SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

23AMB201 - MACHINE LEARNING

II YEAR IV SEM

UNIT I – INTRODUCTION

TOPIC 1 – Machine Learning–Types of Machine Learning

Look Into

DATA

PREDICTIONS

KNOWLEDGE

Brainstorming

1

RAVI

100

1

S.NO	SNAME	TOTAL	RANK
1	RAVI	100	1
2	ARUN	90	2
3	RAM	85	3

FIND WHO GOT 2 RANK?

ARUN

NEW ADMISSION: RAJ

DEPENDS PREVIOUS PERFORMANCE TO PREDICT THE RANK

Find out the difference…

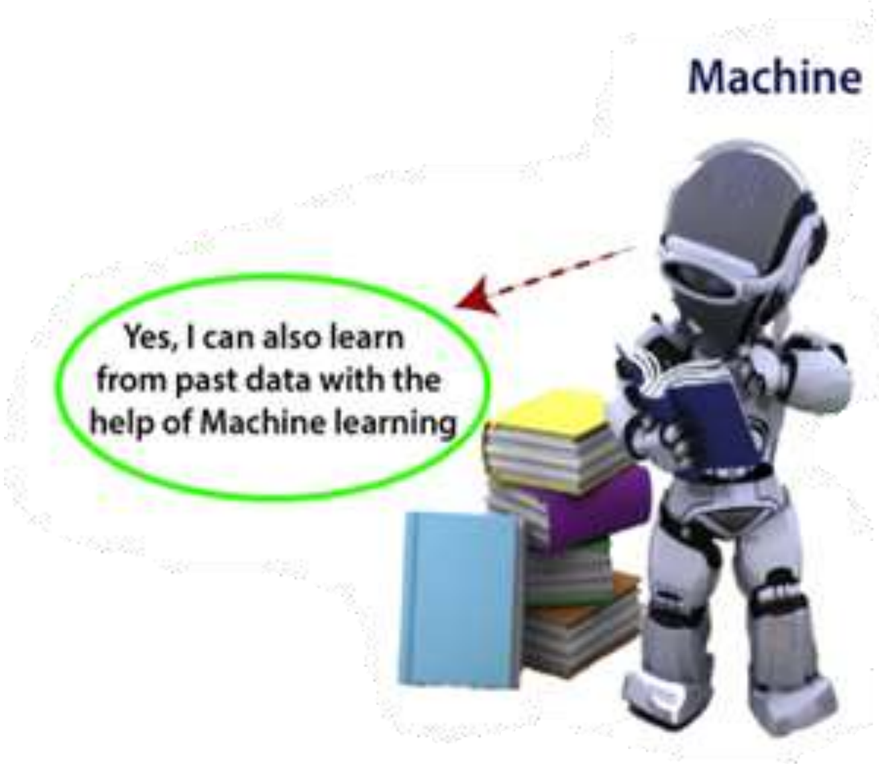
Learning Vs Reading

Learning

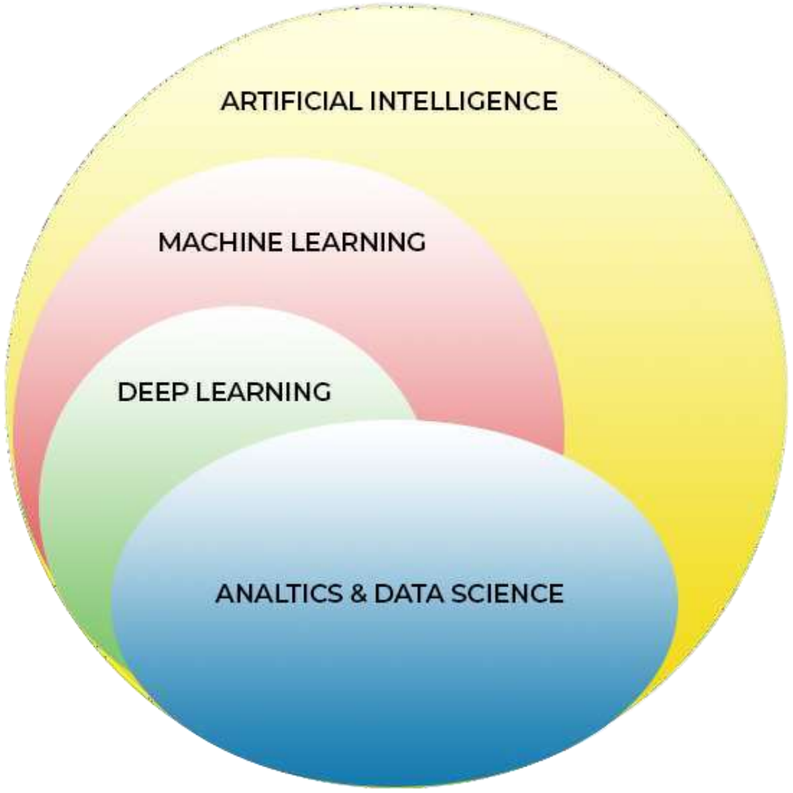
Gain Knowledge from Experience…

Reading

Human Vs Machine



Machine Learning



Aspect	Definition
Data Science	Interdisciplinary field for extracting knowledge from data.
Machine Learning (ML)	Subset of AI that enables systems to learn from data.
Artificial Intelligence (AI)	Broad concept of creating intelligent machines.
Deep Learning	Specialised ML using deep neural networks to analyse complex data.
Big Data	Extremely large datasets require specialised processing and analysis tools.

Name	Class	Phone No
A	AIML	12345
B	MCA	Female
12	MBA	14567

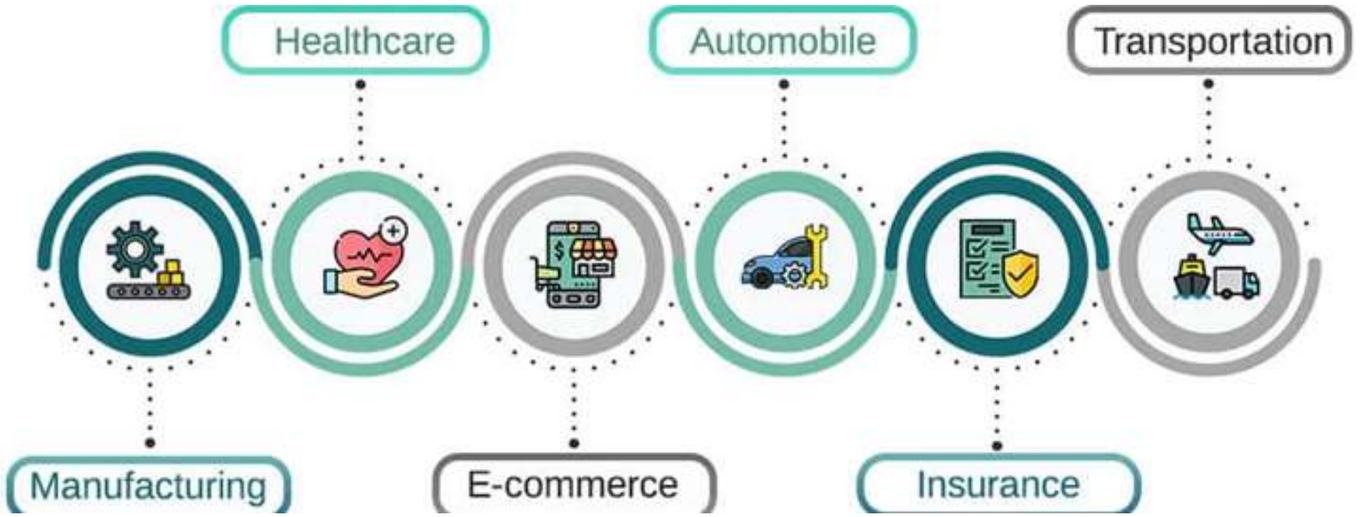
Noise

Definition & Applications of Machine Learning

Machine learning is a subfield of artificial intelligence that

1. Uses algorithms trained on data sets to create models that enable machines to perform tasks

2. Broadly defined as the capability of a machine to imitate intelligent human behavior.



Real case-Examples

Social networks

Web search

E-commerce

Information

Extraction

Computational biology

Space exploration

Finance

Debugging software

Robotics

Why Learning?

"Learning is any process by which a system improves performance from experience."

- Herbert Simon

Why do we need to care about machine learning?

A breakthrough in machine learning would be worth ten Microsoft.

— Bill Gates, Former Chairman, Microsoft

Machine Learning-Introduction

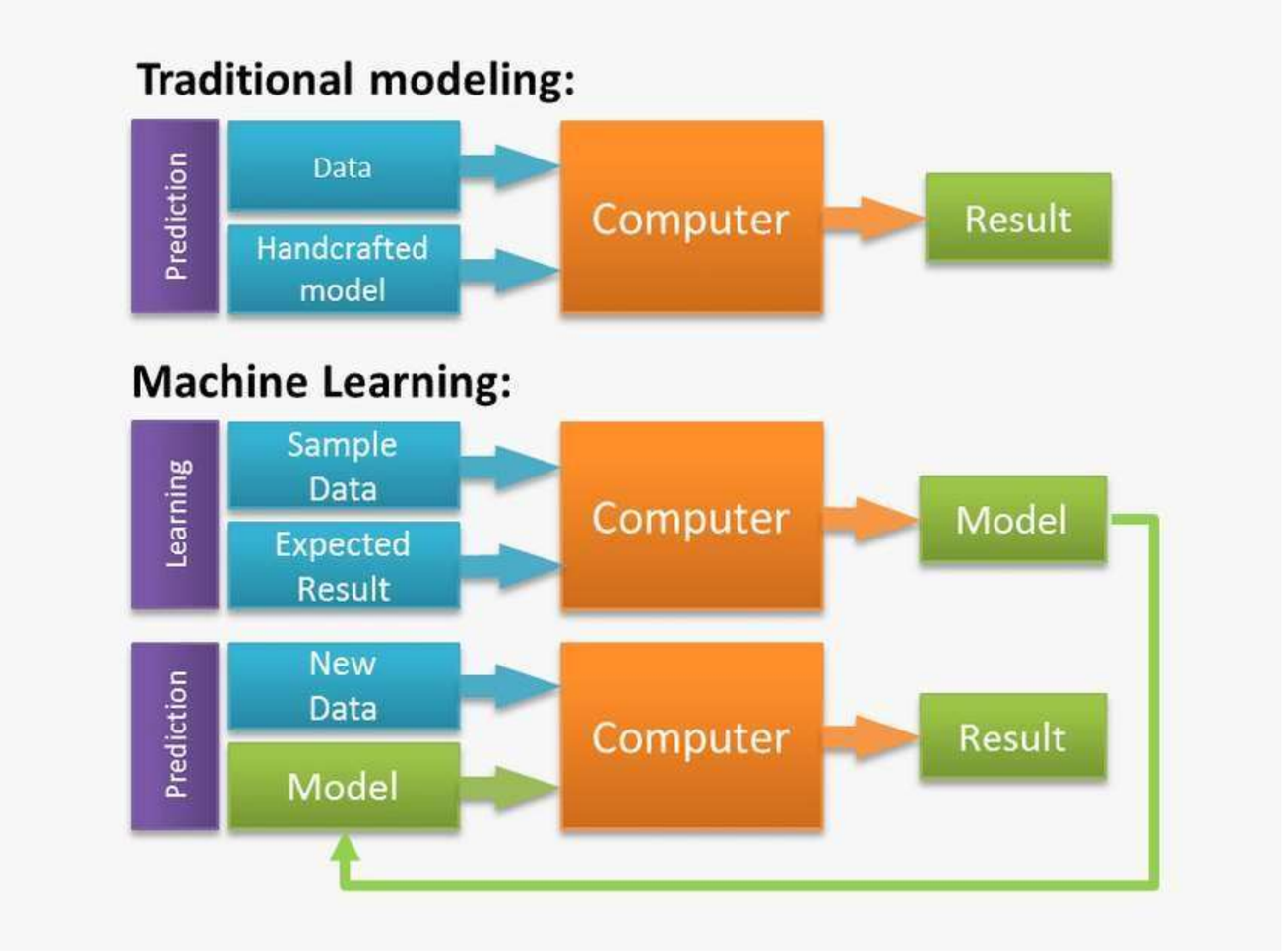
Definition by Tom Mitchell (1998):

Machine Learning is the study of algorithms that

- improve their performance *P*
- at some task *T*
- with experience *E*.

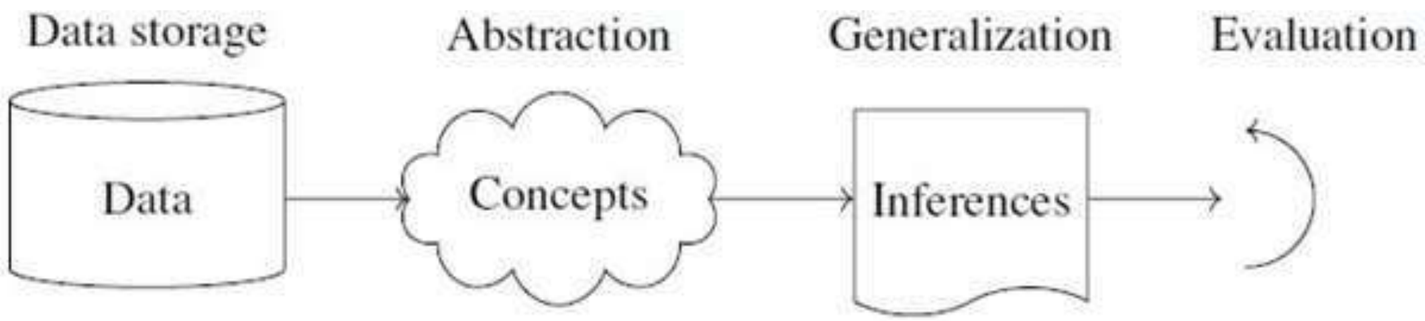
A well-defined learning task is given by <*P*, *T*, *E*>.

Difference between Traditional Programming and Machine Learning



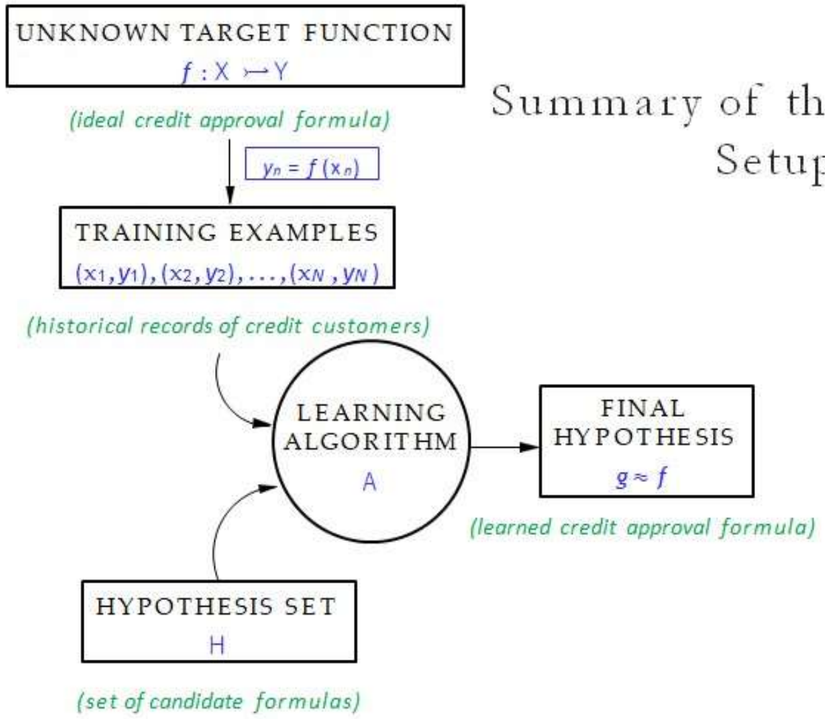
Key Elements of Machine Learning: Three components

1. **Representation**: how to represent knowledge.
    1. Examples decision trees, sets of rules, instances, graphical models, neural networks, support vector machines, model ensembles and others.
2. **Evaluation**: the way to evaluate candidate programs (hypotheses).
    1. Examples accuracy, prediction and recall, squared error, likelihood.
3. **Optimization**: the way candidate programs are generated known as the search process.



Machine Learning in Practice

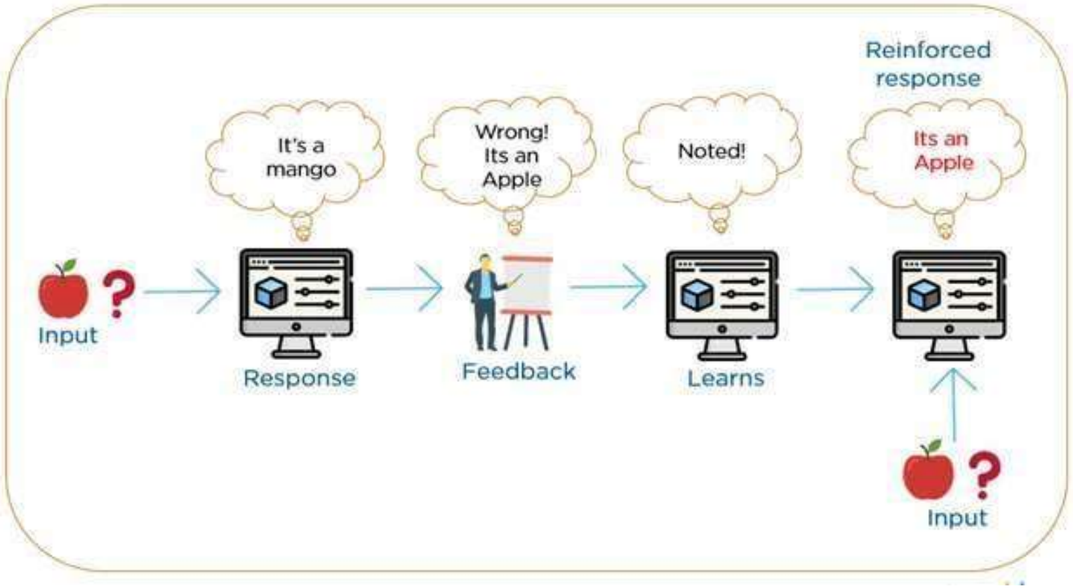
1. Start Loop
    1. **Understand the domain, prior knowledge and goals**.
    2. **Data integration, selection, cleaning and pre-processing**
    3. **Learning models**.
    4. **Interpreting results**.
    5. **Consolidating and deploying discovered knowledge**.
2. End Loop

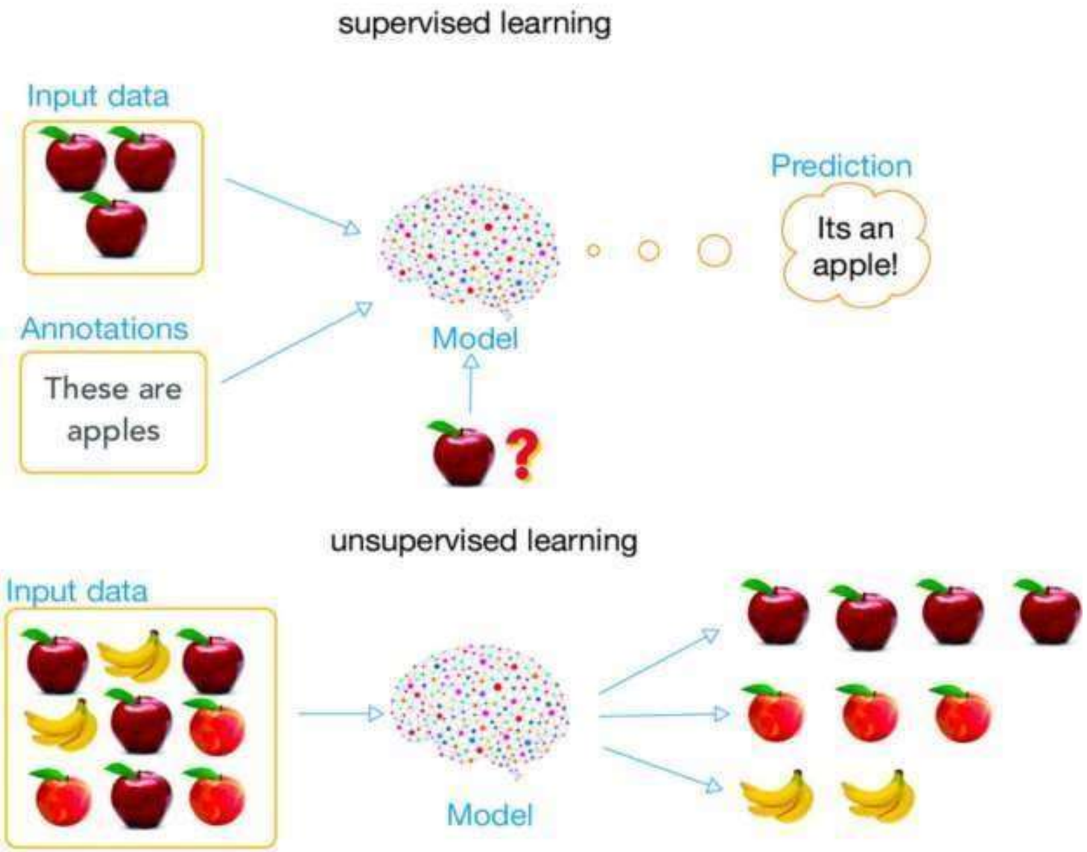


Summary of the Learning Setup

Types of Learning

1. Supervised Learning
2. Unsupervised Learning
3. Reinforcement Learning





1. Learn by examples
2. Learn by observation
3. Learn by mistakes

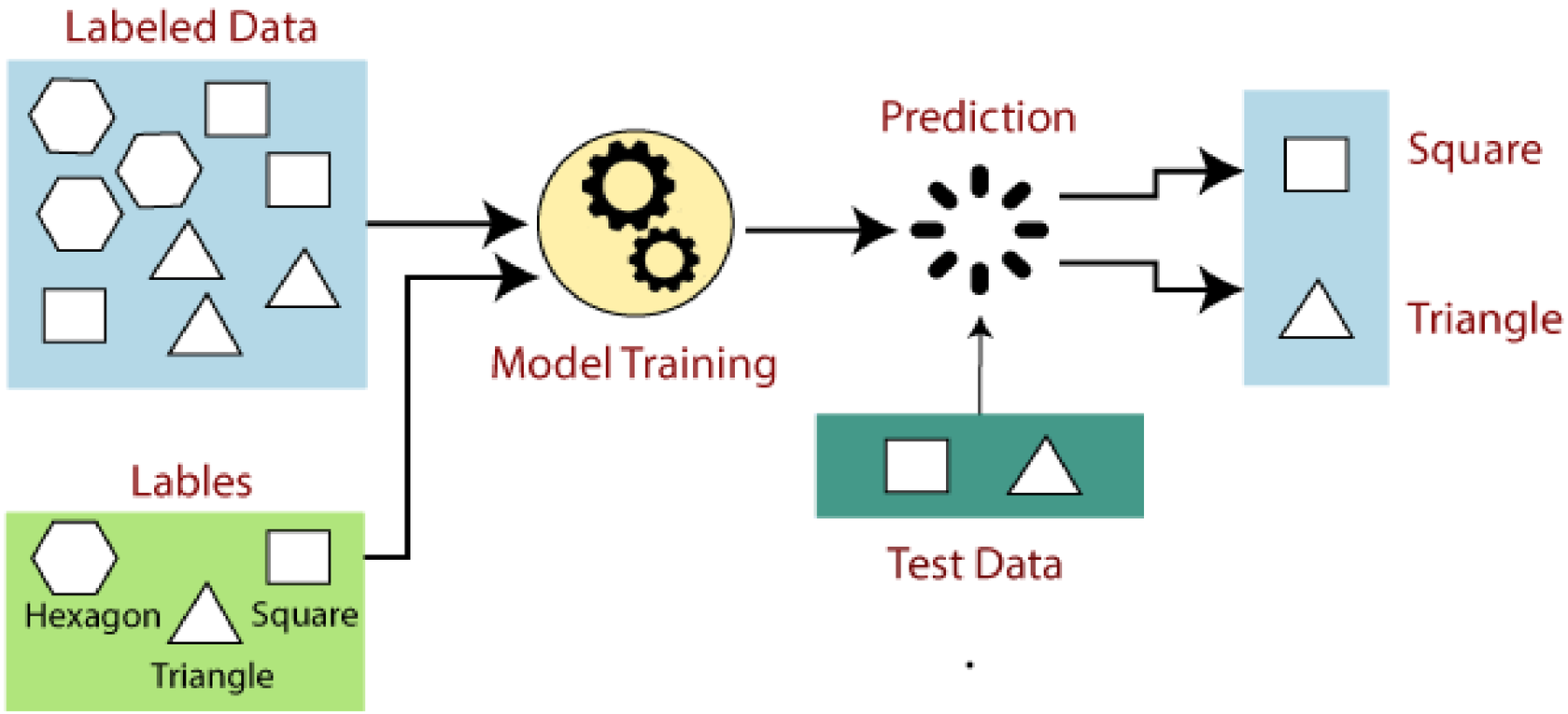
Supervised Learning

1. Machines are trained using well "labelled" training data
2. Based on training data, machines predict the output.
3. Labelled data: Input data already tagged with correct output
4. Definition: Supervised learning is a process of providing input data as well as correct output data to the machine learning model.

Real Use Case

1. **Risk Assessment**
2. **Image classification**
3. **Fraud Detection**
4. **Spam filtering**, etc

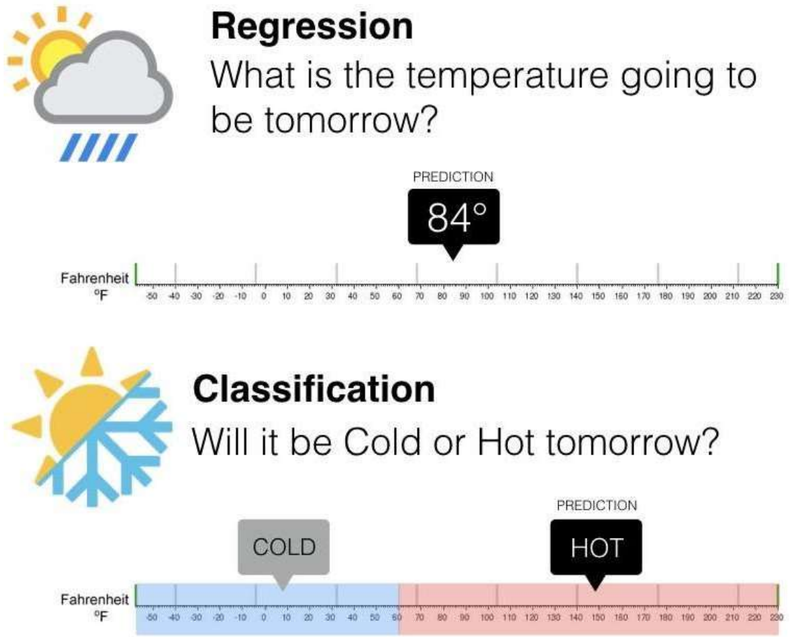
How Supervised Learning Works?

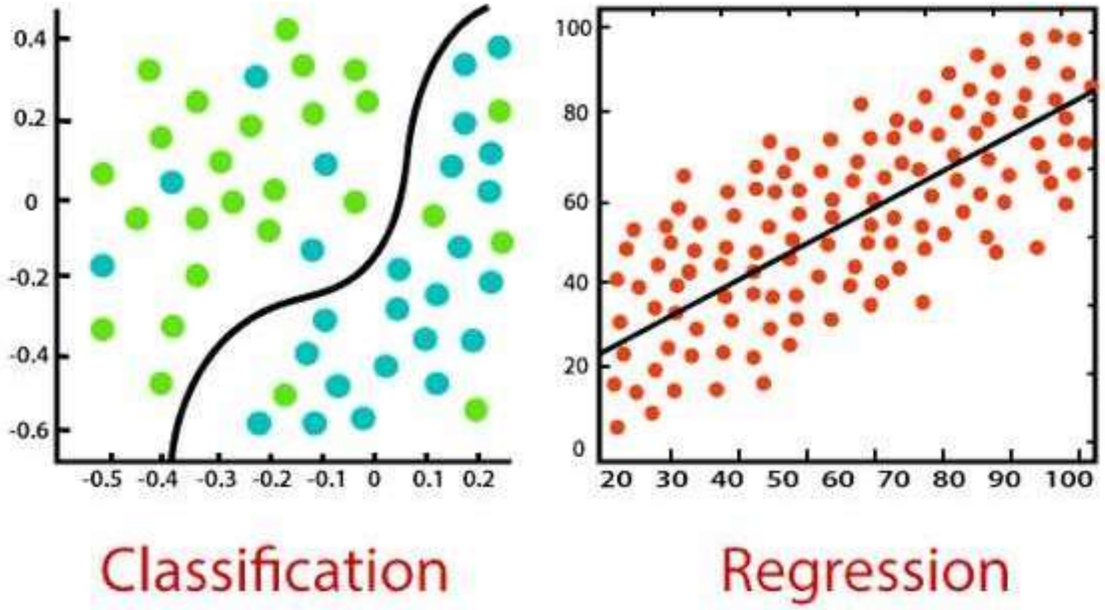


Types of Supervised Learning

1. Classification: Used to **predict/Classify the discrete values** such as Male or Female, True or False, Spam or Not Spam,

2. Regression: Used to **predict the continuous** values such as price, salary, age, etc

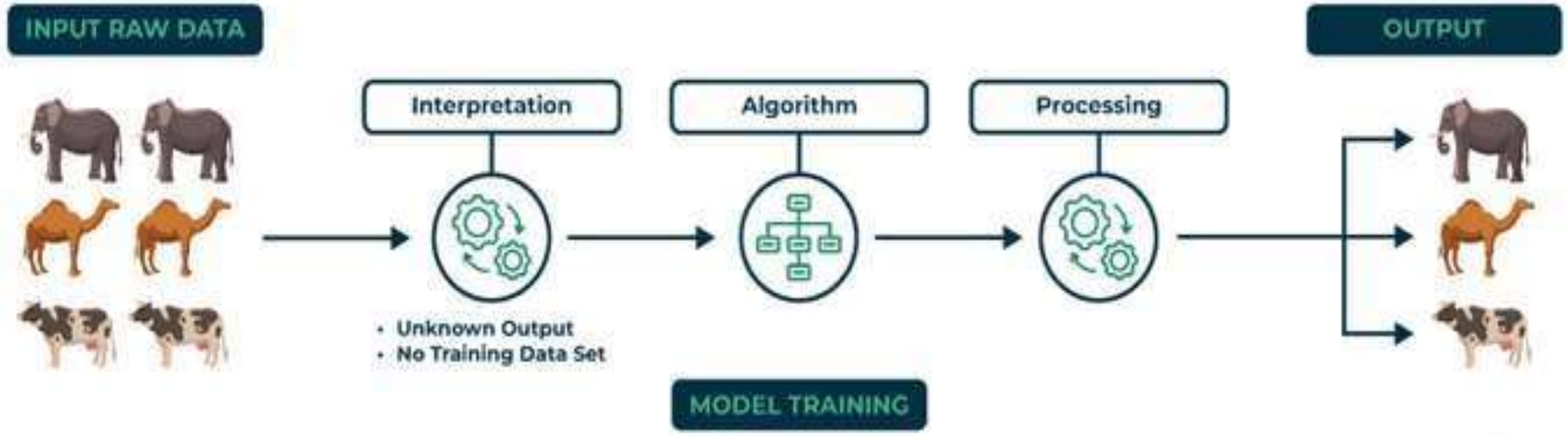




Unsupervised Learning

1. The training data will be unlabelled for Unsupervised Machine Learning Algorithms.
2. The clustering of data into a specific group will be done on the basis of the similarities between the variables.

1. Clustering
2. Association Problems

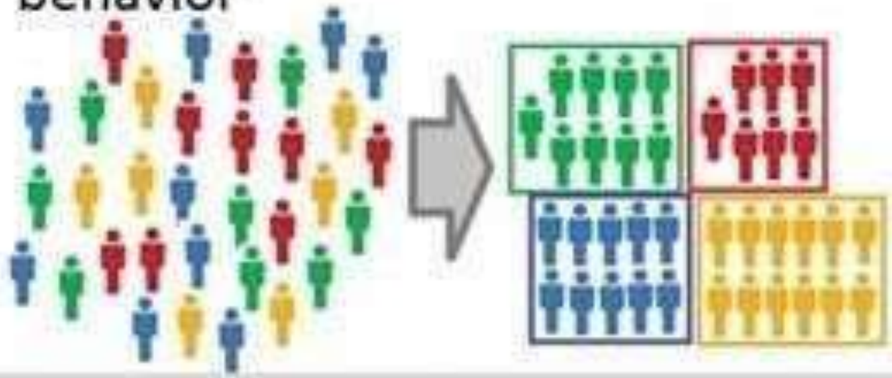


Clustering Vs Association Rule Mining

Unsupervised Learning

Clustering

Grouping customers by purchasing behavior



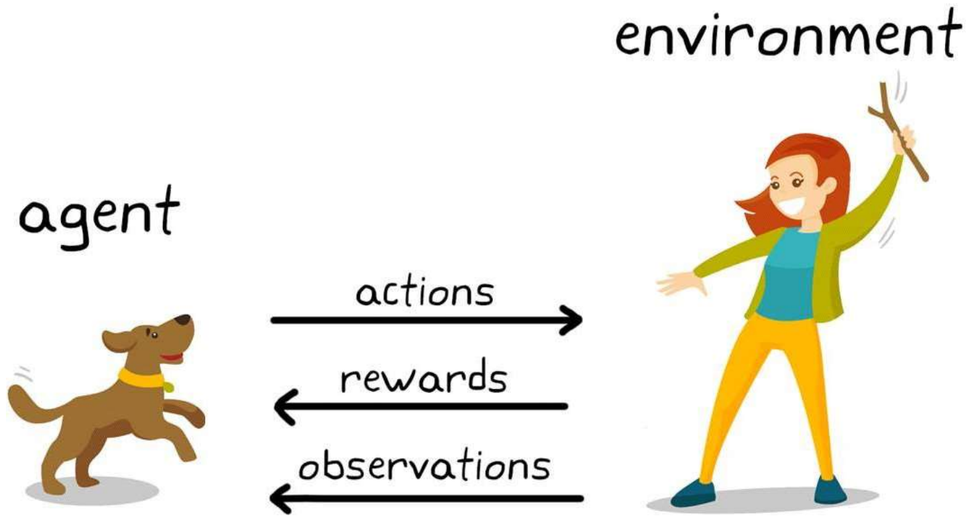
Association

People that buy X tend to buy Y

People that buy A+B tend to buy C

Reinforcement Learning

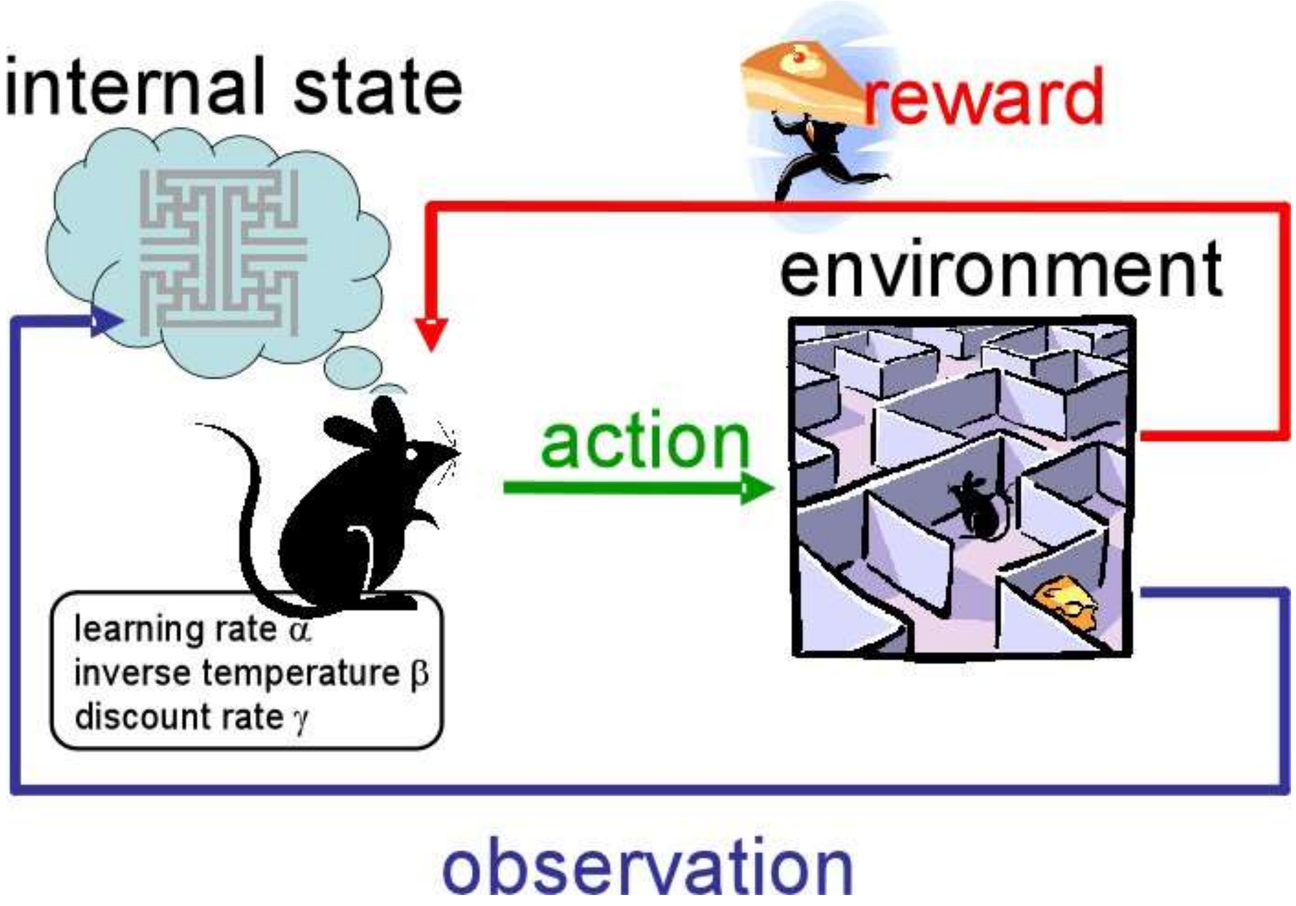
1. Trains a machine to take suitable actions and maximize its rewards in a particular situation.
2. It uses an agent and an environment to produce actions and rewards.



Applications

1. Gaming industry
2. Robotics

Reinforcement Learning – How it works?



References

1. Sebastian Raschka , Yuxi (Hayden) Liu Machine Learning with PyTorch and Scikit-Learn: Developmachine learning and deep learning models with Python Packt Publishing Limited (23 December 2022).

2. Aurélien Géron "Hands-On Machine Learning with Scikit-Learn and TensorFlow" Publisher(s): O'Reilly Media, Inc 2017