

# Introduction to Machine Learning

APSSDC

# Artificial Intelligence



# Machine Learning

Machine Learning is a subtopic of Artificial Intelligence(AI) that the Machine have an ability to learn from the data and improve from experience.



**Arthur Lee Samuel**

# Types of Machine Learning

## Supervised Learning

- Makes machine Learn explicitly
- Data with clearly defined output is given
- Direct feedback is given
- Predicts outcome/future
- Resolves classification and regression problems



## Unsupervised Learning

- Machine understands the data (Identifies patterns/structures)
- Evaluation is qualitative or indirect
- Does not predict/find anything specific



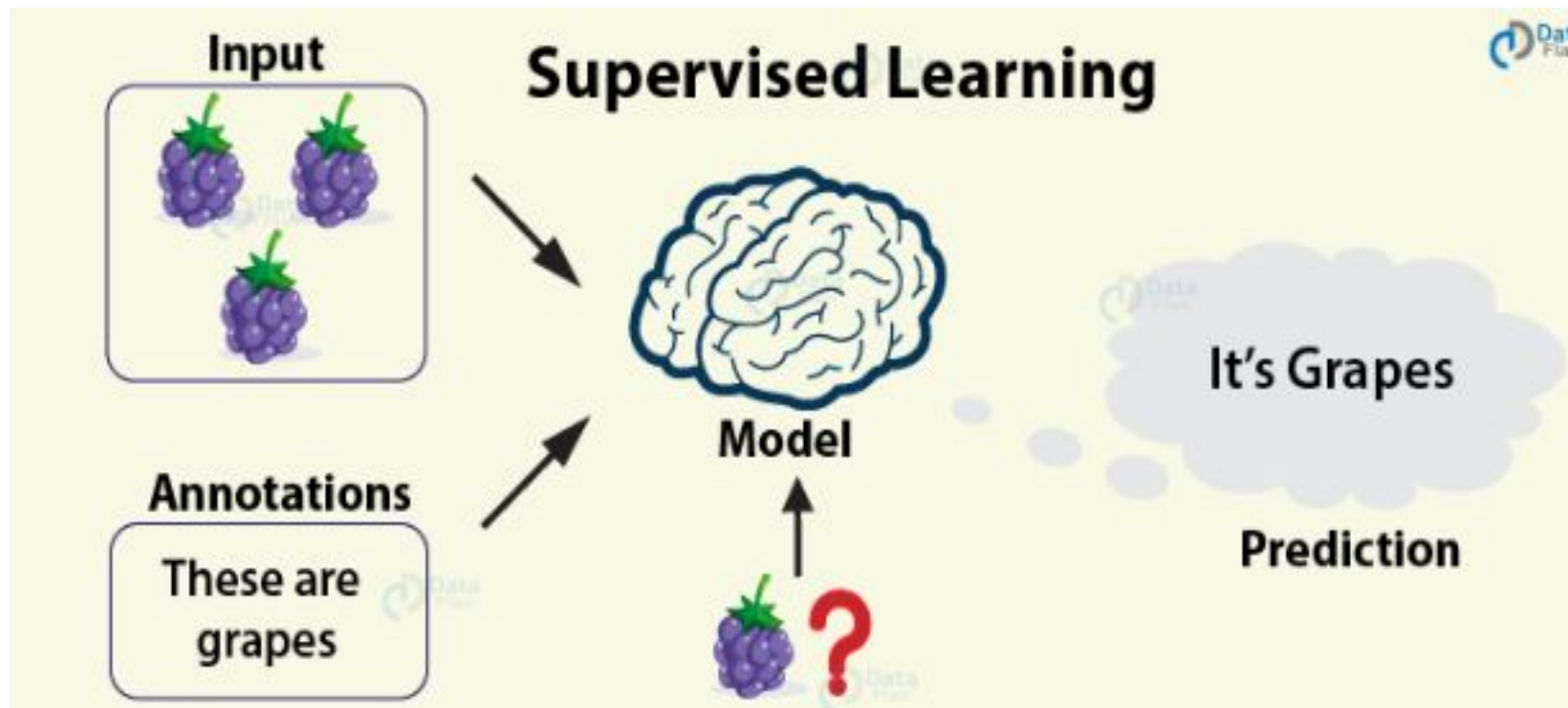
## Reinforcement Learning

- An approach to AI
- Reward based learning
- Learning form +ve & +ve reinforcement
- Machine Learns how to act in a certain environment
- To maximize rewards





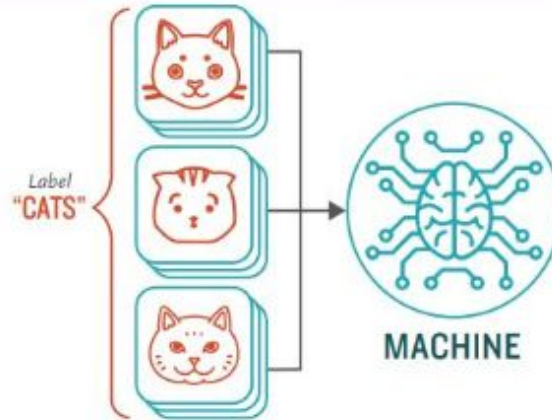
#1  
Supervised  
learning



# How Supervised Machine Learning Works

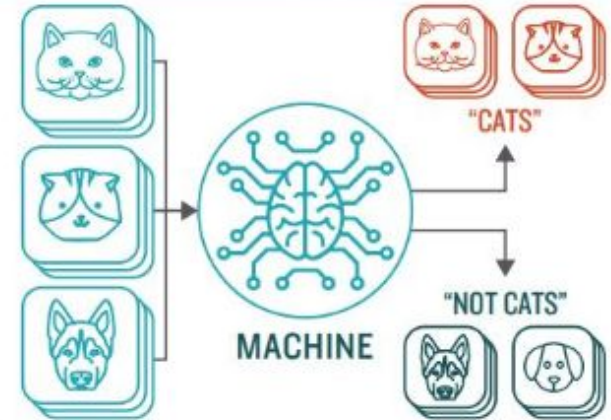
## STEP 1

Provide the machine learning algorithm categorized or "labeled" input and output data from to learn

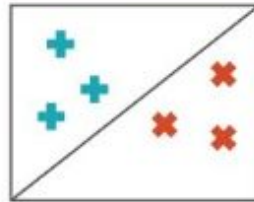


## STEP 2

Feed the machine new, unlabeled information to see if it tags new data appropriately. If not, continue refining the algorithm

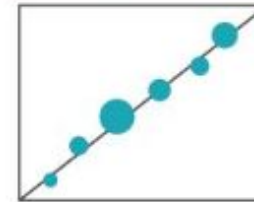


## TYPES OF PROBLEMS TO WHICH IT'S SUITED



### CLASSIFICATION

Sorting items  
into categories



### REGRESSION

Identifying real values  
(dollars, weight, etc.)





#2

Unsupervised  
learning

# Unsupervised Learning



Input

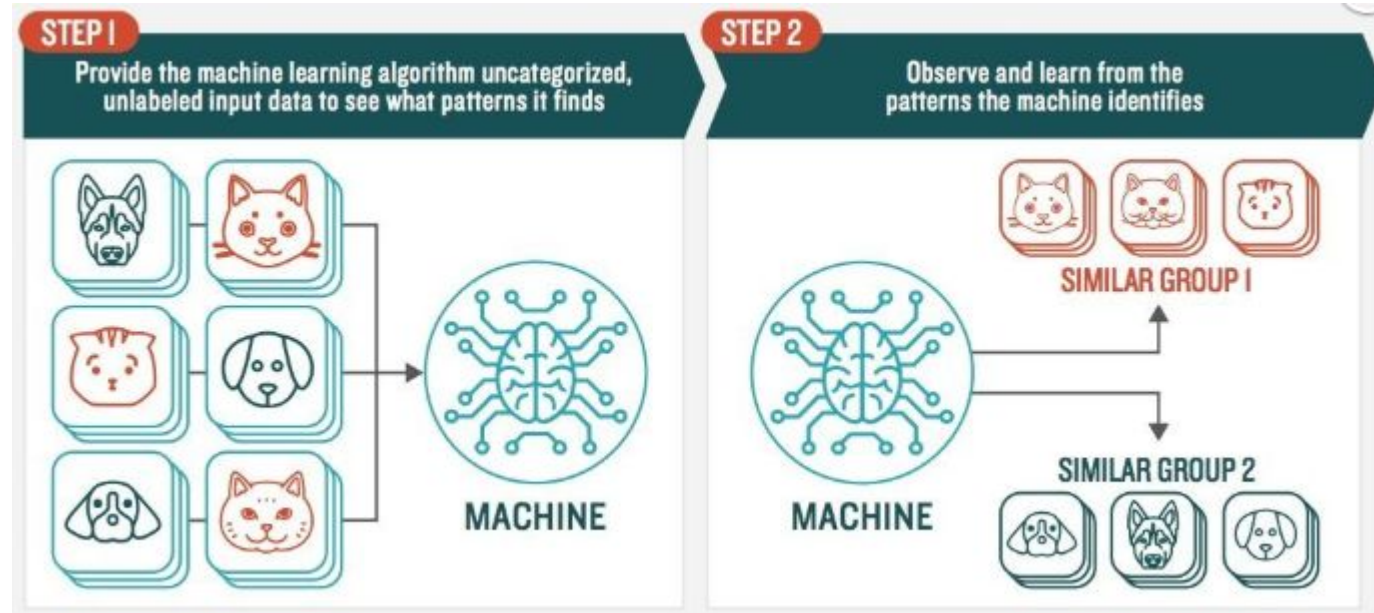


Model

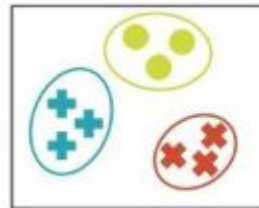


Output

# How Unsupervised Machine Learning Works



## TYPES OF PROBLEMS TO WHICH IT'S SUITED



### CLUSTERING

Identifying similarities in groups

*For Example: Are there patterns in the data to indicate certain patients will respond better to this treatment than others?*

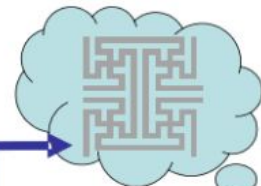




#3

Reinforcement  
Learning

internal state



learning rate  $\alpha$   
inverse temperature  $\beta$   
discount rate  $\gamma$



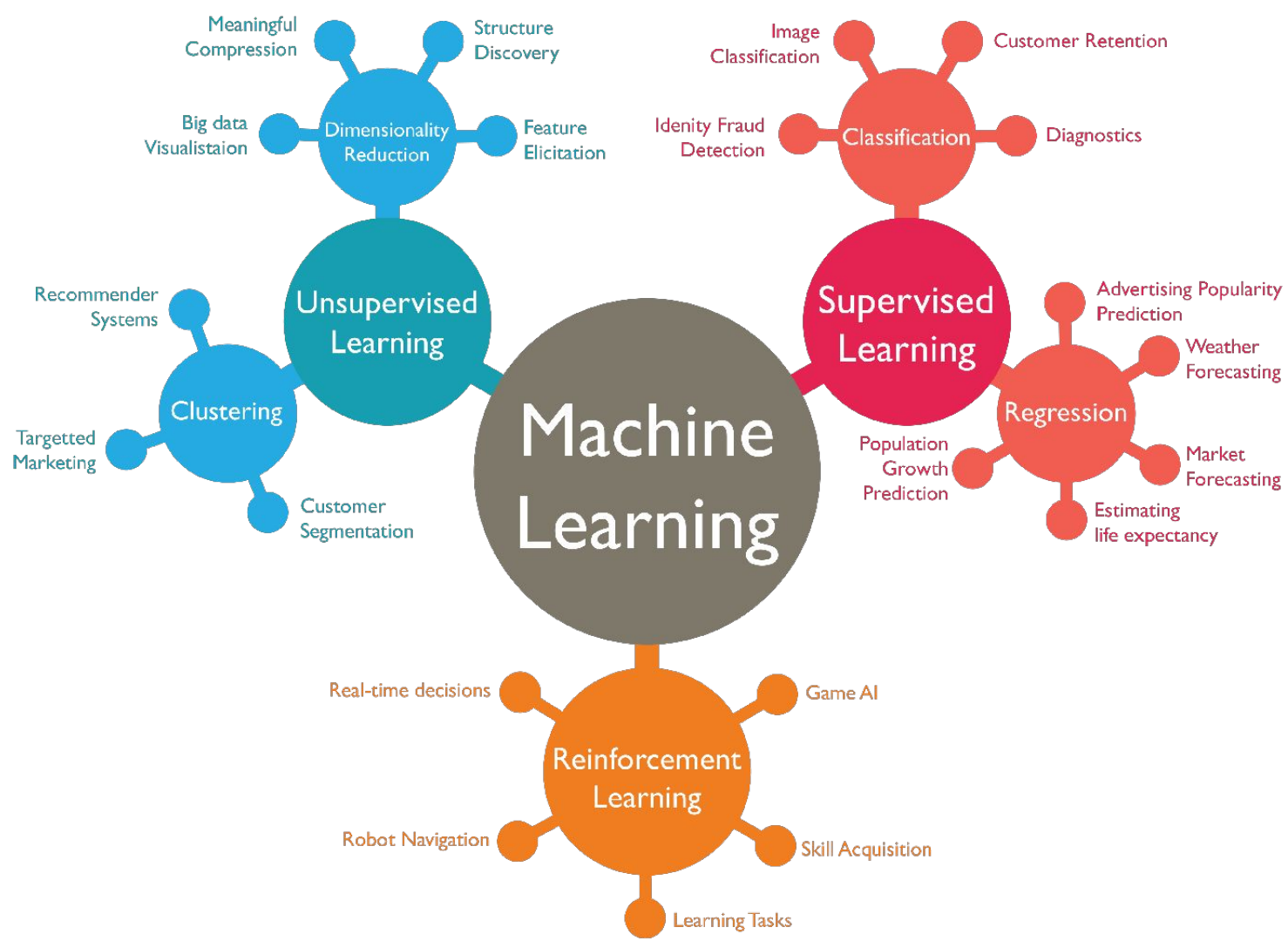
reward

environment



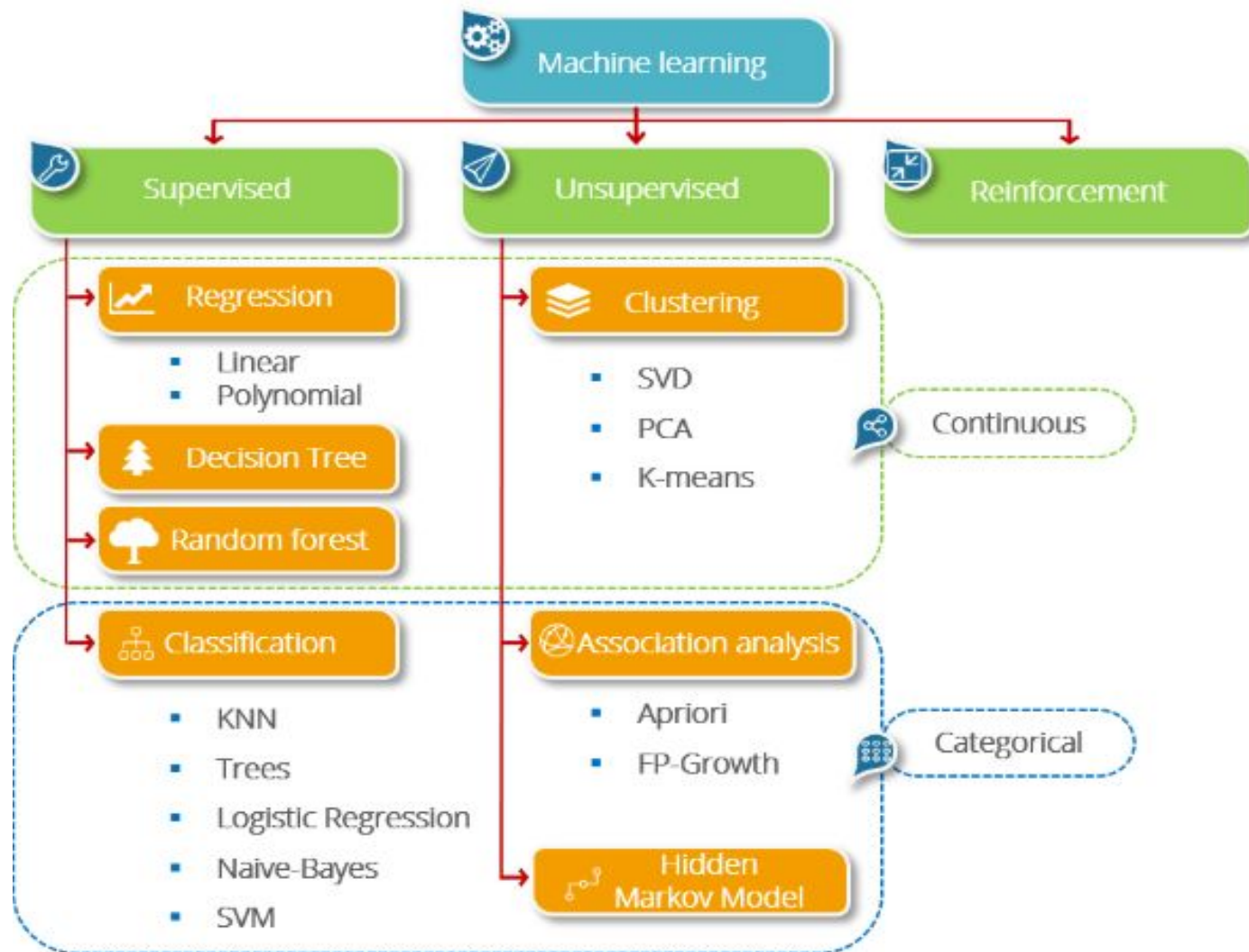
action





# Algorithms

In Machine Learning



# Classification

- Logistic Regression
- K Nearest Neighbours
- Trees (Random Forest)
- Naive Bayes
- SVM





#1  
Supervised  
learning



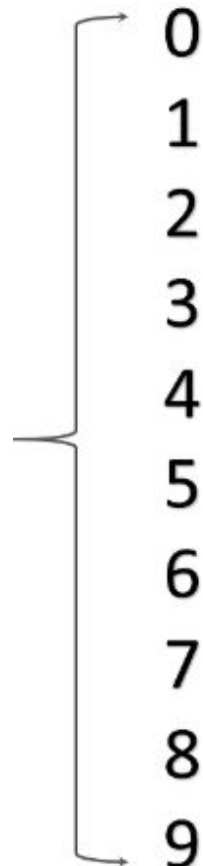


Happy



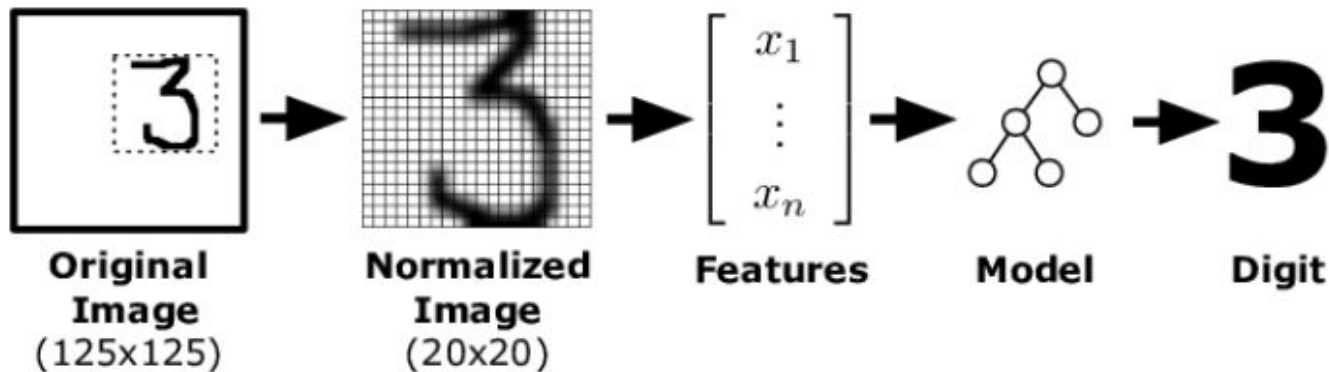
Sad

# MNIST Handwritten Digits



# Digit Classification

- Collect Images or Data
- Extract features from the images
- Apply statistical machine learning algorithms
- Evaluate the effectiveness of their system



# Regression

- Simple Linear Regression
- Polynomial Regression





#1

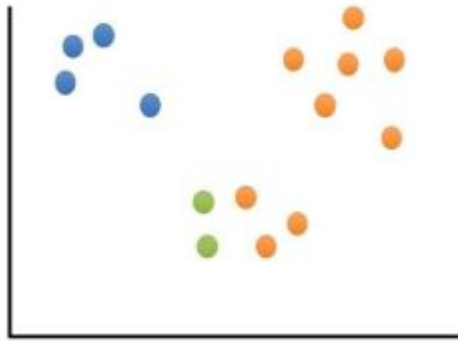
Supervised  
learning

# House Price Prediction



# Clustering

- K - means algorithm
- Gaussian distributions



## Social Network Analysis



#2

Unsupervised  
learning

# Netflix Movie Recommendation



netflix top 100 movies



All

News

Images

Videos

Shopping

More

Settings

Tools

Movies > Netflix



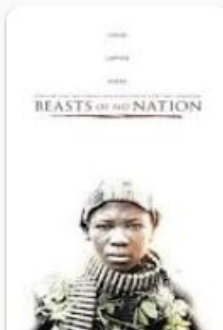
The Irishman  
2019



Roma  
2018



Marriage Story  
2019



Beasts of No  
Nation  
2015



Mudbound  
2017



The Ballad of  
Buster Scruggs  
2018

100 Best Movies on Netflix Right Now (January 2020) - Vulture

[https://www.vulture.com > article > best-movies-on-netflix-right-now](https://www.vulture.com/article/best-movies-on-netflix-right-now)

Dec 2, 2019 - The **best movies** on **Netflix** include Pulp Fiction, Raging Bull, Black Panther, Roma, The Irishman, and many more. We list the **100 best films** on ...

**Features / Independent  
Variables**

Gender	Head Size
male	4112
female	3690
female	4557
male	3986
female	3299
male	4723

**Target / Dependent  
Variables**

Brain Weight
1590
1366
1588
1411
1237
1569