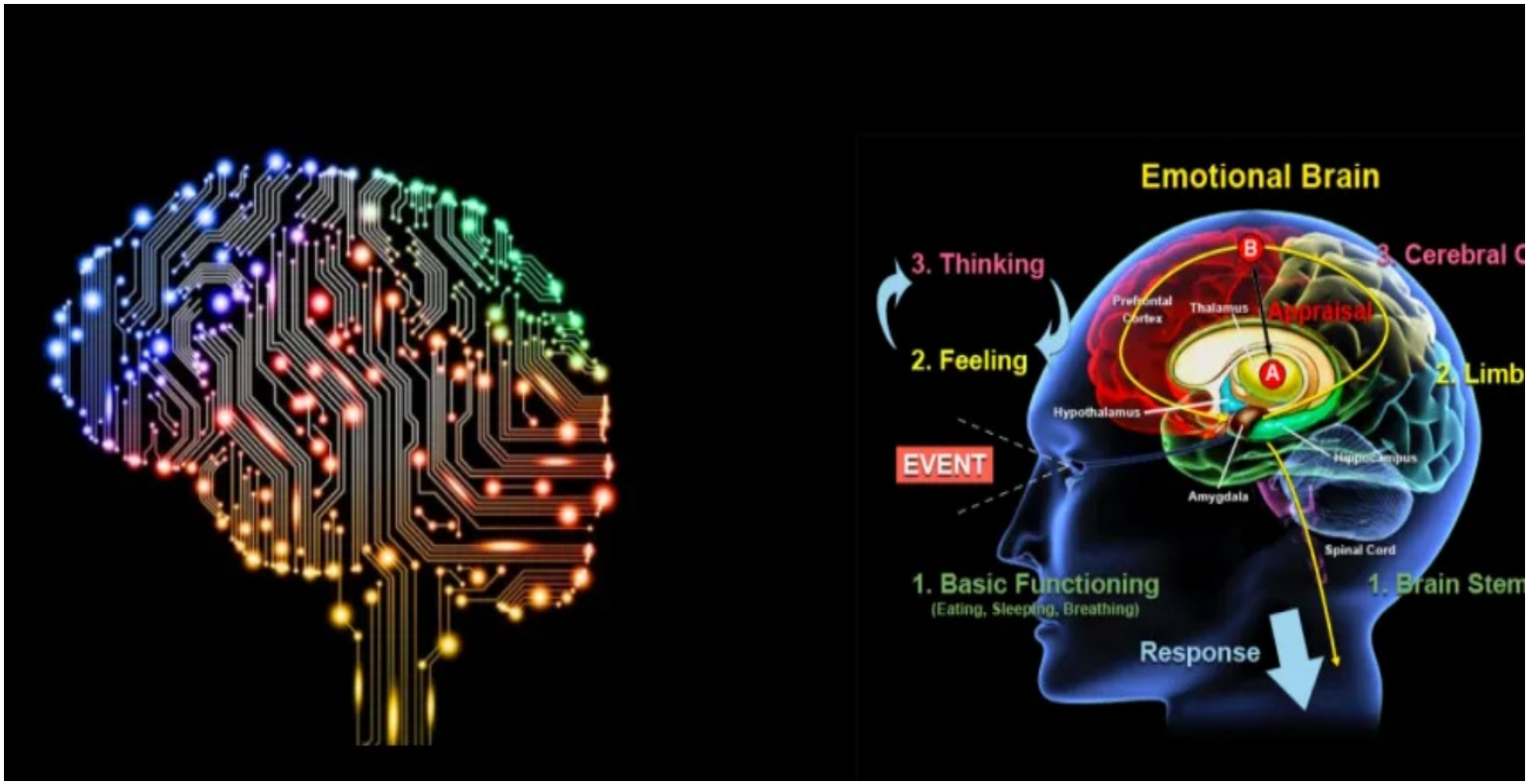
Artificial Intelligence Vs. Human Intelligence



Source:https://techswizard.com/gadget/artificial-intelligence-vs-human-intelligence/

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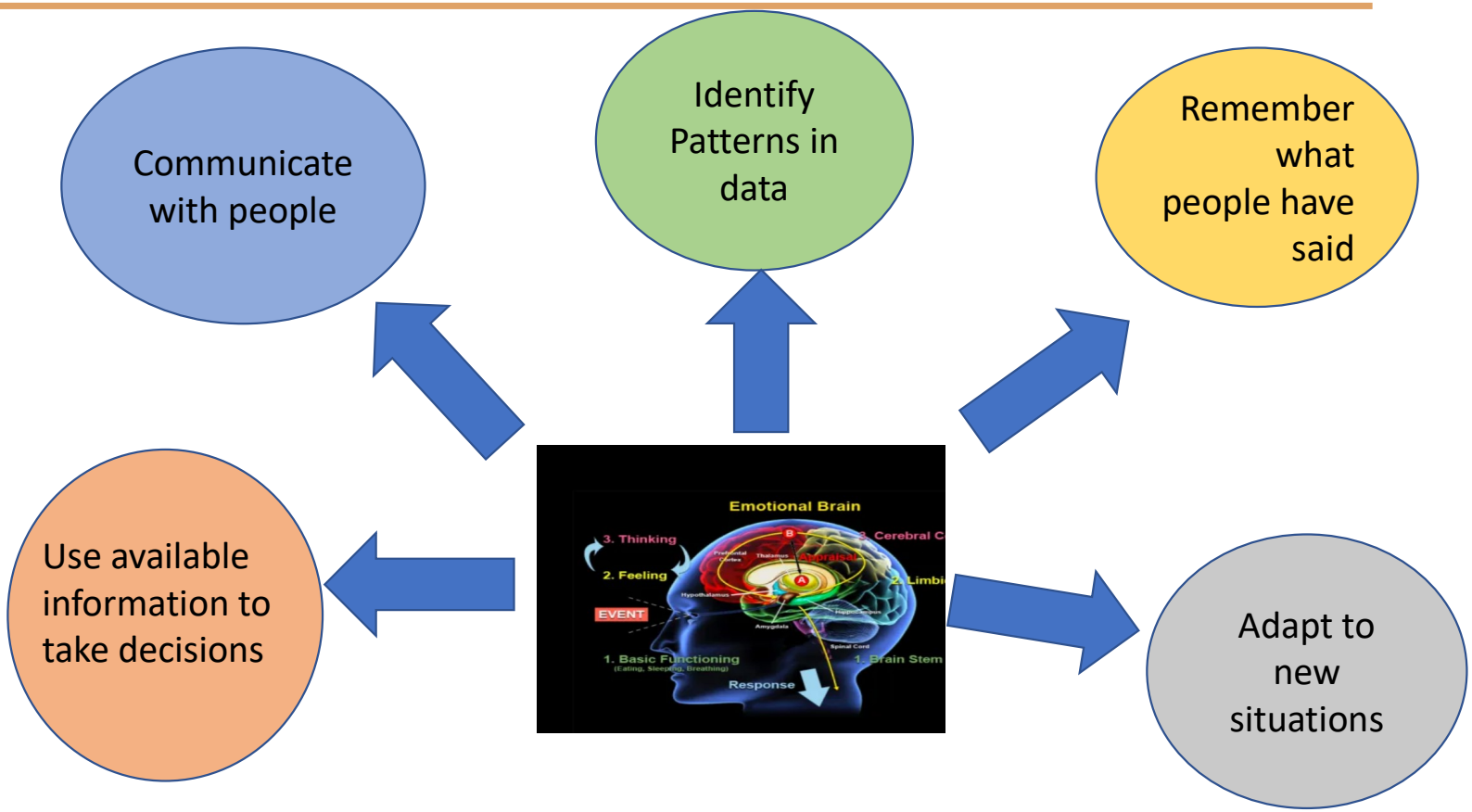
Human Intelligence



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Levels of Artificial Intelligence

AI has three different levels:

Narrow AI: A artificial intelligence is said to be narrow when the machine can perform a specific task better than a human. The current research of AI is here now

General AI: An artificial intelligence reaches the general state when it can perform any intellectual task with the same accuracy level as a human would

Active AI: An AI is active when it can beat humans in many tasks

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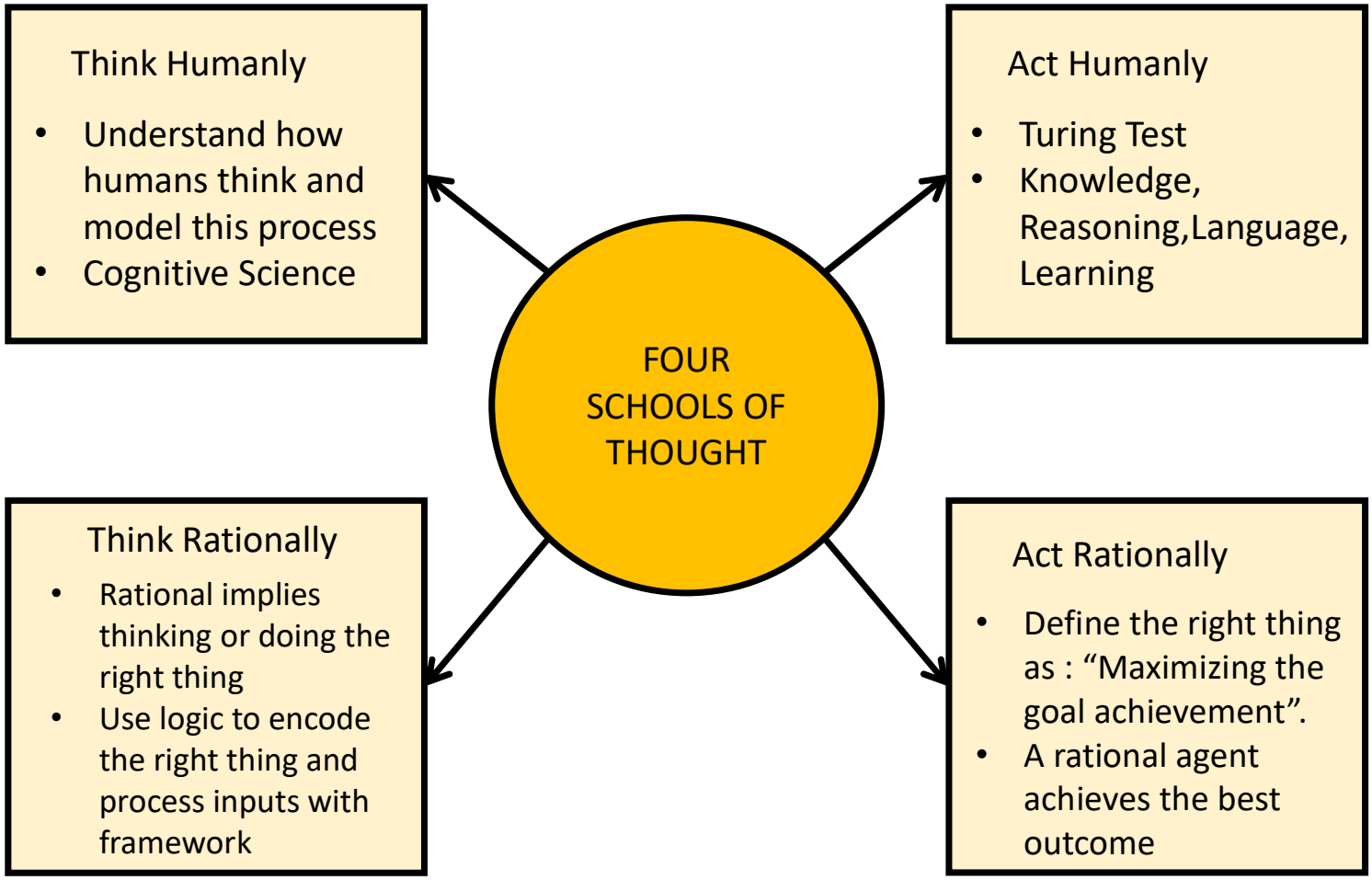
Four Schools of Thought on Artificial Intelligence



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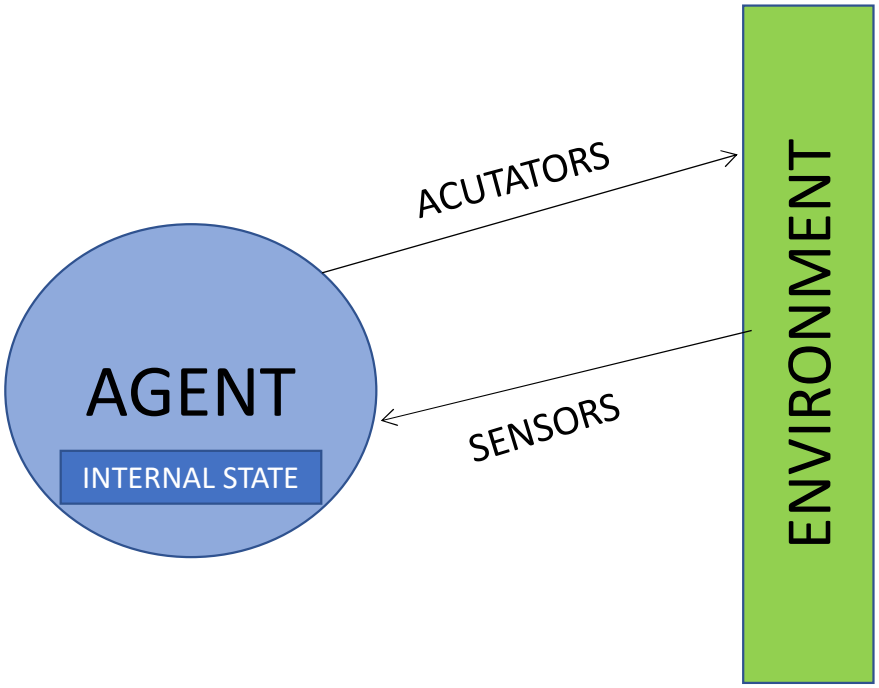
Agent – A definition

- Agent perceives the environment and acts upon the environment in order to maximize achievement of the required goal.(Actions)
- We will discuss more about agents in the upcoming sessions.



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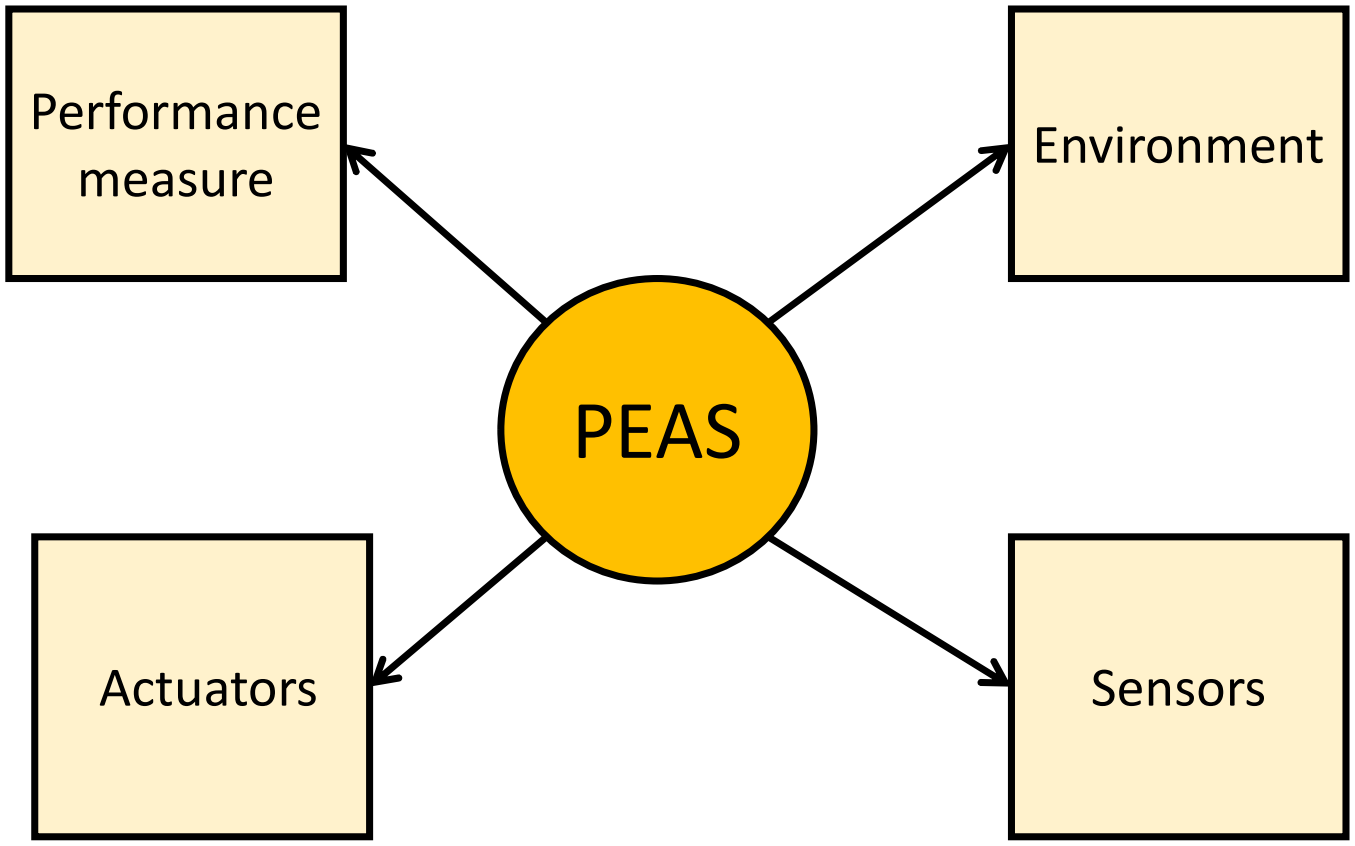
Grouping of Intelligent Agent

In order to group similar time of agents we follow a specific grouping system called PEAS



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What would be the PEAS for this example

What Architecture would you choose
What would be your algorithm for preventing this accident

How would you recognize a kerb from a drunk lying on the road?

Performance measure: Safe, fast, legal, comfortable trip, maximize profits
Environment: Roads, other traffic, pedestrians, customers
Actuators: Steering wheel, accelerator, brake, signal, horn
Sensors: Cameras, sonar, speedometer, GPS, odometer, engine sensors, keyboard

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Turing Test

Act Humanly

- Turing Test
- Knowledge, Reasoning,Language, Learning

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Modelling AI problems

Different types of problems may require different types of approaches

- some problems can be easily represented using state spaces
  ex: Robot navigation through the maze
- Problems that can be solved using Machine Learning techniques
  ex: Face Recognition
- Probabilistic Graphical Models such as Bayes Network,HMMs
  ex: Speech Recognition
- Problem that can be well addressed using deductive logic ,like given a certain proposition and input ,perform logical interface
  ex: imagine a chat bot that encodes some knowledge and can reason with the user

Modelling example

- Problem-

  Suppose you have to reach place A from place B with a route that leads you fast as possible .You are provided with map and info about traffic along routes

- Model-

  Represent the landmarks as nodes of graph,.Edges represent the connection between the landmarks.Edges are annotated with time cost of moving from one landmark to next .

- Algorithm-

  Graph Search algorithm such as BFS,DFS, Uniform Cost Search etc

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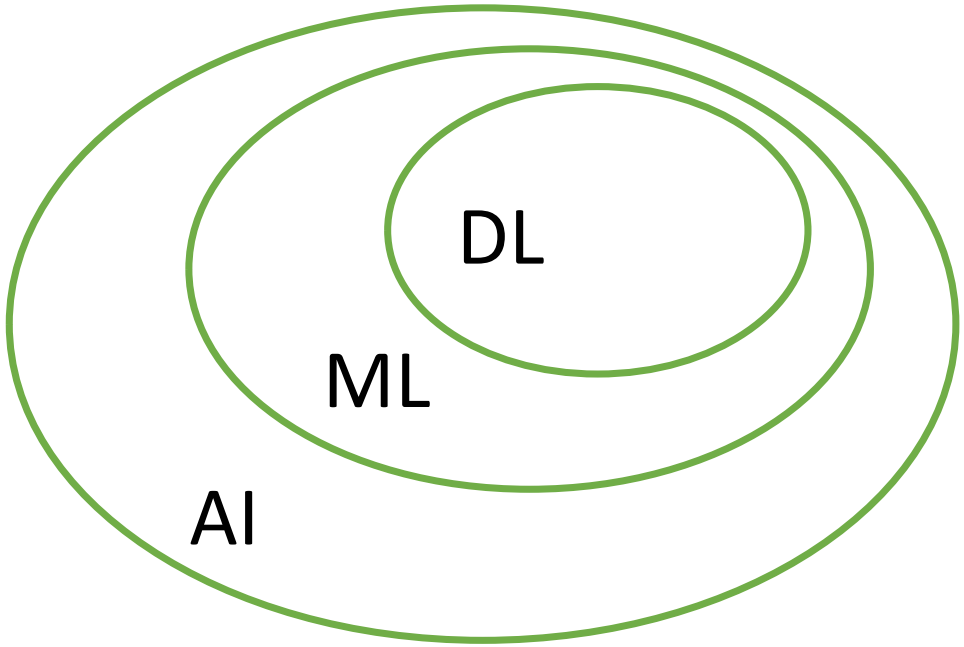
Artificial Intelligence >>> Machine Learning

- The goal of AI is to build human-like intelligence on machines
- ML is a core approach to achieve this goal
- DL is a suite of techniques that form a sub set of a broad suit of ML techniques



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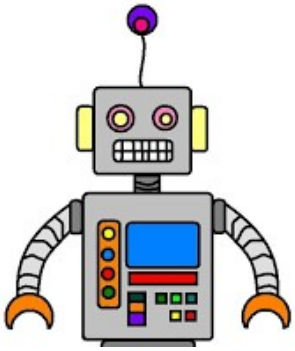
Machine Learning

- Consider the world ,we have humans and we have computers
- Can we get computers to learn from experience too???
- YES -and that is precisely what machine learning means
- but for computers we have a different term for experience that is data

Learn from experience

Learn from ~~experience~~ data



Follow instructions

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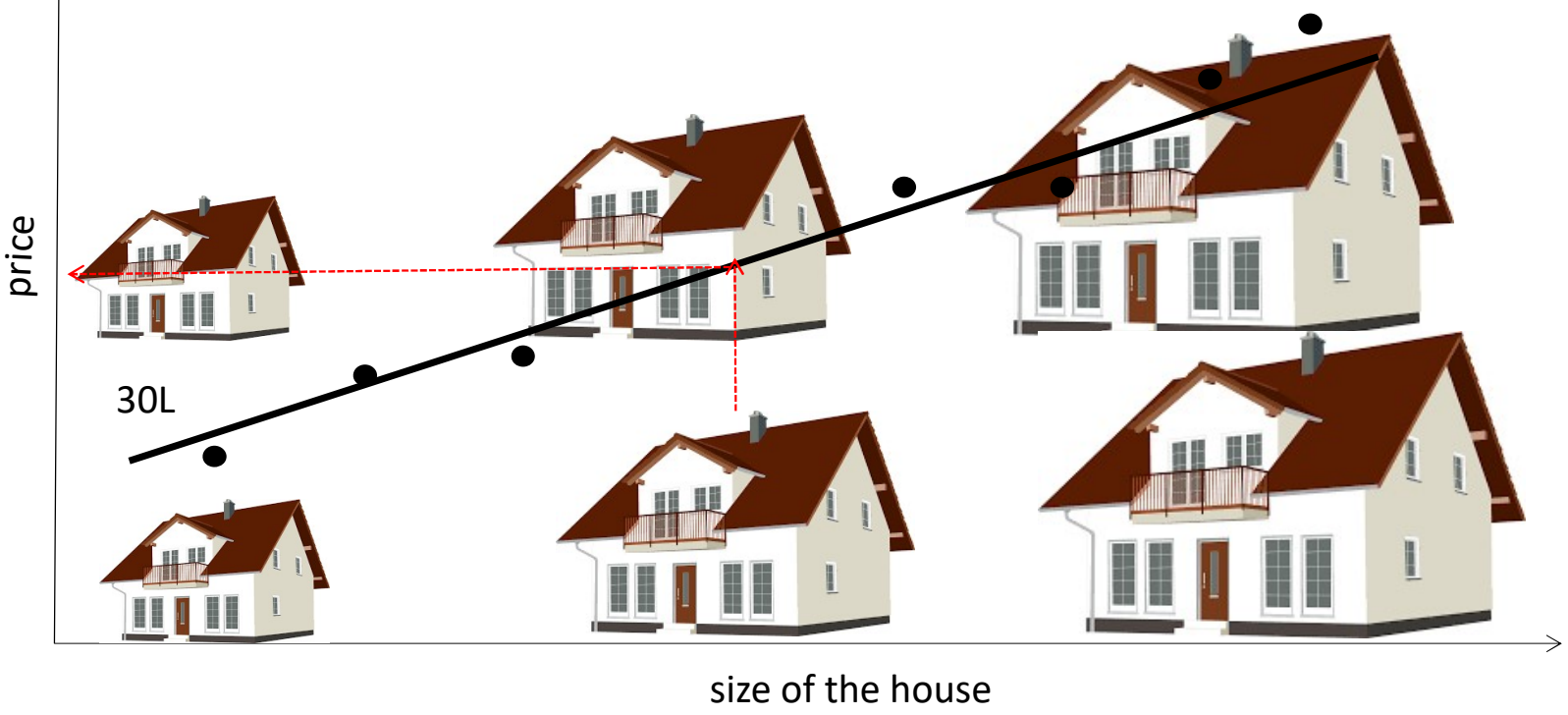
Learning from Data

- Let us see one example to understand how a machine learns from experience(data)
- consider we have two house with following price and we need to predict the price of the medium sized house
- we will plot them on a graph with some other data ,find a best fit line to predict its price
- this method is called linear regression ,how to find the best fit line ? we will see it in further session.



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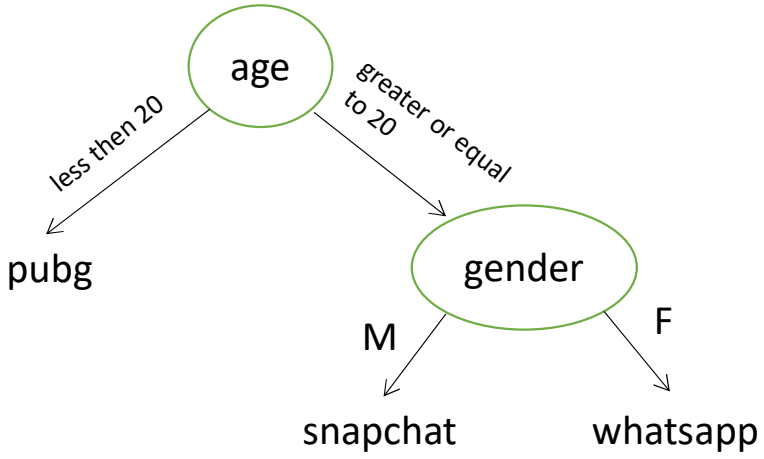
Learning from Data

- we are on a task to built a app recommendation system with some previous data
- what do think can be criteria that influences the recommendation more , gender or age
- There is not much split in gender
- If we use the age split we see people below age 20 downloaded pubg and other downloaded whatsapp and snapchat
- we can decide the following algorithm
- This is known as decision tree learning and we will study this in detail in upcoming sections

Gender	Age	App
F	15	pubg
F	25	whatsapp
M	32	snapchat
F	40	whatsapp
M	12	pubg
M	14	pubg



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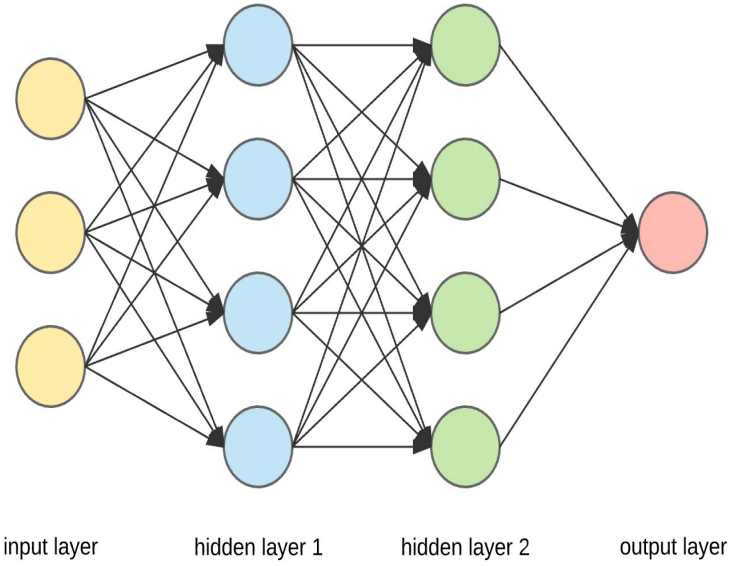
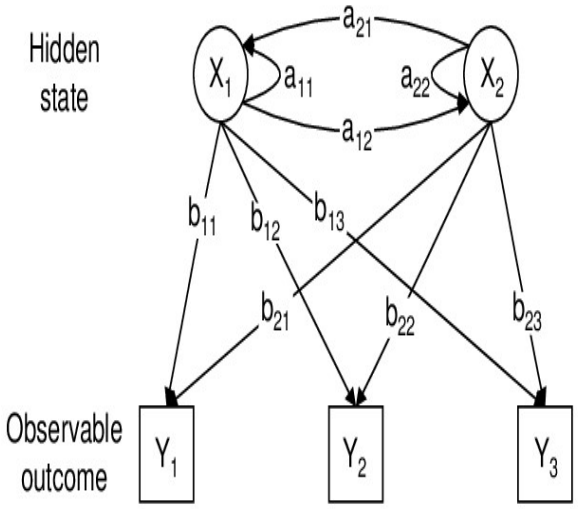
Machine Intelligence is Omni Present

We will be analyzing other various kind of algorithms throughout this course to solve real world problems





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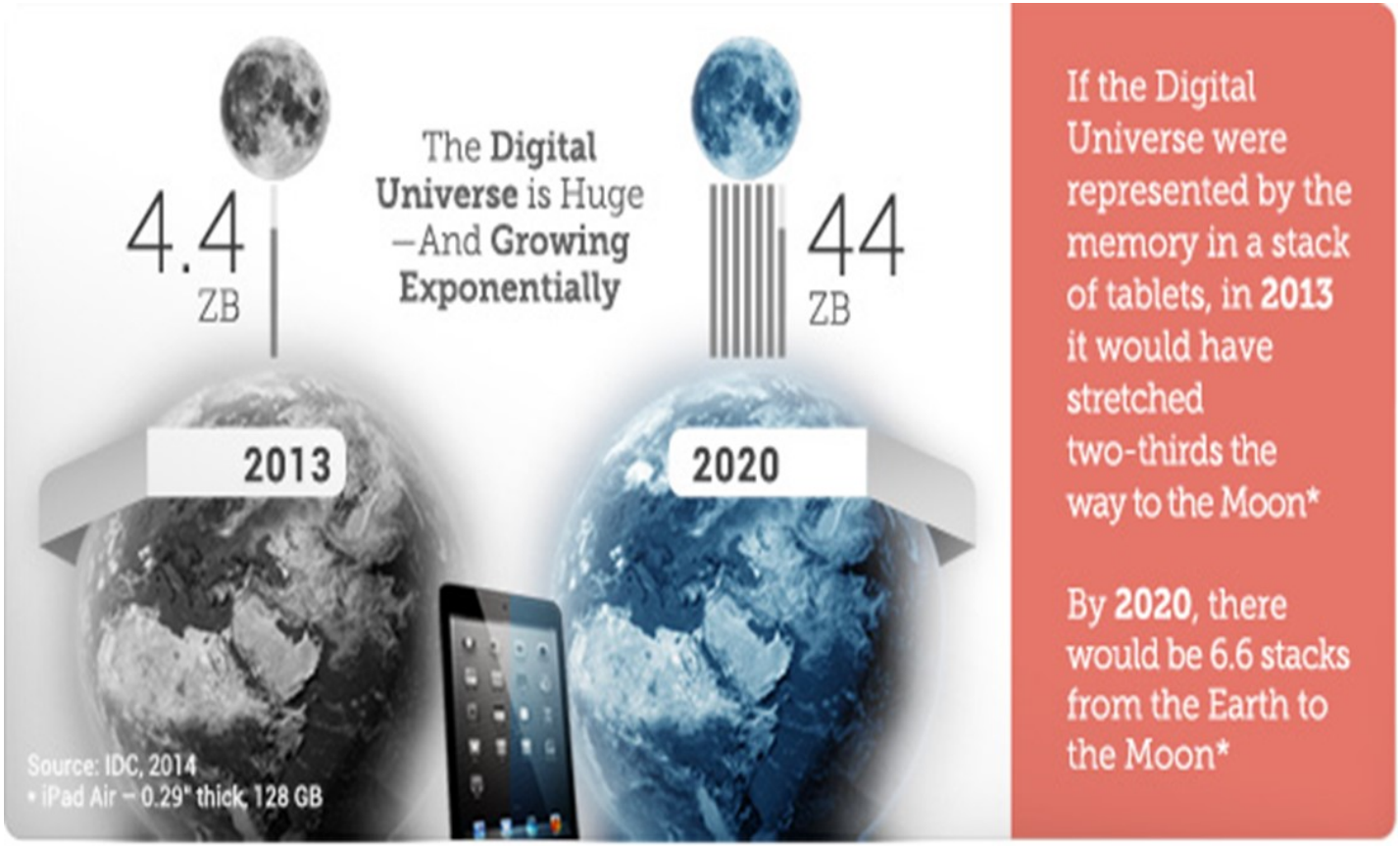
The new dawn of Machine Intelligence



https://www.emc.com/leadership/digital-universe/2014iview/executive-summary.htm

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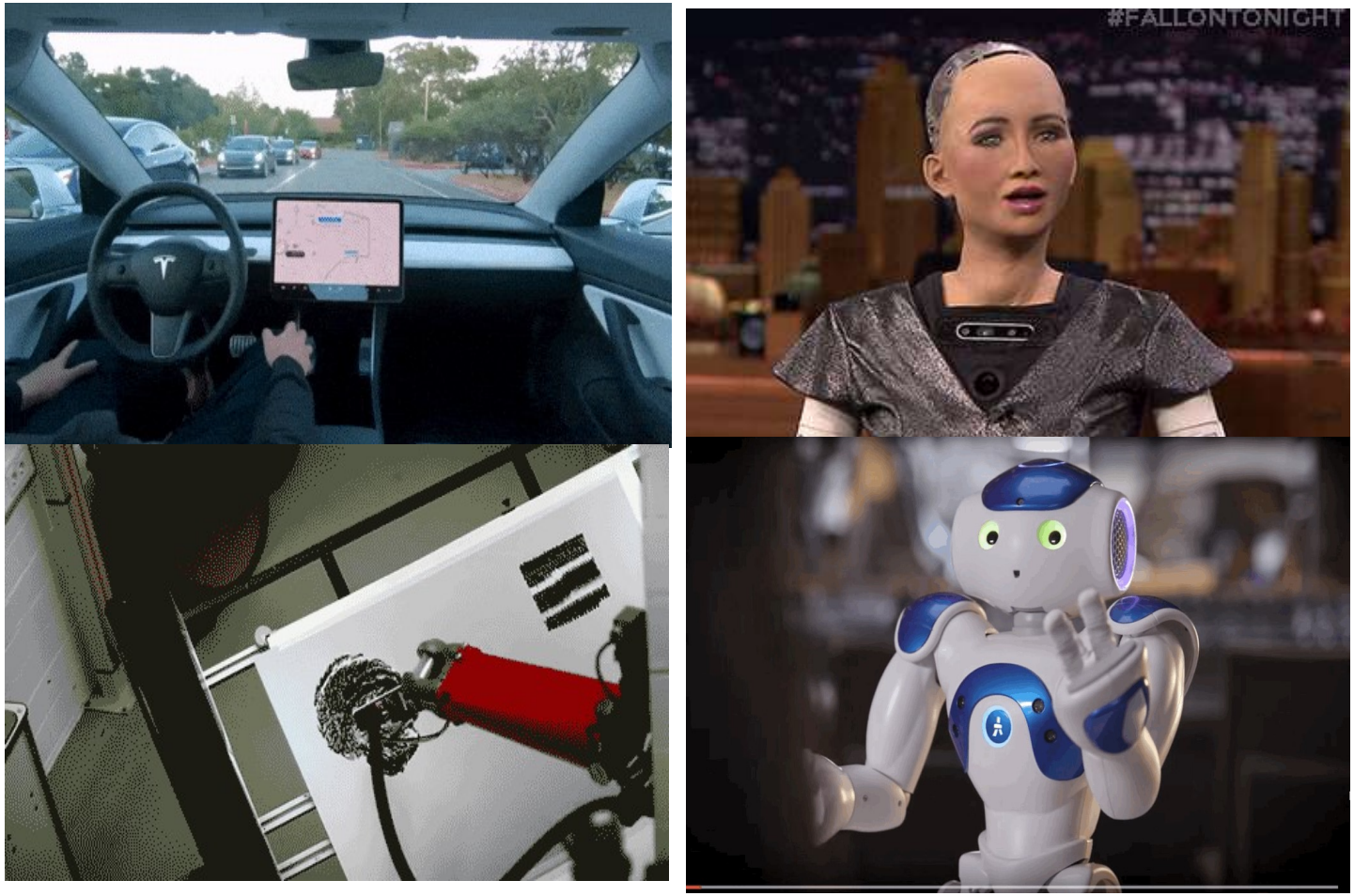
Examples of Machine Intelligence



Source: https://giphy.com/search/artificial-intelligence

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Issues with Machine Intelligence

- What algorithms can approximate functions well and when ?
- How much training data is sufficient to learn a concept with high confidence?
- When is it useful to use prior knowledge?
- Are some training examples more useful than others?
- What are best tasks for a system to learn?
- What is the best way for a system to represent its knowledge?
- Can the learner automatically alter its representation for improvement ?

At the end of this course you will be able to answer all these questions

THANK YOU

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