What is Machine Learning?

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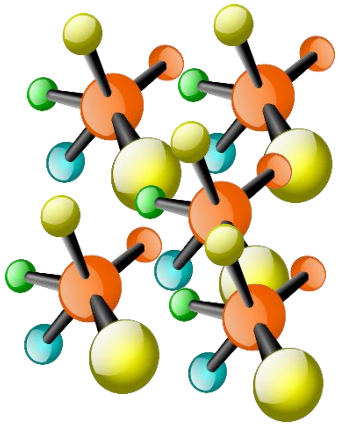
- **Machine learning** is the subfield of computer science that gives computers the ability to learn without being explicitly programmed.
  – Arthur Samuel, 1959

- Extraction of knowledge from data

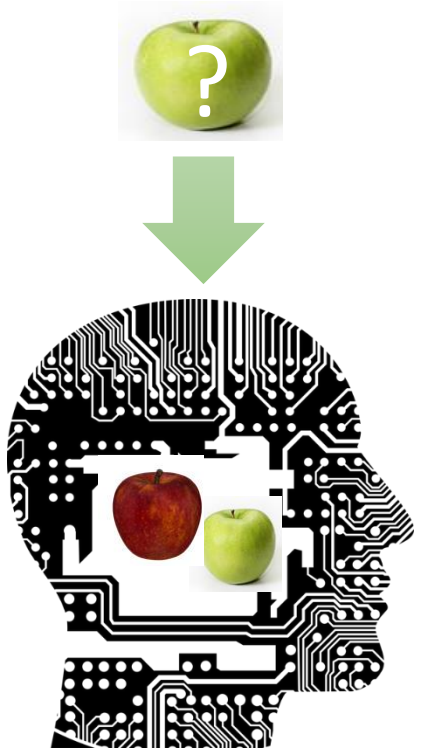
- Learns from past behaviour and make predictions or decisions

How Machines Learn?

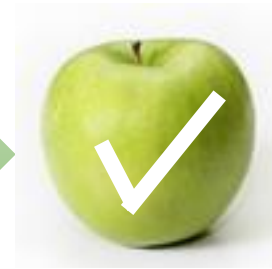
Historic Data



Learning Algorithms



Intelligent Model



Green Apple

Supervised, Unsupervised and Reinforcement Learning

Supervised Machine Learning

- Data is labelled
- There is an Input variable “X” or set of input variables and an output variable “Y”

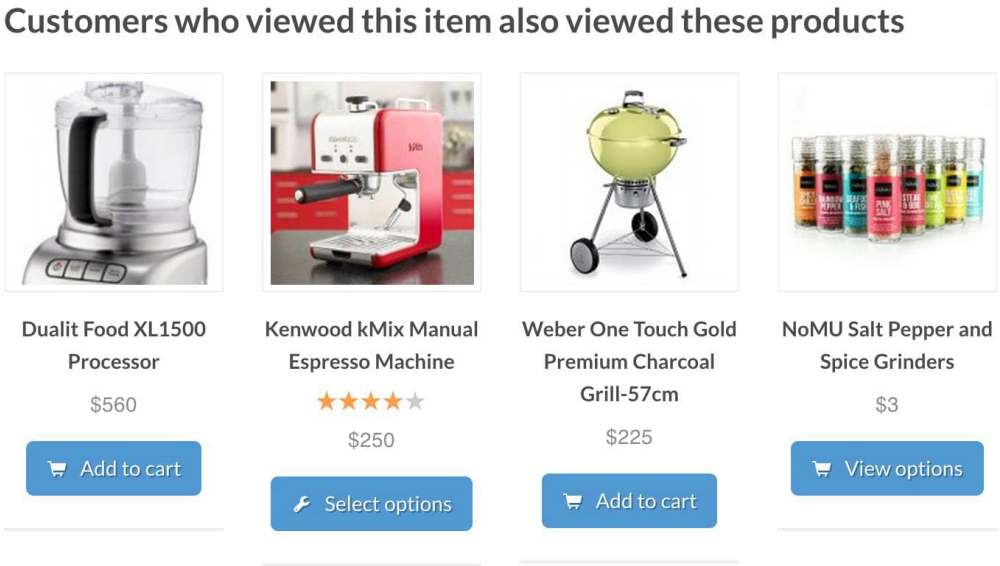
$$Y = f(X)$$

- The function is approximated to predict new values of Y given X
- Examples
  - **Regression** – Output variable is a real value such as Amount, Height, Weight etc
  - **Classification** – Output variable is a category, such as Yes, No, Red, Blue, Yellow etc

Loan_ID	Gender	Married	Dependents	Self_Employed	Income	LoanAmt	Term	CreditHistory	Property_Area	Status
LP001002	Male	No	0	No	$5,849.00		60	1	Urban	Y
LP001003	Male	Yes	1	No	$4,583.00	$128.00	120	1	Rural	N
LP001005	Male	Yes	0	Yes	$3,000.00	$66.00	60	1	Urban	Y
LP001006	Male	Yes	2	No	$2,583.00	$120.00	60	1	Urban	Y

Unsupervised Machine Learning

- Only X or input variable is known
- The goal for unsupervised learning is to model the underlying structure or distribution in the data in order to learn more about the data.
- There is no correct answers and there is no teacher.
- Algorithms are left on their own to discover and present the interesting structure in the data.
- Examples
  - Clustering – Customer behaviour grouping
  - Association – Recommendation model



Reinforcement Learning

- Reinforcement learning rewards good behaviour and penalizes bad ones

- The idea is to maximise the gain or reward