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Kurumbapalayam(Po), Coimbatore – 641 107
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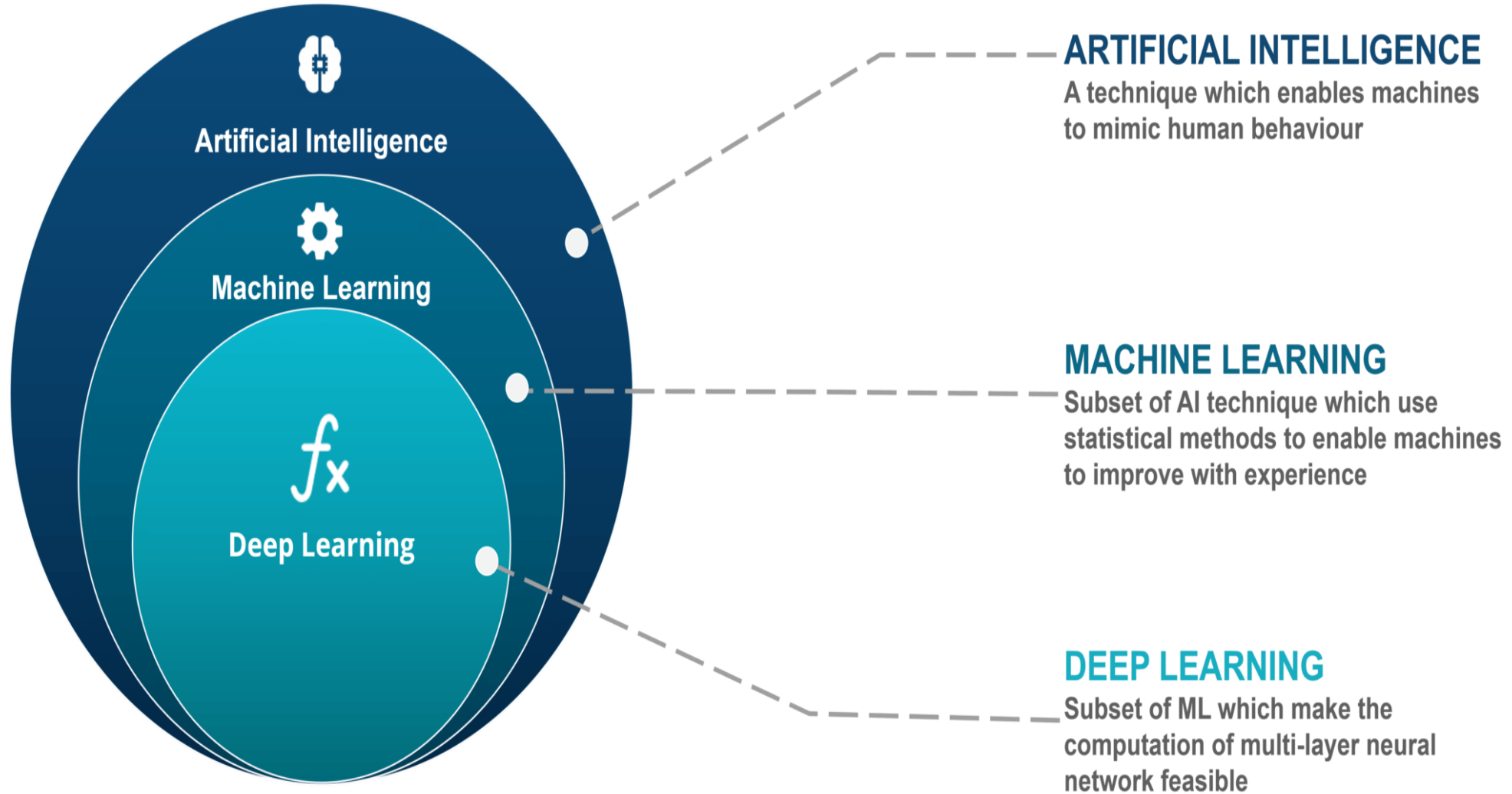
Approved by AICTE, Recognized by UGC & Affiliated to Anna University, Chennai

Mrs. N.Padmashri/Assistant Professor
DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATASCIENCE





An Overview of ML



Human

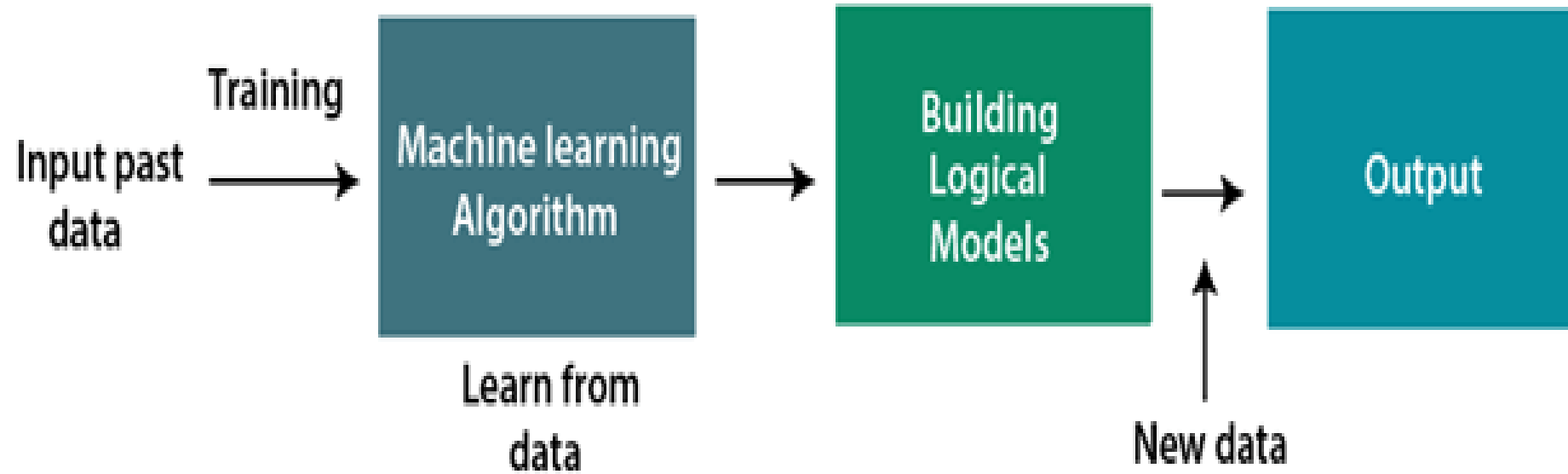


I can learn everything automatically from experiences.
Can u learn?

Machine



Yes, I can also learn from past data with the help of Machine learning



Scenario 1: Playing chess with computer



Scenario 2: Smart Air Conditioner



Smart Saving
Saves up to 63% on your electricity bill



Smart Remote
Turns your mobile into a remote for convenient access



Smart Sense
Senses ambient temperature & suggests the best mode

VOLTAS all weather™
smart AC 



Scenario 3: Self Driving Car



Scenario 4: Smart Devices

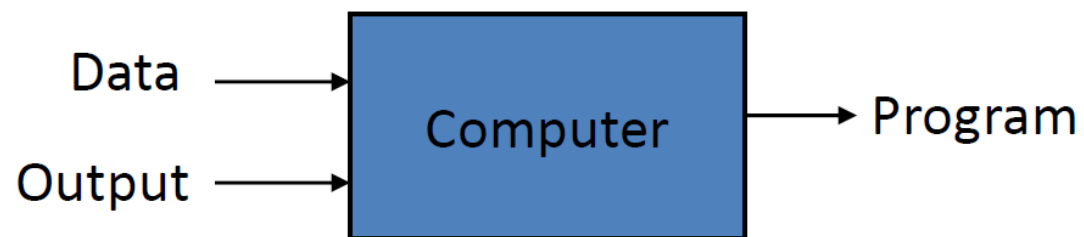
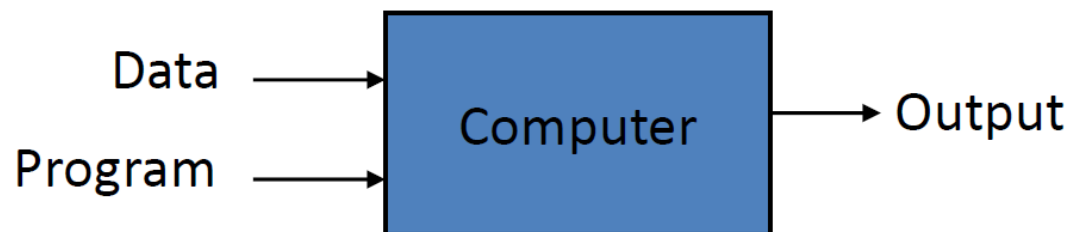


Scenario 5: Robot





Traditional Programming





Definitions Of Machine Learning

Learning happens with experience....



- **Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed.**
- **Machine learning focuses on the development of computer programs that can access data and use it learn for themselves.**
- **The primary aim is to allow the computers learn automatically without human intervention or assistance and adjust actions accordingly.**



Formal Definition

T. Mitchell: Well posed machine learning

A computer program is said to 'learn' from experience E with respect to some class of tasks T and performance measure P , if its performance at tasks in T , as measured by P , improves with experience E .



Example 1: A Chess Learning Problem

Task T : playing chess

Performance Measure P : percent of games won against opponents

Training Experience E : playing practice games against itself



Example 2: Autonomous Vehicle Problem

- Task T** : driving on a public highway/roads using vision sensors
- Performance Measure P**: percentage of time the vehicle is involved in an accident
- Training Experience E** : a sequence of images and steering commands recorded while observing a human driver



Example 3: A Handwriting Recognition Learning Problem:

Task T : recognizing and classifying handwritten words within images

Performance measure P : percent of words correctly classified

Training experience E : a database of handwritten words with given classifications

Types of Machine Learning



Task Driven
(Predict next value)



Data Driven
(Identify Clusters)



Learn from
Mistakes





Types of Machine Learning

Data
Flair

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Supervised Learning

Classification

- Fraud detection
- Email Spam Detection
- Diagnostics
- Image Classification

Regression

- Risk Assessment
- Score Prediction

Unsupervised Learning

Dimensionality Reduction

- Text Mining
- Face Recognition
- Big Data Visualization
- Image Recognition

Clustering

- Biology
- City Planning
- Targetted Marketing

Reinforcement Learning

- Gaming
- Finance Sector
- Manufacturing
- Inventory Management
- Robot Navigation



Supervised Learning

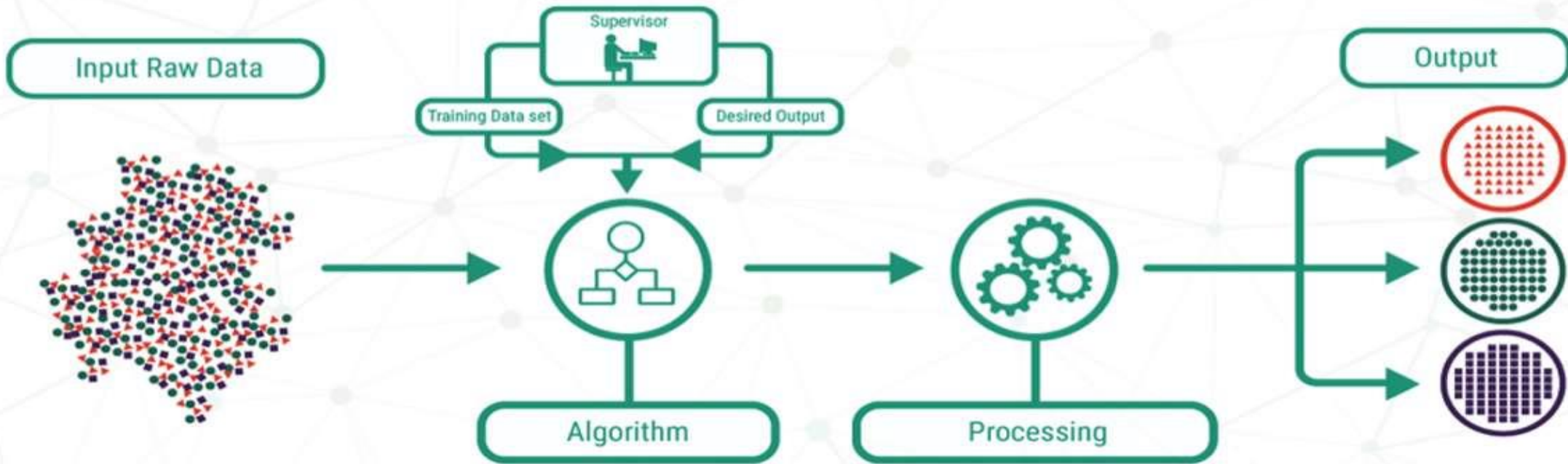
- **Most popular paradigm for machine learning.**
- **Easiest to understand and the simplest to implement.**
- **Example : Teaching a child with the use of flash cards**

- **In Supervised Learning, the dataset on which we train our model is labeled. There is a clear and distinct mapping of input and output. Based on the example inputs, the model is able to get trained in the instances**

- **Task-oriented as highly focused on a singular task.**

- **Feeding more and more examples to the algorithm until it can accurately perform on that task.**

Supervised Learning





TYPES OF SUPERVISED LEARNING

- Supervised learning can be grouped further in to two categories of algorithms:
 - Classification
 - Regression
- The main goal of the supervised learning technique is to map the input variable(x) with the output variable(y).
- Classification
 - Classification algorithms are used to solve the classification problems in which the output variable is categorical, such as "Yes" or No, Male or Female, Red or Blue, etc.



Classification algorithms

➤ The classification algorithms predict the categories present in the dataset. Some real-world examples of classification algorithms are Spam Detection, Email filtering, etc.

Some popular classification algorithms are given below:

- Random Forest Algorithm
- Decision Tree Algorithm
- Logistic Regression Algorithm
- Support Vector Machine Algorithm



Regression algorithms

- Regression
 - Regression algorithms are used to solve regression problems in which there is a linear relationship between input and output variables.
 - These are used to predict continuous output variables, such as market trends, weather prediction, etc.

Some popular Regression algorithms are given below:

- Simple Linear Regression Algorithm
- Multivariate Regression Algorithm
- Decision Tree Algorithm
- Lasso Regression

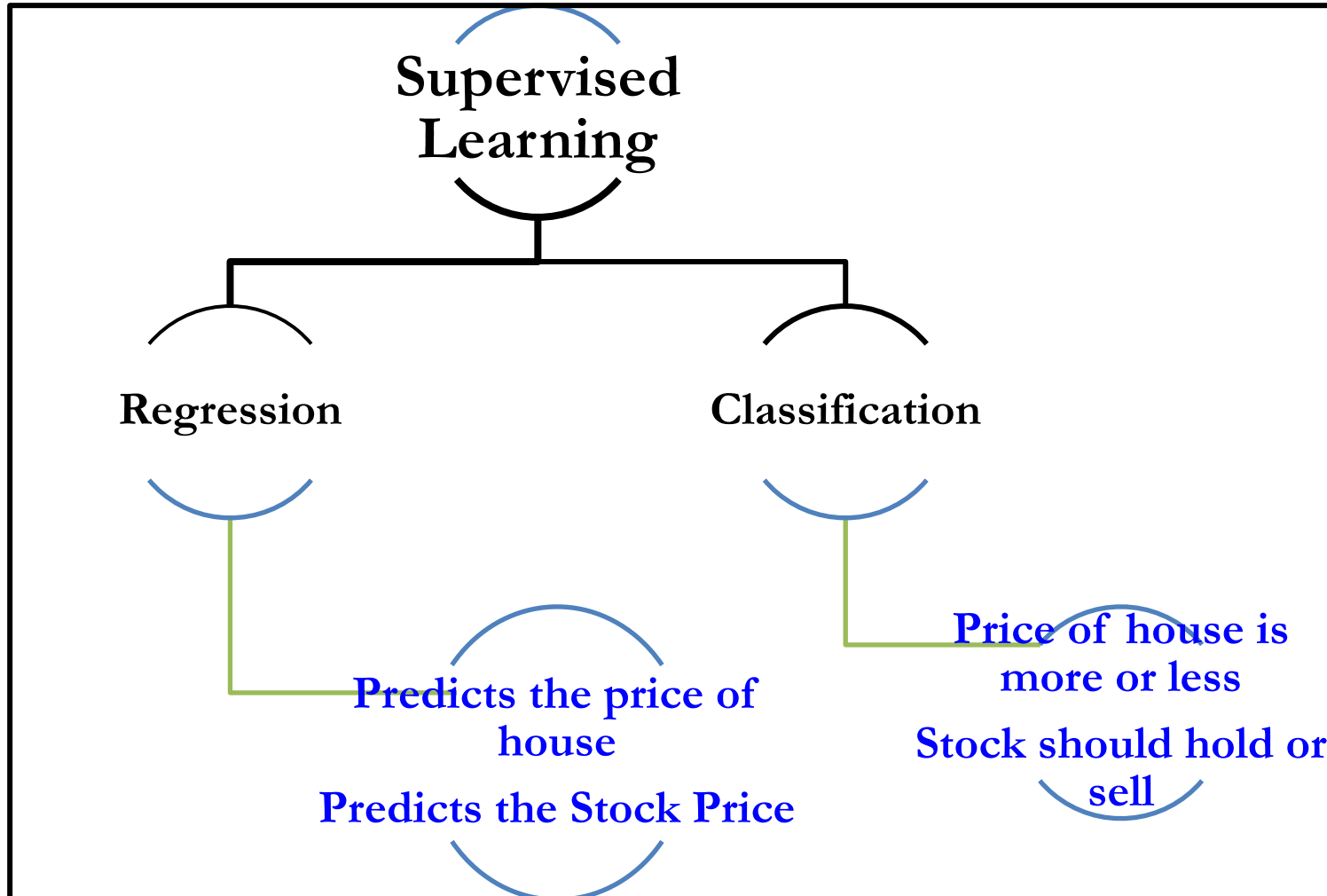


Supervised Learning Examples

- ✓ Predicting price of a stock
- ✓ Predicting performance of a sportsman
- ✓ Image Segmentation
- ✓ Medical Diagnosis
- ✓ Fraud Detection
- ✓ Spam detection
- ✓ Speech Recognition



Supervised Learning: Sub Classification



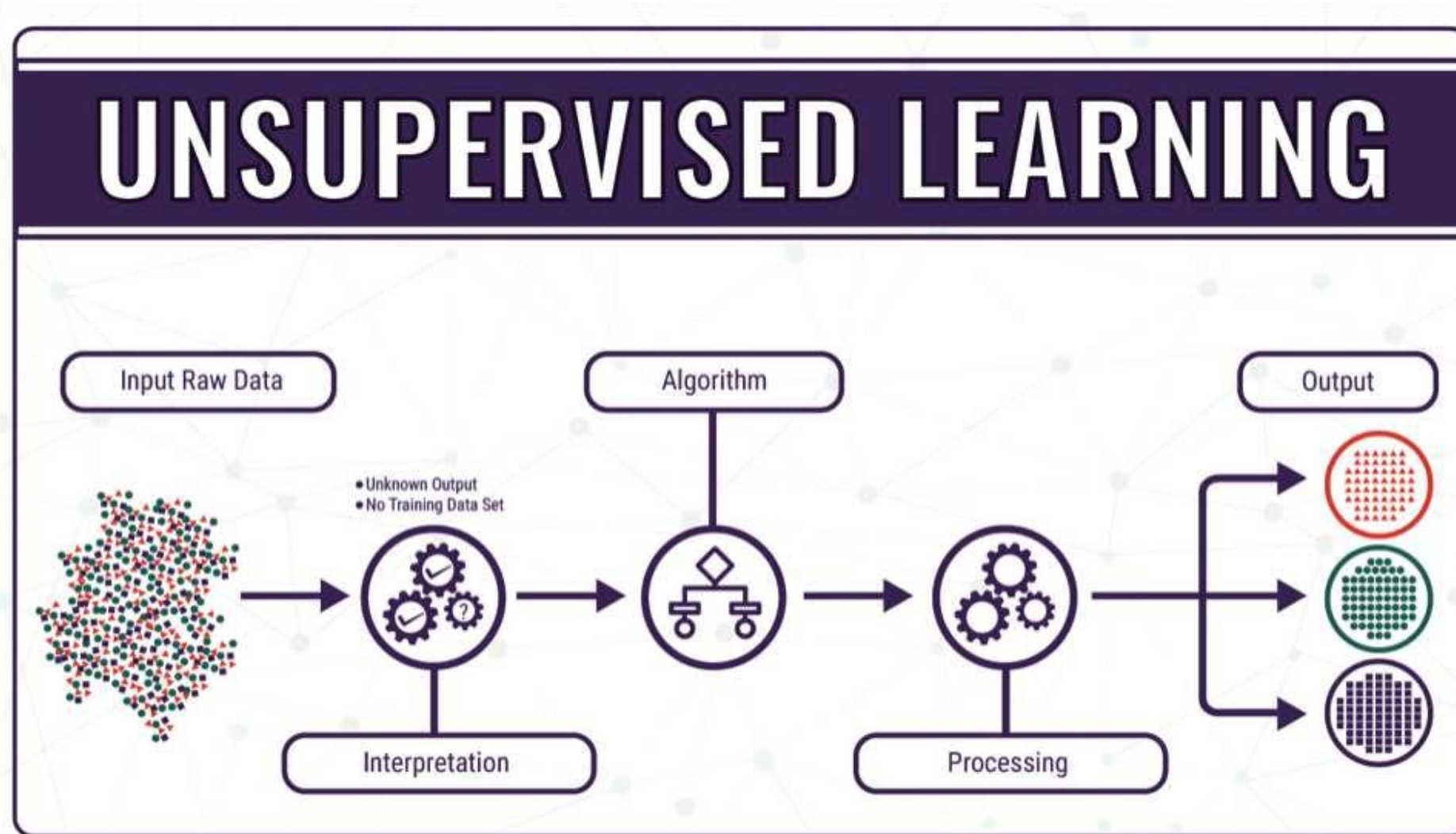


UnSupervised Learning

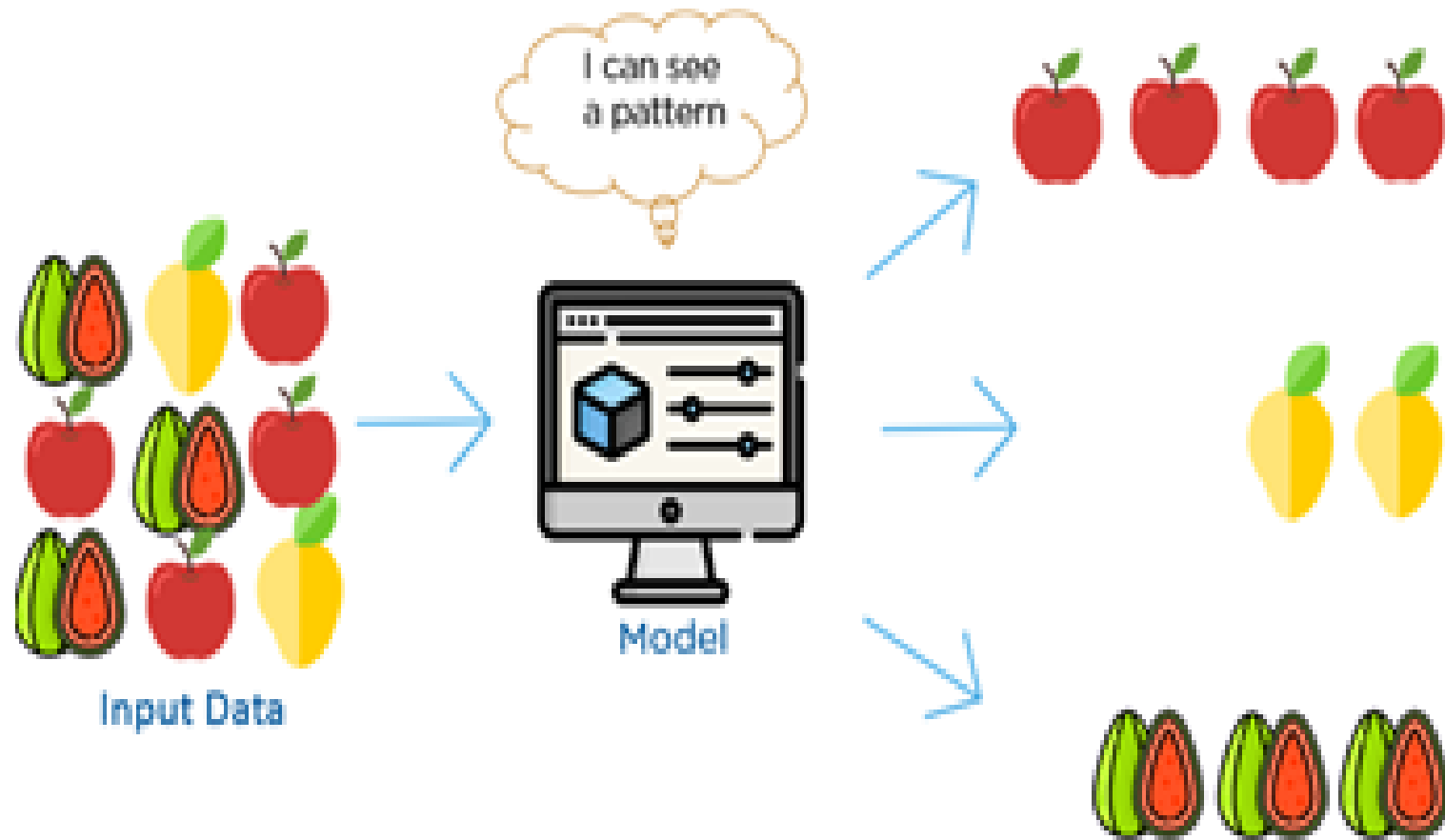



- The machine is trained using the **unlabeled dataset**, and the machine predicts the output without any supervision.
- In unsupervised learning, the models are trained with the data that is neither classified nor labelled, and the model acts on that data **without any supervision**.
- The main aim of the unsupervised learning algorithm is to group or categories the **unsorted dataset according to the similarities, patterns, and differences**.
- Machines are instructed to find the hidden patterns from the input dataset.
- So, now the machine will discover its patterns and differences, such as colour difference, shape difference, and predict the output when it is tested with the test dataset.







UNSUPERVISED LEARNING



Unsupervised Learning



Input	Current Clusters	New clusters	Parameter/ Criteria
 <small>shutterstock.com • 234344407</small>	{ }	 <small>shutterstock.com • 234344407</small>	Color=Green

Input	Current Clusters	New clusters	Parameter/ Criteria
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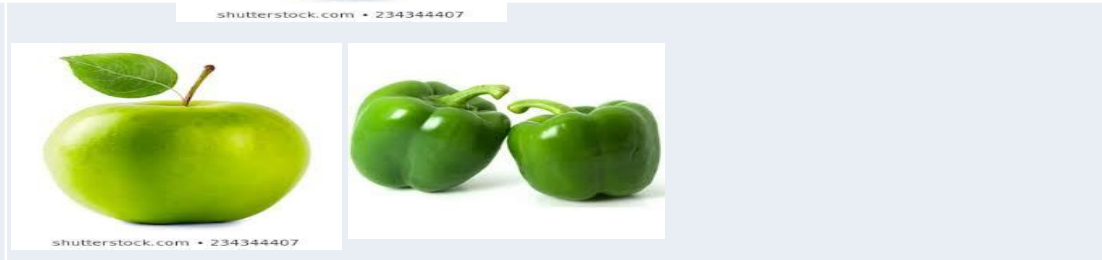
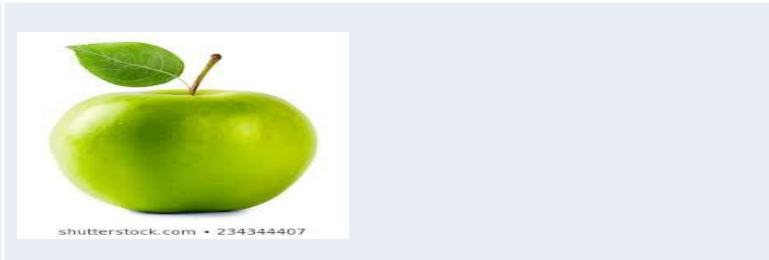
Input	Current Clusters	New clusters	Parameter/ Criteria
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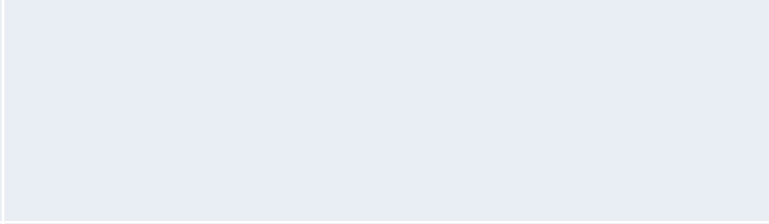
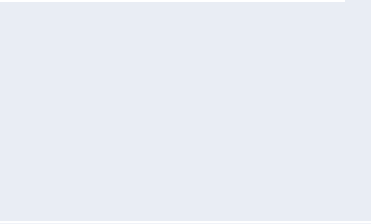
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Color



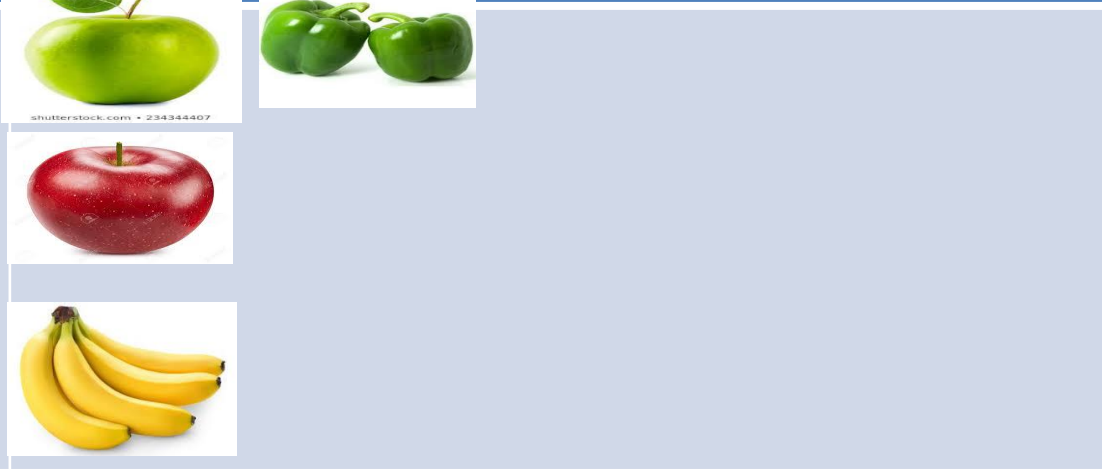
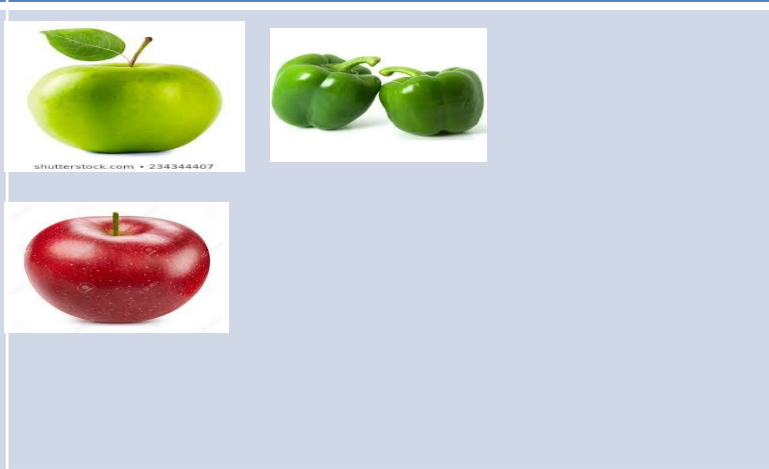
C1

color



Input	Current Clusters	New clusters	Parameter/ Criteria
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		 	<p>Color</p>
	 	<p>C1</p>   	<p>Color</p>
	  	   	

Input	Current Clusters	New clusters	Parameter/ Criteria
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Final Cluster



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Categories of Unsupervised Machine Learning

Categories of Unsupervised Machine Learning

Unsupervised Learning can be further classified into two types

- Clustering
- Association

Clustering:

- The clustering technique is used when we want to find the **inherent groups from the data.**
- It is a way to group the objects in to a cluster such that the objects with most similarities remain in one group and have fewer or no similarities with the objects of other groups.
- An example of the clustering algorithm is **grouping the customers by their purchasing behavior.**



Clustering algorithms

- K-Means Clustering algorithm
- Mean-shift algorithm
- DBSCAN Algorithm
- Principal Component Analysis
- Independent Component Analysis

Association:

- Association rule learning is an **unsupervised learning technique**, which finds interesting relations among variables within a large dataset.
- The main aim of this learning algorithm is to **find the dependency of one data item on another data item** and map those variables accordingly so that it can generate maximum profit.
- This algorithm is mainly applied in Market Basket analysis, Web usage mining, continuous production, etc.

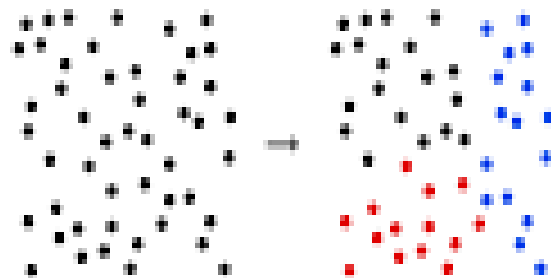


Association algorithms

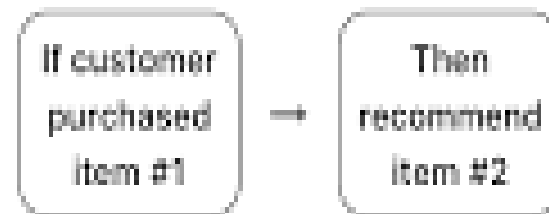
- Apriori Algorithm,
- Eclat,
- FP-growth algorithm.

UNSUPERVISED LEARNING

Clustering



Association





Unsupervised Learning: Applications



- ✓ Buying Habit
- ✓ Grouping user logs
- ✓ Network Analysis
- ✓ Recommendation Systems
- ✓ Anomaly Detection
- ✓ Singular Value Decomposition