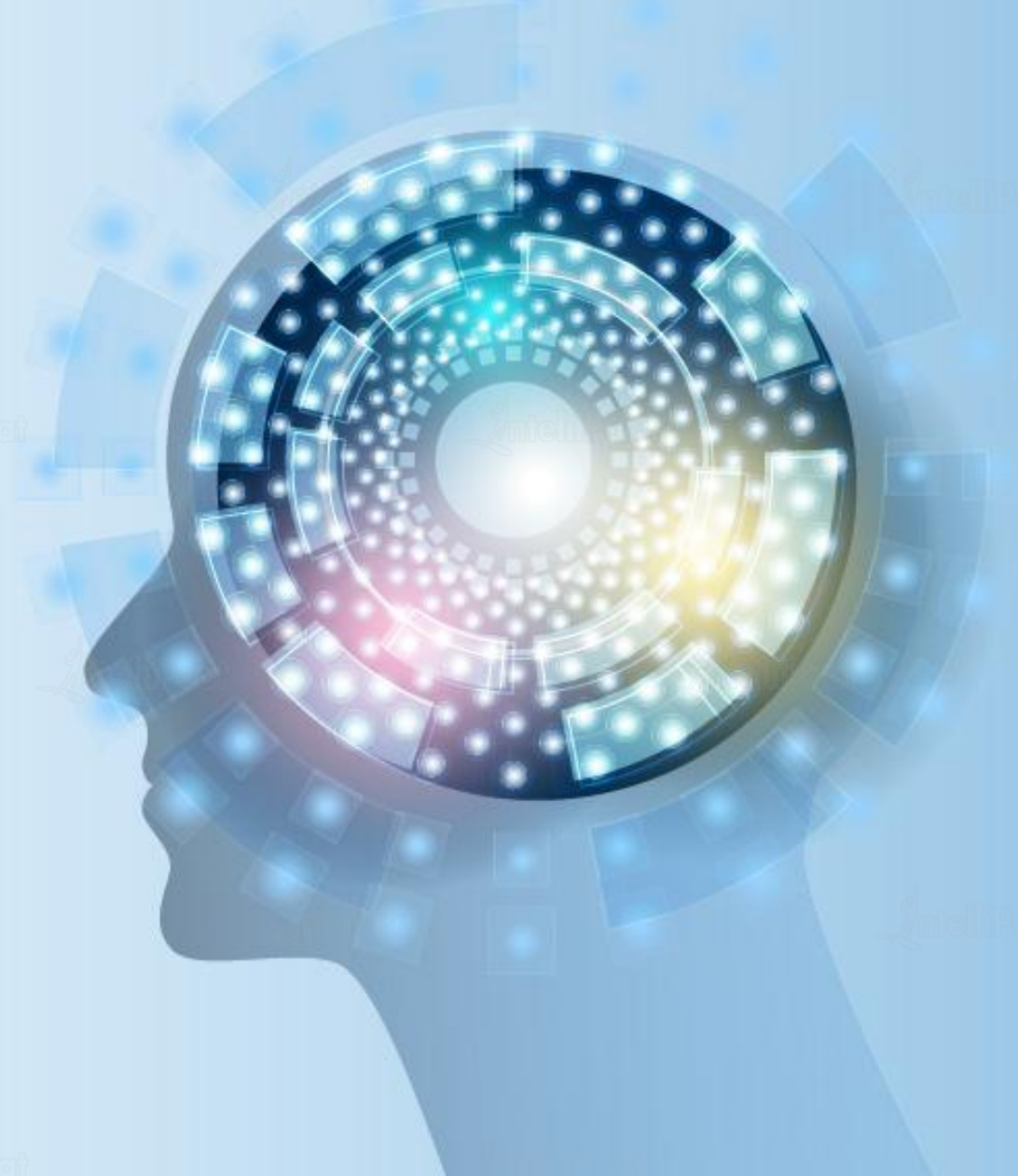




# Artificial Intelligence

Introduction to Artificial Intelligence



# Agenda

**01**

**Importance of AI**

**02**

**What Is AI?**

**03**

**What Is Intelligence?**

**04**


**Difference Between AI, ML, and DL**

**05**

**Basics of Machine Learning**

**06**

**Basics of Deep Learning**

A cartoon illustration of a man with a beard and glasses, wearing a blue shirt and khaki pants, standing with his arms crossed and looking thoughtful. A thought bubble is above his head.

Let us understand why we should  
study Artificial Intelligence!

# Why Artificial Intelligence?

*Widely used in banking  
and finance industries*



*An important feature  
of medical science*



*Perfect for heavy  
industries*



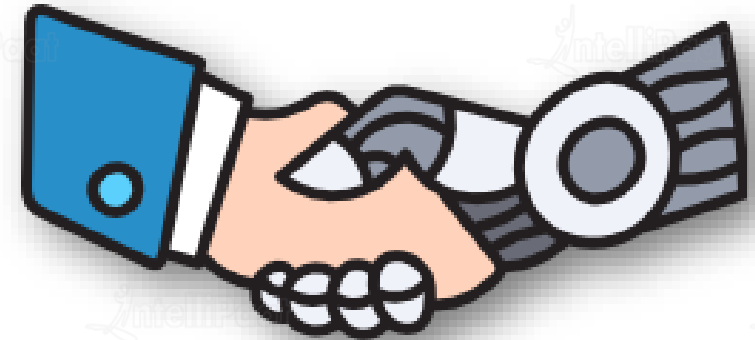
*Efficiently used in air  
transport*



*Changed the face of  
gaming*



*Reinvented the world*



*A great help for  
humans*

Want to know more about Artificial  
Intelligence?



# Artificial Intelligence



*'Artificial intelligence (AI) is a field of computer science that emphasizes on the creation of intelligent machines which can work and react like humans'*

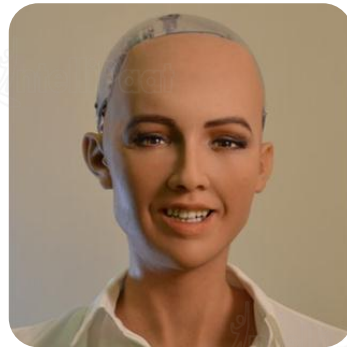
# Artificial Intelligence



*'Artificial intelligence (AI) is a field of computer science that emphasizes on the creation of intelligent machines which can work and react like humans'*



Hi, how can I help?



# What Is Intelligence?



*'Intelligence can be defined as one's capacity for understanding, self-awareness, learning, emotional knowledge, planning, creativity, and problem solving'*

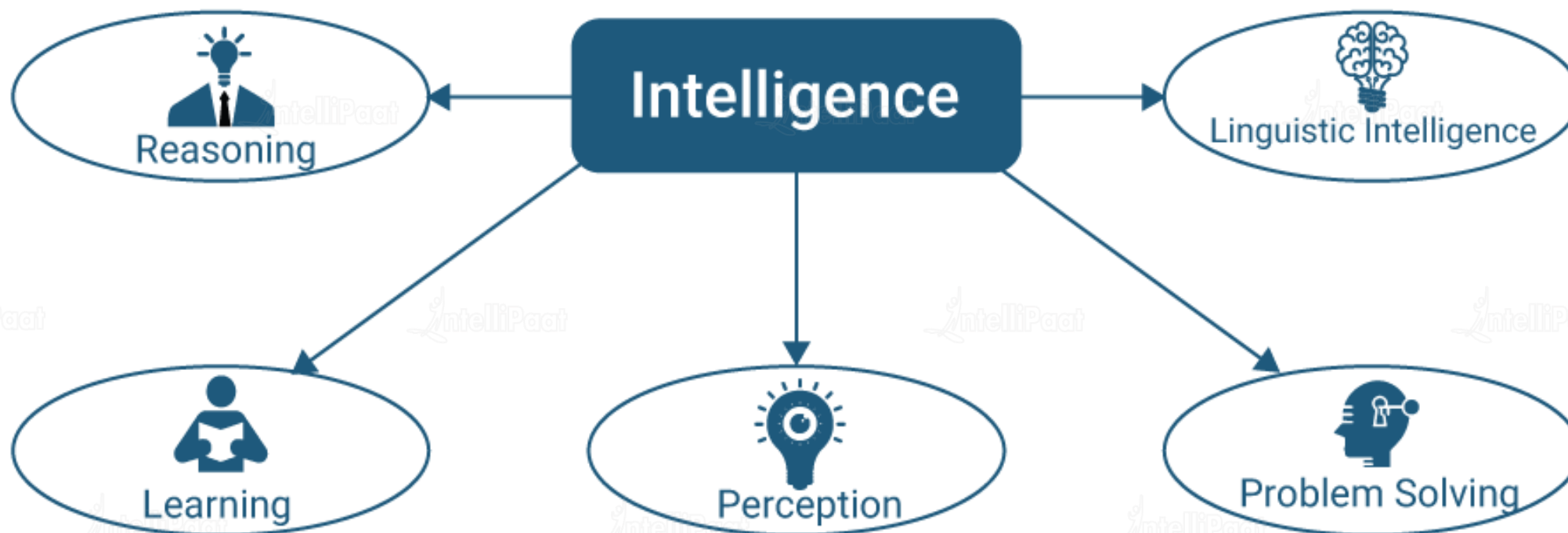
- Artificial Intelligence is *intelligence in machines*
- It is commonly implemented in computer systems using program software
- Accordingly, there are two possibilities:
  - A system with intelligence is expected to behave as intelligently as a human
  - A system with intelligence is expected to behave in the best possible manner



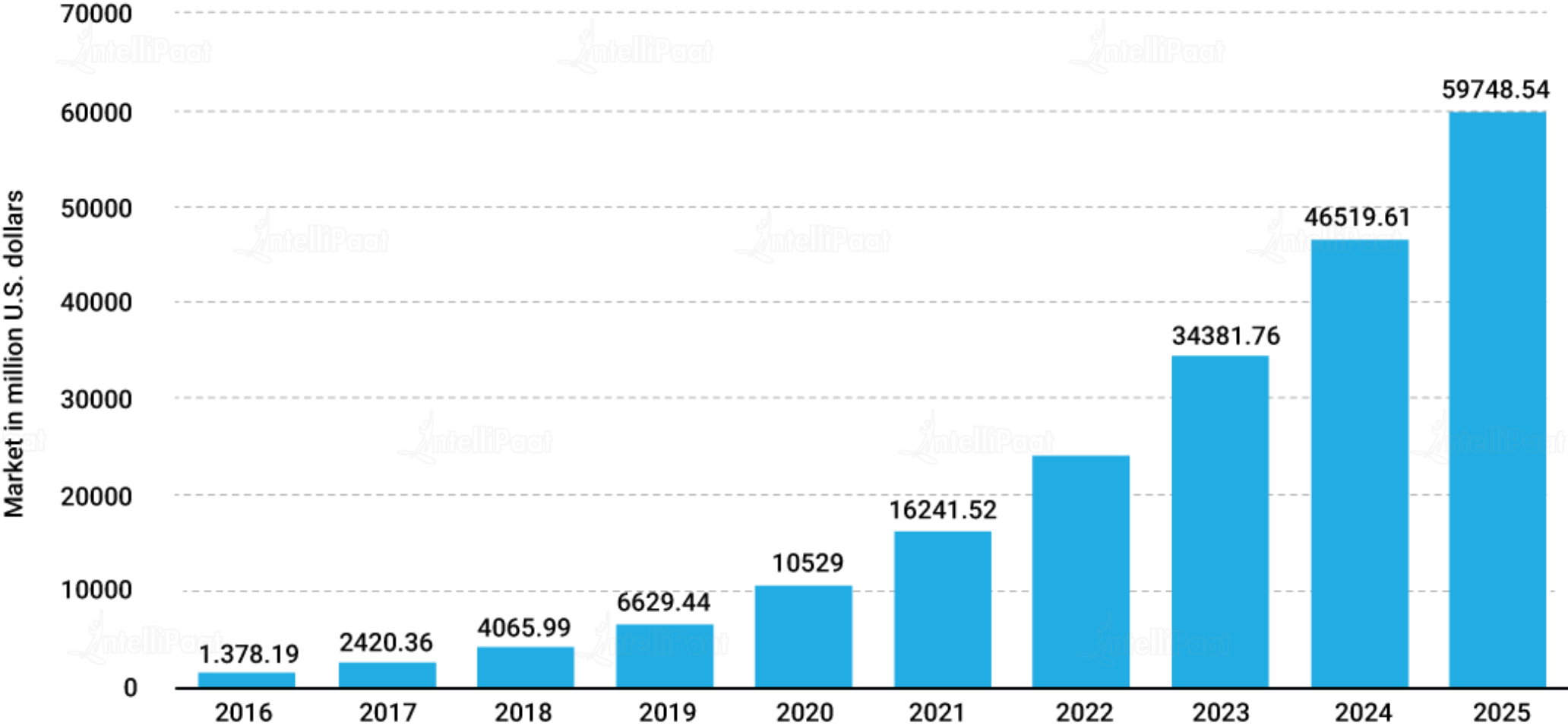



# What Makes Humans Intelligent?

The core problem of Artificial Intelligence includes programming computers for certain traits such as:



# Growth of Artificial Intelligence



A cartoon illustration of a man with a brown beard and glasses, wearing a blue button-down shirt and tan pants. He is standing with his arms crossed, looking thoughtful.

A lot of people think that Artificial Intelligence, Machine Learning, and Deep Learning, all are the same. Let me tell you some real facts then!

## Artificial Intelligence



```
graph TD; AI[Artificial Intelligence] --> ML[Machine Learning (ML)]; AI --> DL[Deep Learning (DL)];
```

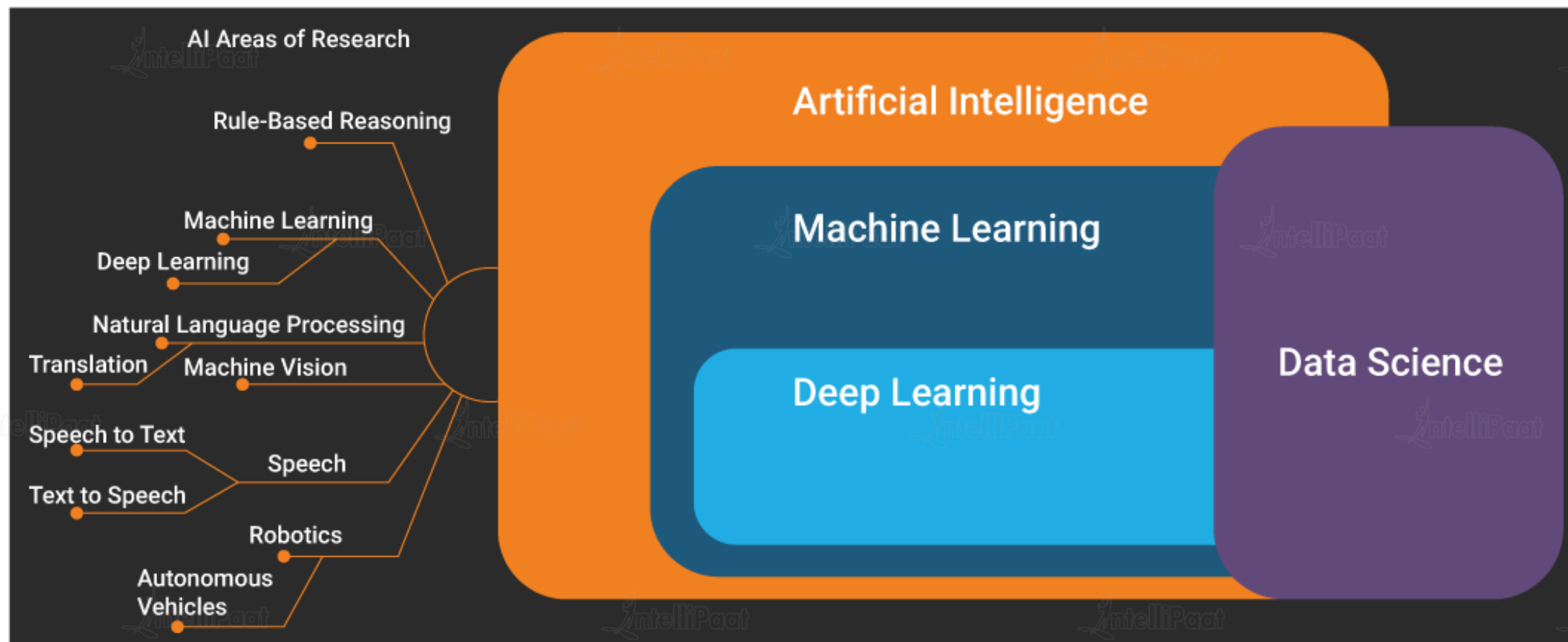
### Machine Learning (ML)


- An Approach to achieve Artificial Intelligence
- A subfield of AI that aims to teach computers the ability to do tasks with data, without explicit programming
- It uses numerical and statistical approaches, including artificial neural networks, to encode learning in models

### Deep Learning (DL)

- A technique for implementing Machine Learning
- A subfield of AI that uses specialized techniques involving multi-layer (2+) artificial neural networks
- Layering allows cascaded learning and abstraction levels (e.g., line -> shape -> object -> scene)

# AI in a Bigger Set



A cartoon illustration of a man with brown hair, a beard, and glasses, wearing a blue button-down shirt and tan pants. He is standing with his arms crossed, looking upwards and to the right. A thought bubble is connected to his head by three small circles.

Let us understand Machine Learning in  
detail!

# Machine Learning Around YOU!



# Machine Learning Around YOU!

## Products Recommendation





# Machine Learning Around YOU!



## Amazon Alexa




# Machine Learning Around YOU!

## Movie Recommendation

### House of Cards

★★★★★ 2013 TV-MA 1 Season HD 5.1

Sharks gliding ominously beneath the surface of the water? They're a lot less menacing than this Congressman.

 This winner of three Emmys, including Outstanding Directing for David Fincher, stars Kevin Spacey and Robin Wright.



Because you watched Orange Is the New Black



Because you watched Red Lights



# Machine Learning Around YOU!



## Google Traffic Prediction



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# Introduction to Machine Learning





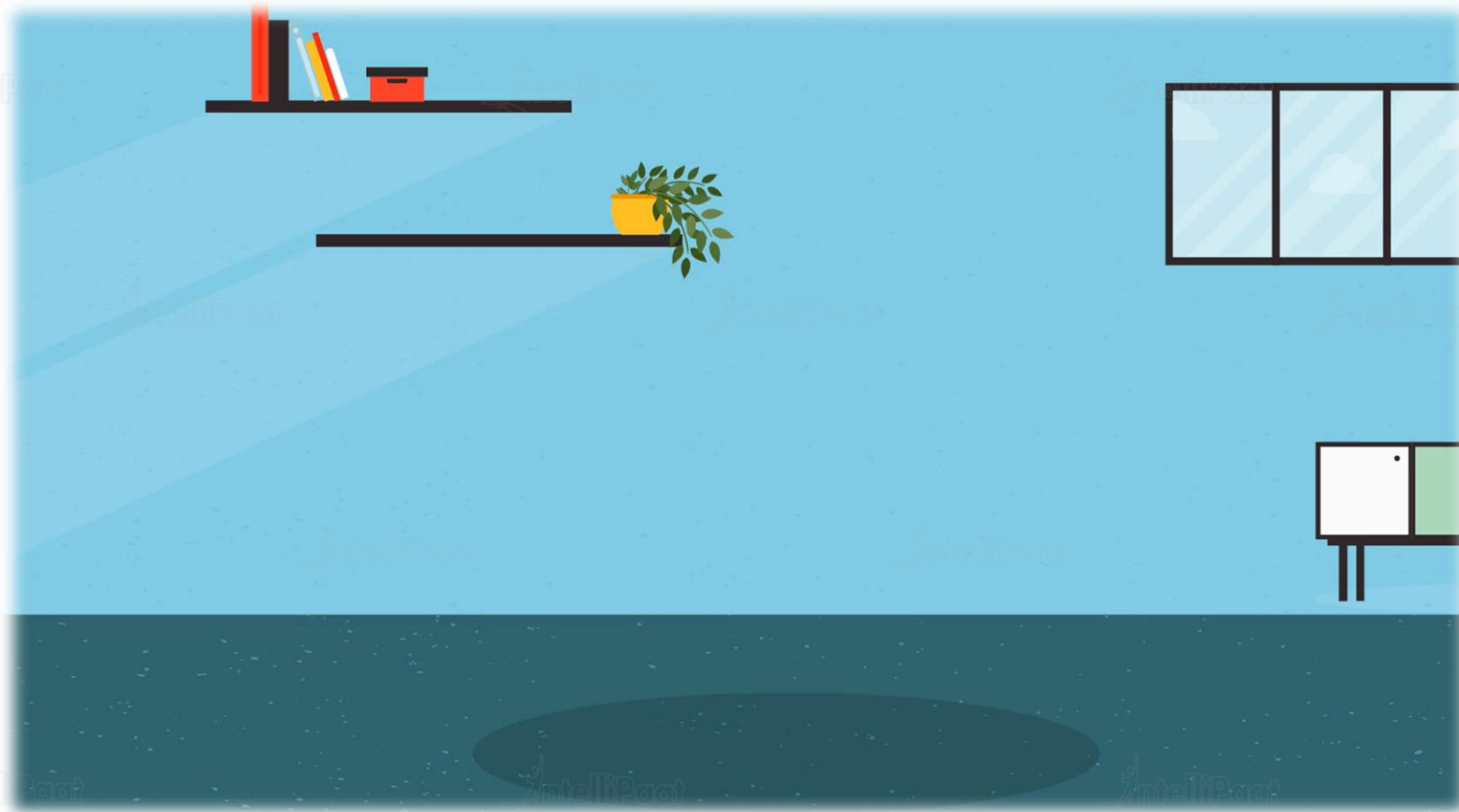
# What Is Machine Learning?



Machine Learning is a subset of Artificial Intelligence which gives a machine the ability to learn without being explicitly programmed. Data, not algorithms, is key to machine learning success



# What Is Machine Learning?



# How Does a Machine Learn?



- Machine Learning algorithm is trained using a training dataset to create a model
- When a new input data is introduced to the ML algorithm, it makes a prediction on the basis of the model
- The prediction is evaluated for accuracy and if the accuracy is acceptable, the Machine Learning algorithm is deployed
- If the accuracy is not acceptable, the Machine Learning algorithm is trained again and again with an augmented training dataset



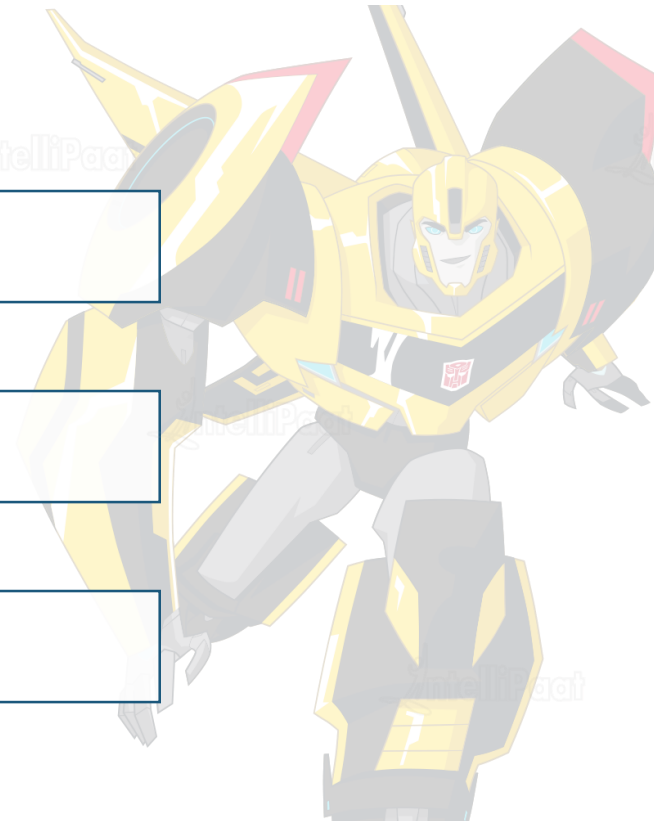
# Machine Learning Types

Machine learning is categorized into three types

Supervised Learning

Unsupervised Learning

Reinforcement Learning





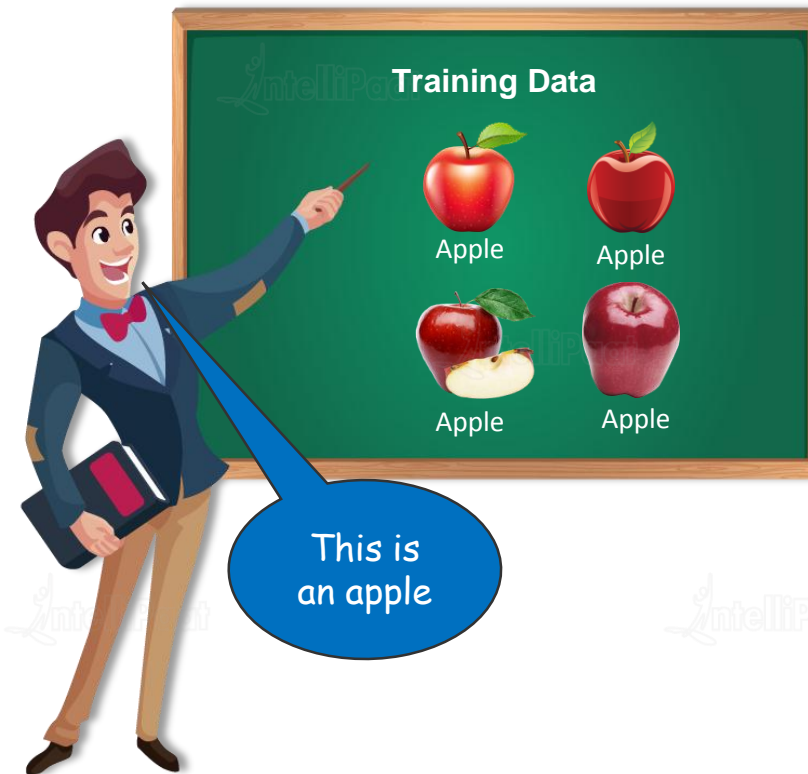
# Machine Learning Types!

*In Supervised Learning, you can consider that the learning is guided by a teacher. We have a dataset which acts as a teacher and its role is to train the model or the machine. Once the model gets trained, it can start making a prediction or decision whenever new data is given to it*

Supervised Learning

Unsupervised Learning

Reinforcement Learning



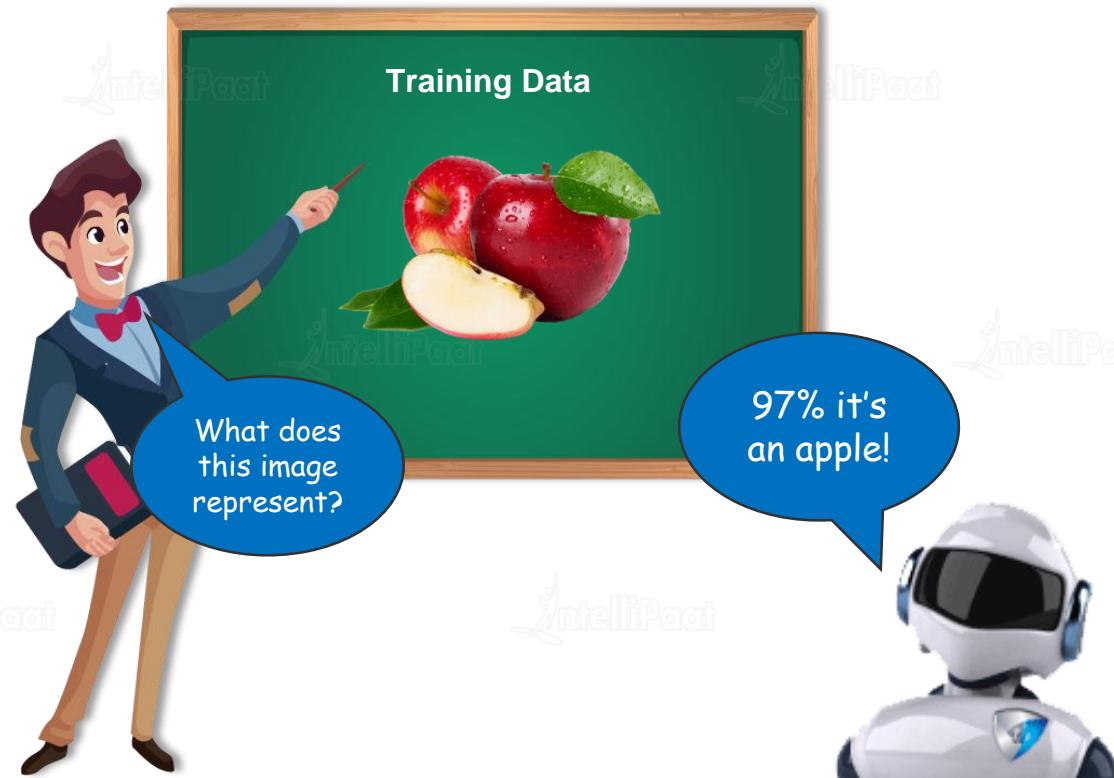
# Machine Learning Types!

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Supervised Learning

Unsupervised Learning

Reinforcement Learning



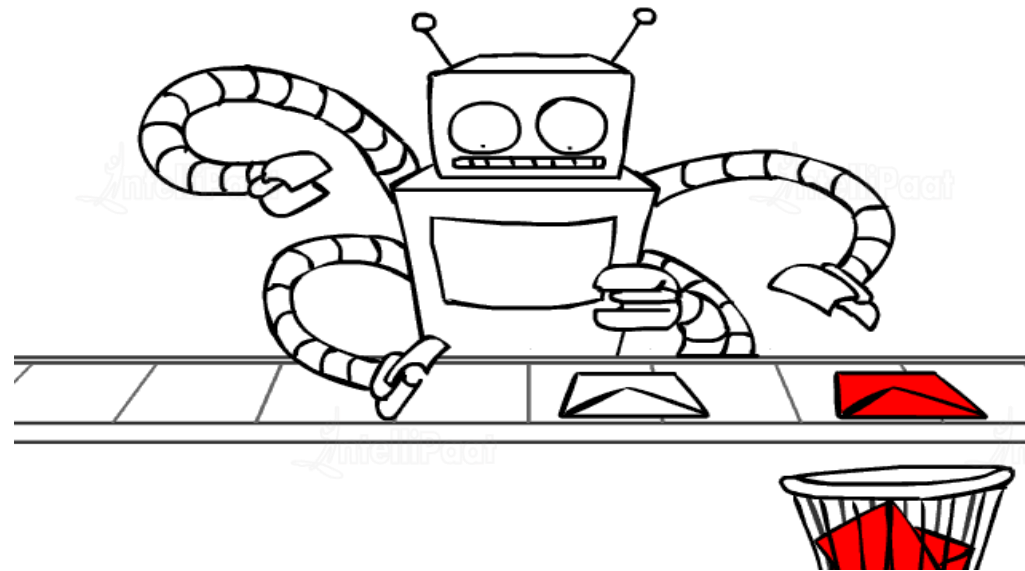
## Use Case: Spam Classifier

# Machine Learning Types!

Supervised Learning

Unsupervised Learning

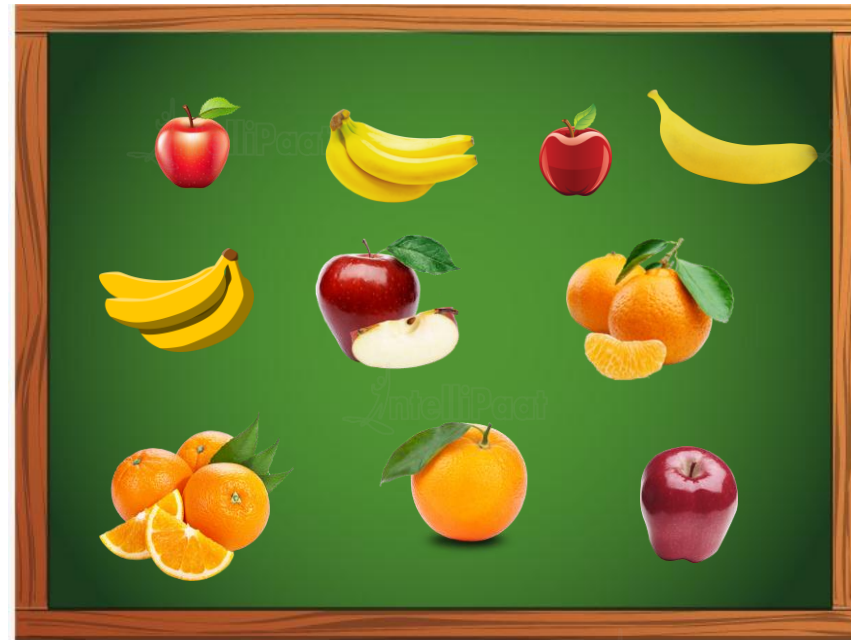
Reinforcement Learning



Most of the spam filtering techniques are based on text categorization methods. Thus, filtering spam turns out to be a classification problem. We employ Supervised Machine Learning techniques to filter the email spam messages

# Machine Learning Types!

*Here, the model learns through observation and finds structures in data. Once the model is given a dataset, it automatically finds patterns and relationships in the dataset by creating clusters in it. What it cannot do is to add labels to these clusters. For example, it cannot say if this is a group of apples, mangoes, or oranges, but it will separate all apples from mangoes and oranges*



Supervised Learning

Unsupervised Learning

Reinforcement Learning



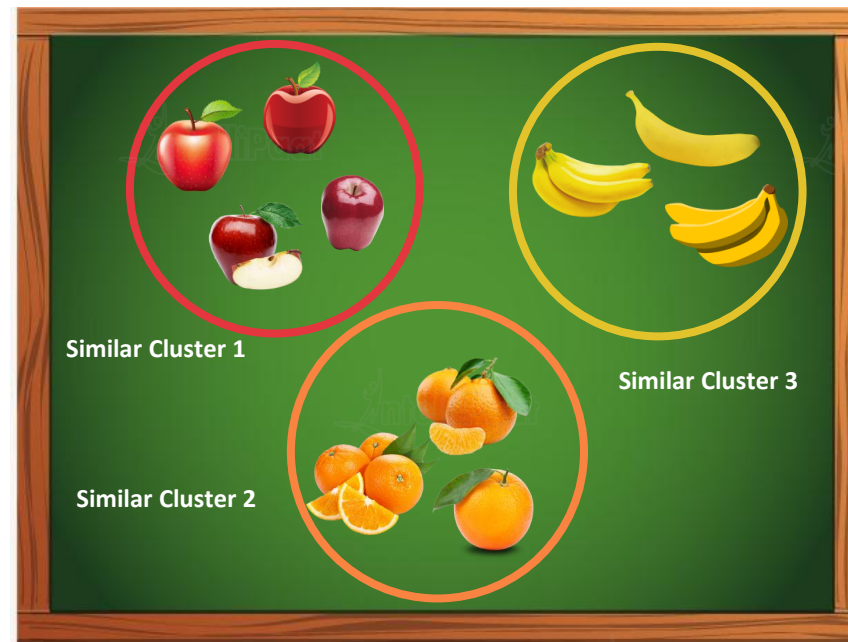
# Machine Learning Types!

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Supervised Learning

Unsupervised Learning

Reinforcement Learning



3 clusters





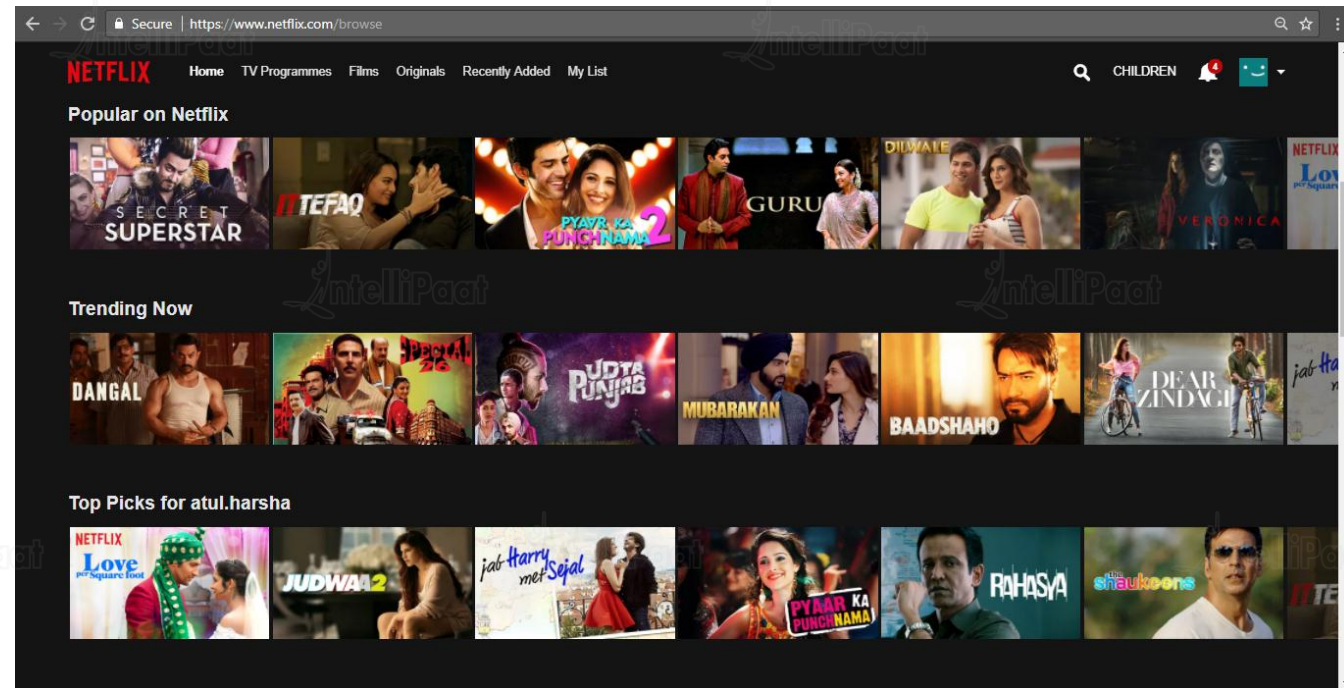
# Machine Learning Types!

Supervised Learning

Unsupervised Learning

Reinforcement Learning

## Use Case: Netflix Recommendation



Netflix uses Machine Learning algorithms to help break viewers' preconceived notions and find shows that they might not have initially chosen

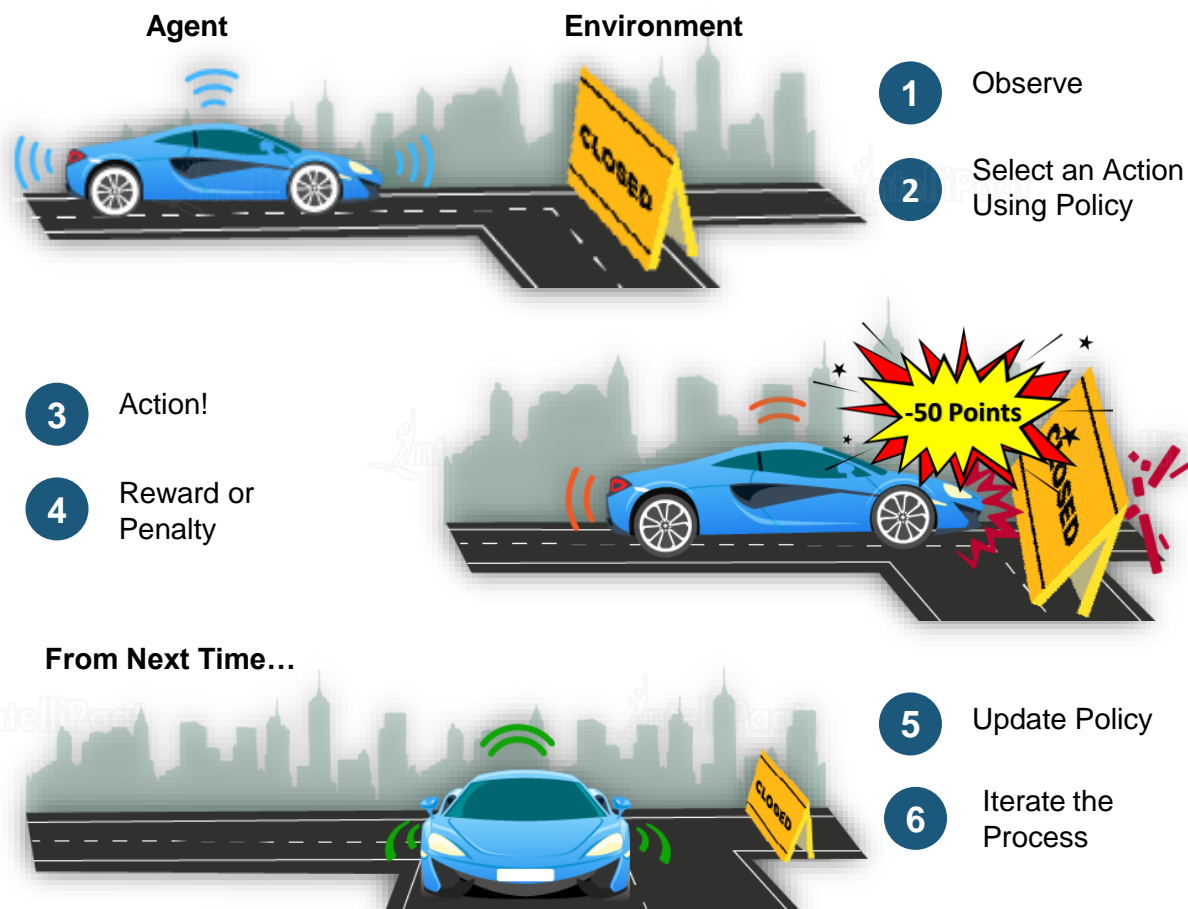
# Machine Learning Types!

Supervised Learning

Unsupervised Learning

Reinforcement Learning

It is the ability of an agent to interact with the environment and find out what the best outcome is. It follows the concept of hit and trial method. The agent is rewarded or penalized with a point for a correct or a wrong answer, and on the basis of the positive reward points gained the model trains itself



## Use Case: Self-driving Cars

# Machine Learning Types!

Supervised Learning

Unsupervised Learning

Reinforcement Learning

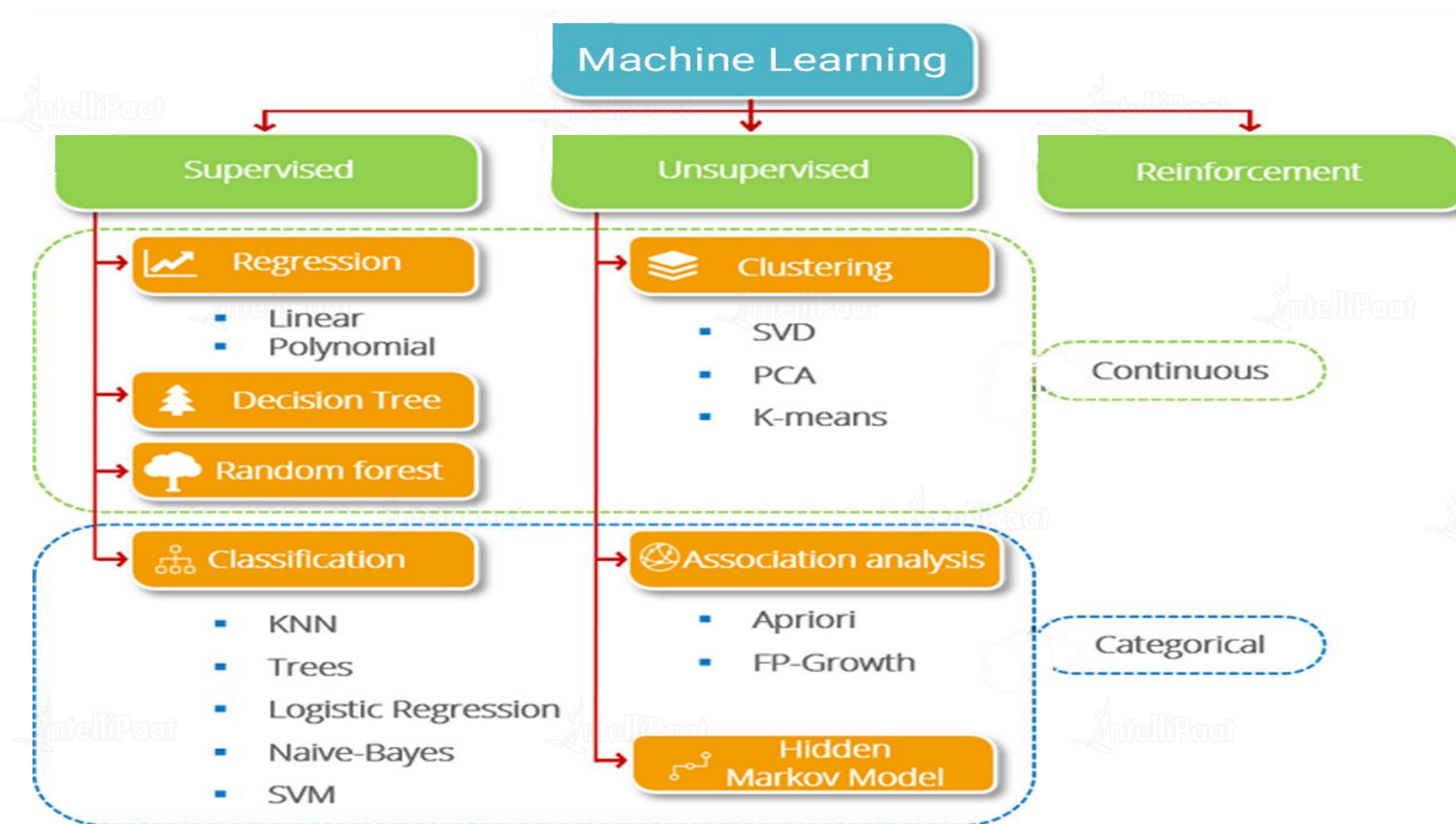


Companies such as Tesla (you've heard of them), Google, Wayve, and more are working on such machines.

These cars are powered by Reinforcement Learning. It allows machines (known as agents) to learn by experimentation



# Machine Learning Algorithms



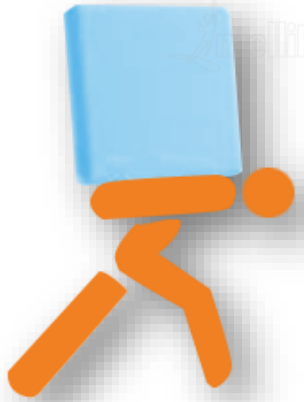
# Machine Learning for You!

Cool Machine Learning projects you can use:

- <https://www.autodraw.com/>
- <https://quickdraw.withgoogle.com/>
- <https://opensource.google.com/projects/explore/machine-learning>
- <https://experiments.withgoogle.com/collection/ai>
- <https://toolbox.google.com/datasetsearch>



# Limitations of Machine Learning



Machine Learning algorithms  
require massive amount of  
training data



Error diagnosis and correction  
can be difficult



Lack of creativity



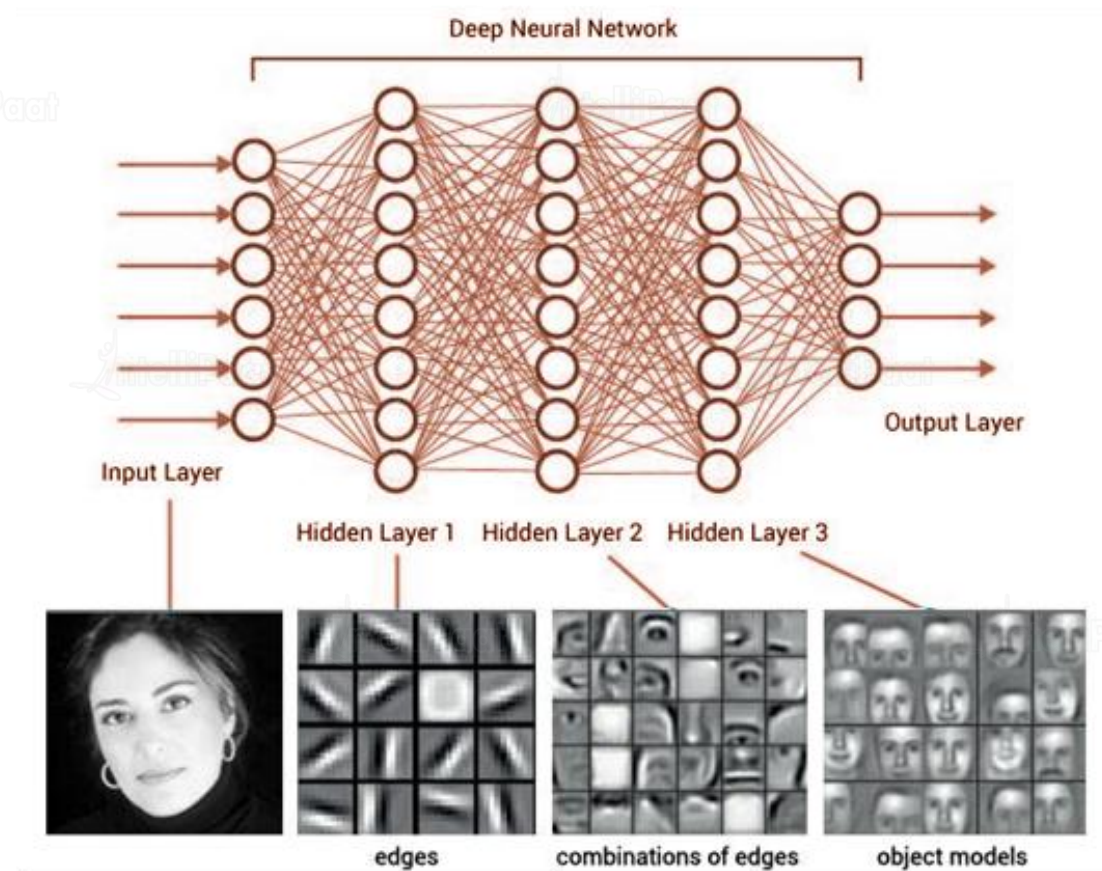
Time constraints in learning as  
it learns through historical data

# Introduction to Deep Learning



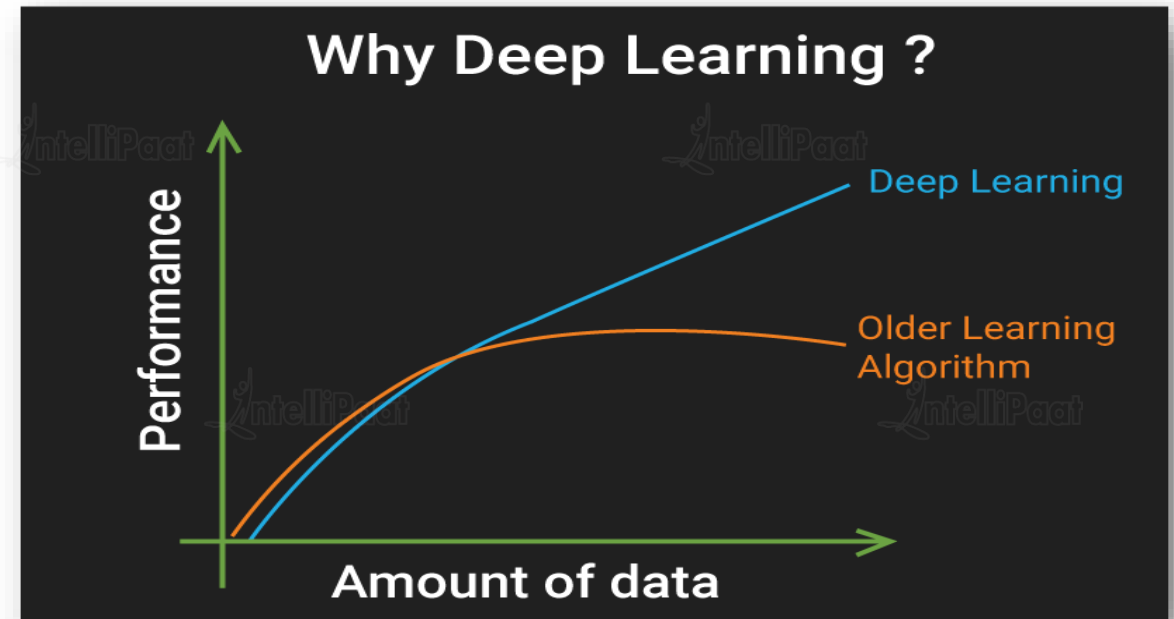
# Deep Learning

Deep Learning is part of Machine Learning methods based on learning data representations, as opposed to task-specific algorithms. It teaches computers to do what comes naturally to humans (to learn by examples)



# Deep Learning

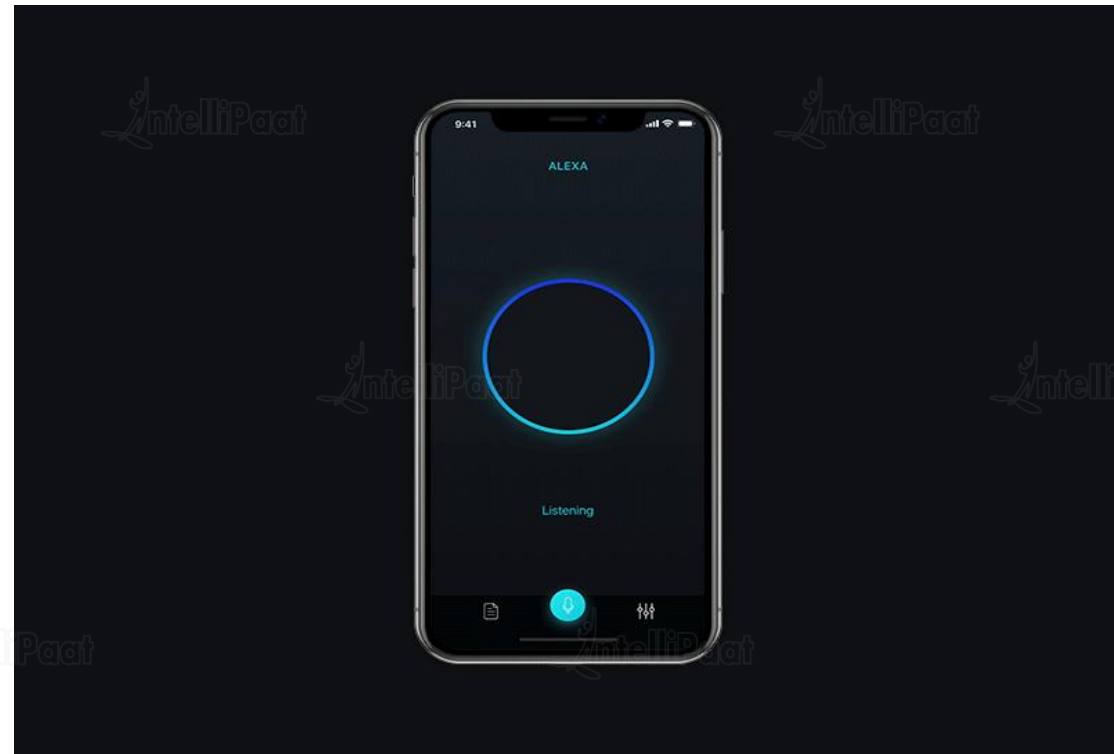
- Deep Learning architectures such as deep neural networks, deep belief networks, and recurrent neural networks have been applied to fields including computer vision, speech recognition, natural language processing, audio recognition, etc. where they have produced results comparable to, and in some cases superior to, human experts
- Most modern Deep Learning models are based on artificial neural networks



# Applications of Deep Learning



## Speech Recognition





# Applications of Deep Learning



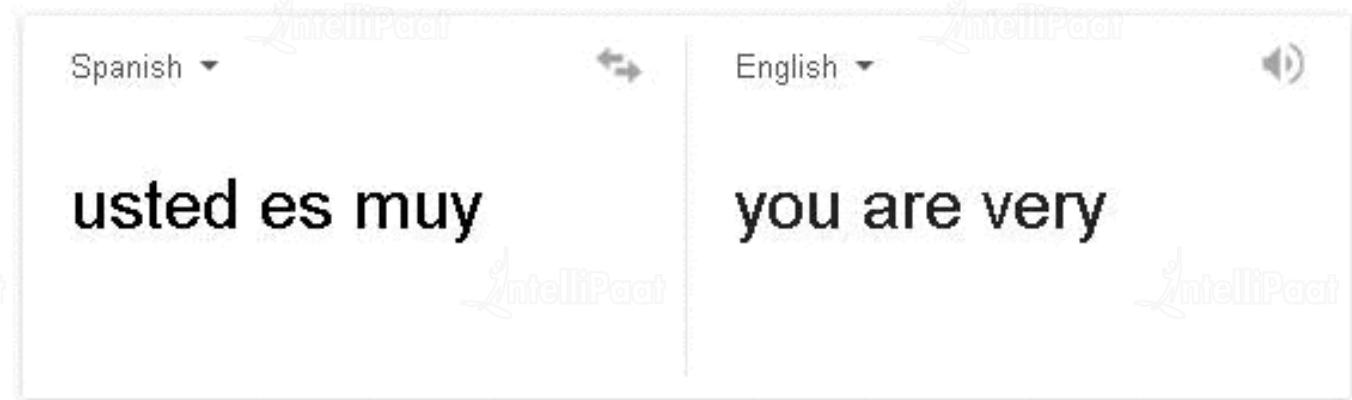
## Self-driving Cars





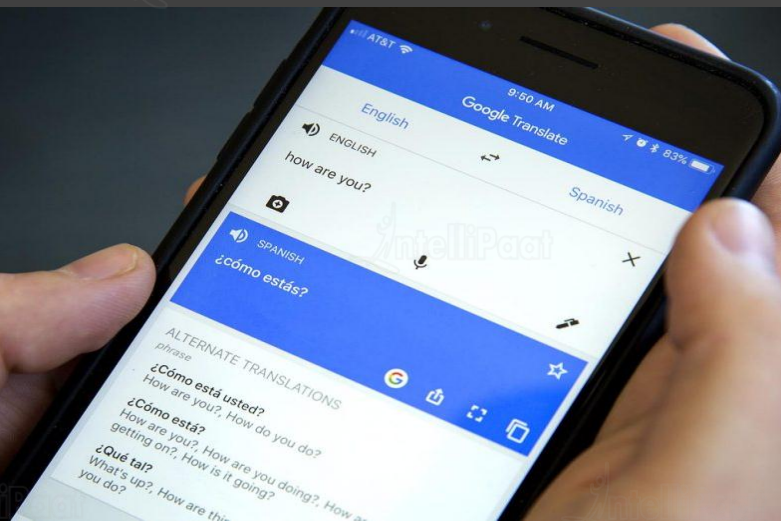
# Applications of Deep Learning

## Automatic Machine Translation



[Open in Google Translate](#)

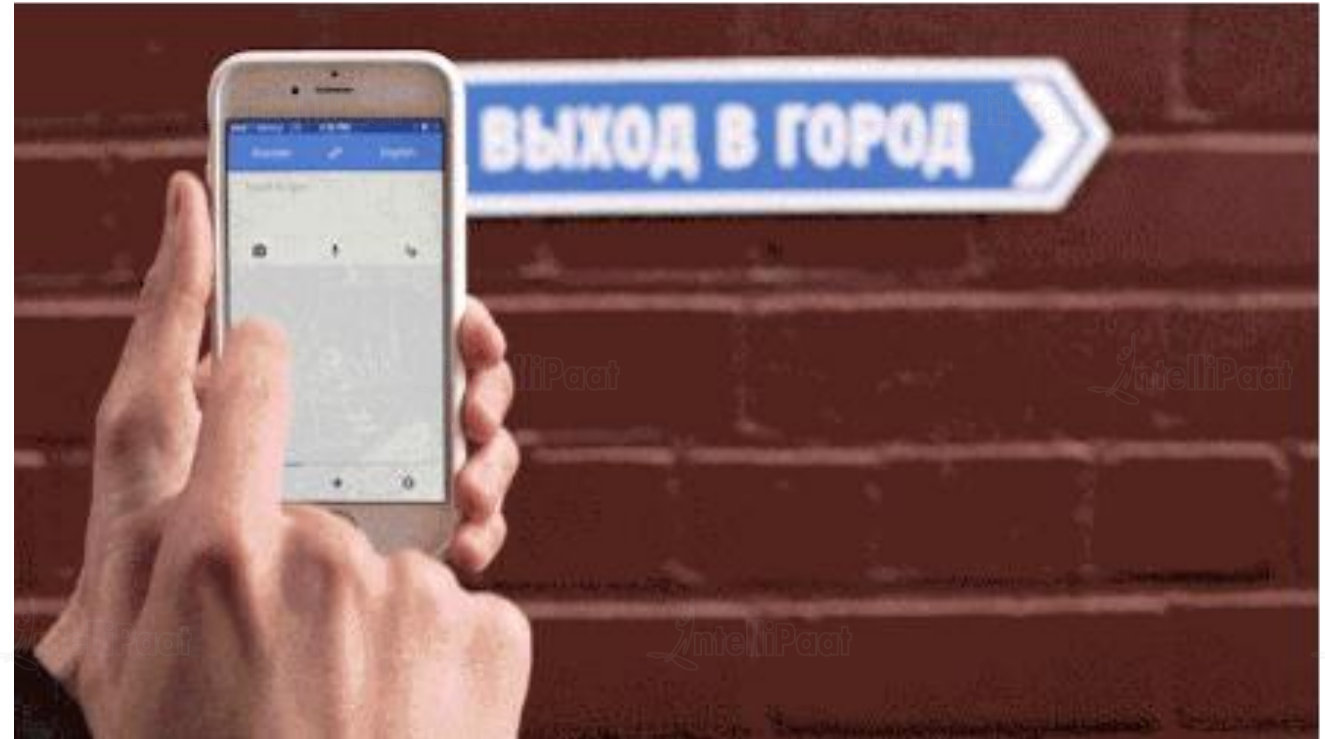
Google Translate



# Applications of Deep Learning



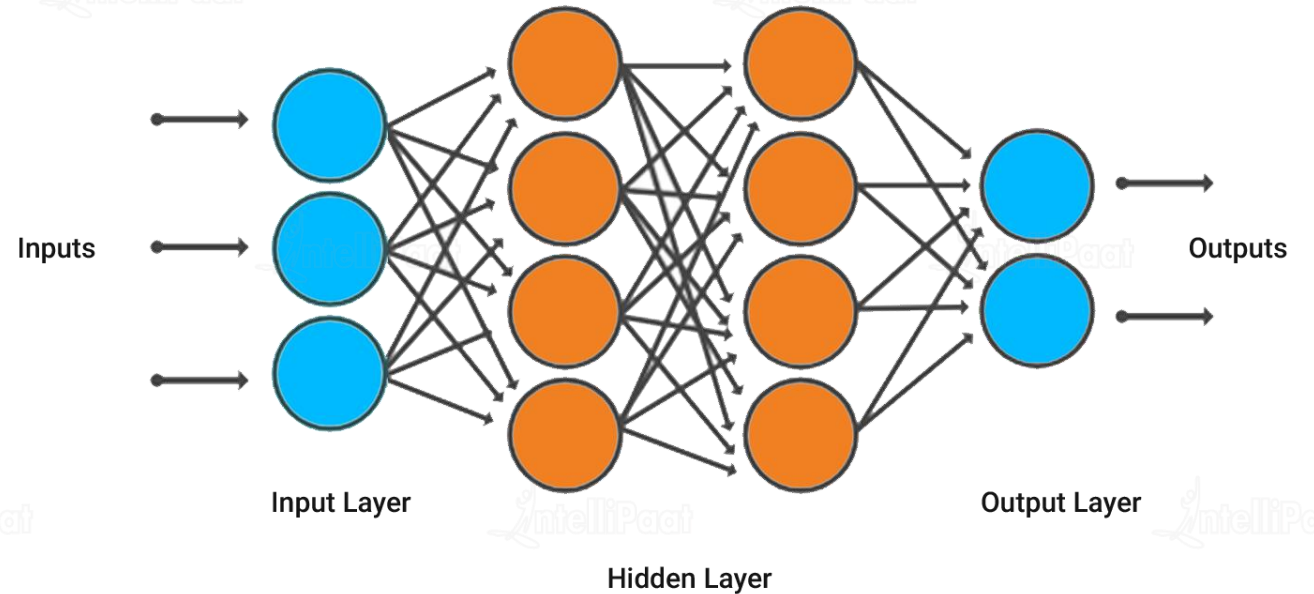
## Visual Translation



# How Does Deep Learning Work?

Most Deep Learning methods use neural networks architecture, which is why Deep Learning models are often referred to as deep neural networks

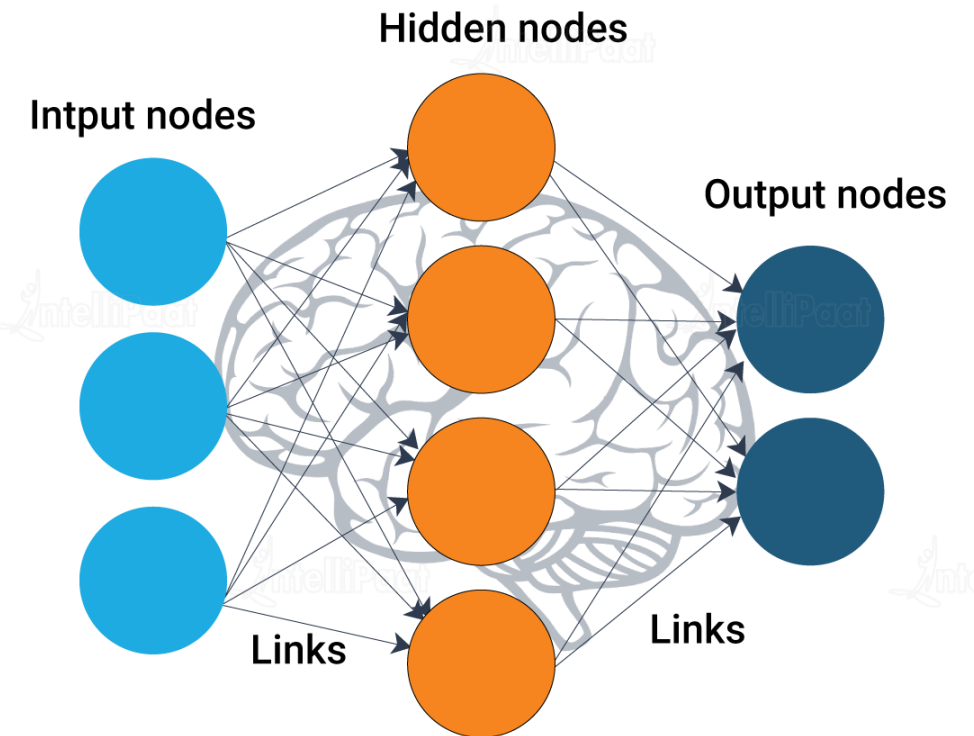
- The term 'deep' usually refers to the number of hidden layers in the neural network
- Traditional neural networks contain only 2–3 hidden layers, while deep networks can have as many as 150
- Deep Learning models are trained using large sets of labeled data and neural network architectures that learn features directly from data without the need for manual feature extraction



# What Is a Neural Network?

A neural network is a computing model whose layered structure resembles the networked structure of neurons in the brain, with layers of connected nodes. It can learn from data, so it can be trained to recognize patterns, classify data, and forecast future events

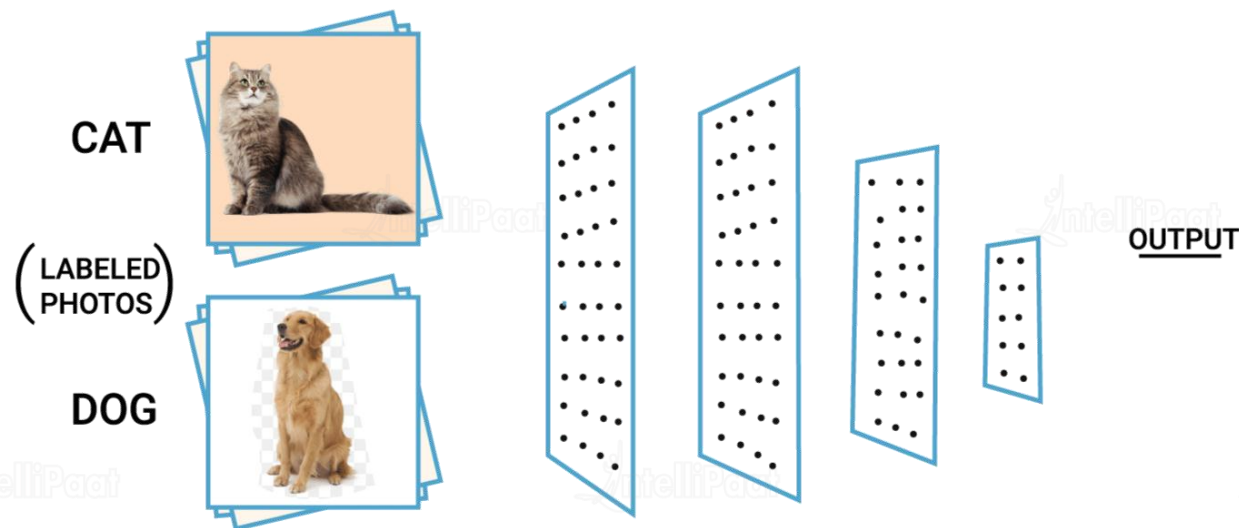
- A neural network breaks down your input into layers of abstraction
- It consists of an input layer, one or more hidden layers, and an output layer
- These layers are interconnected via nodes, or neurons, with each layer using the output of the previous layer as its input
- Its main function is to receive a set of inputs, perform calculations, and then use the output to solve the problem



# Artificial Neural Networks (ANN)

Artificial neural networks are computing systems inspired by the biological neural networks that constitute animal brains. Such systems learn (progressively improve their ability) to do tasks by considering examples, generally without task-specific programming

- For example, in image recognition, they might learn to identify images that contain cats by analyzing example images that have been manually labeled as 'cat' or 'no cat', and by using these analytic results they can identify cats in other images
- They have found to be most useful in applications difficult to express with a traditional computer algorithm using rule-based programming



# Quiz

# Quiz 1

Deep Learning is not a subset of ML.

A

True

B

False



## Answer 1

Deep Learning is not a subset of ML.

A

True

B

False

## Quiz 2

Self-Driving Cars is the use case of ..

- A** Classification Algorithm
- B** Reinforcement Learning
- C** Unsupervised Learning
- D** Supervised Learning

## Answer 2

Self-Driving Cars is the use case of ..

**A** Classification Algorithm

**B** Reinforcement Learning

**C** Unsupervised Learning

**D** Supervised Learning

## Quiz 3

Having a Perception is a kind of Intelligence?

A

Yes

B

No

## Answer 3

Having a Perception is a kind of Intelligence?

A

Yes

B

No

*Thank you!*





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