

MACHINE LEARNING ALGORITHMS

01

Supervised Learning

02

Unsupervised Learning

03

Semisupervised Learning

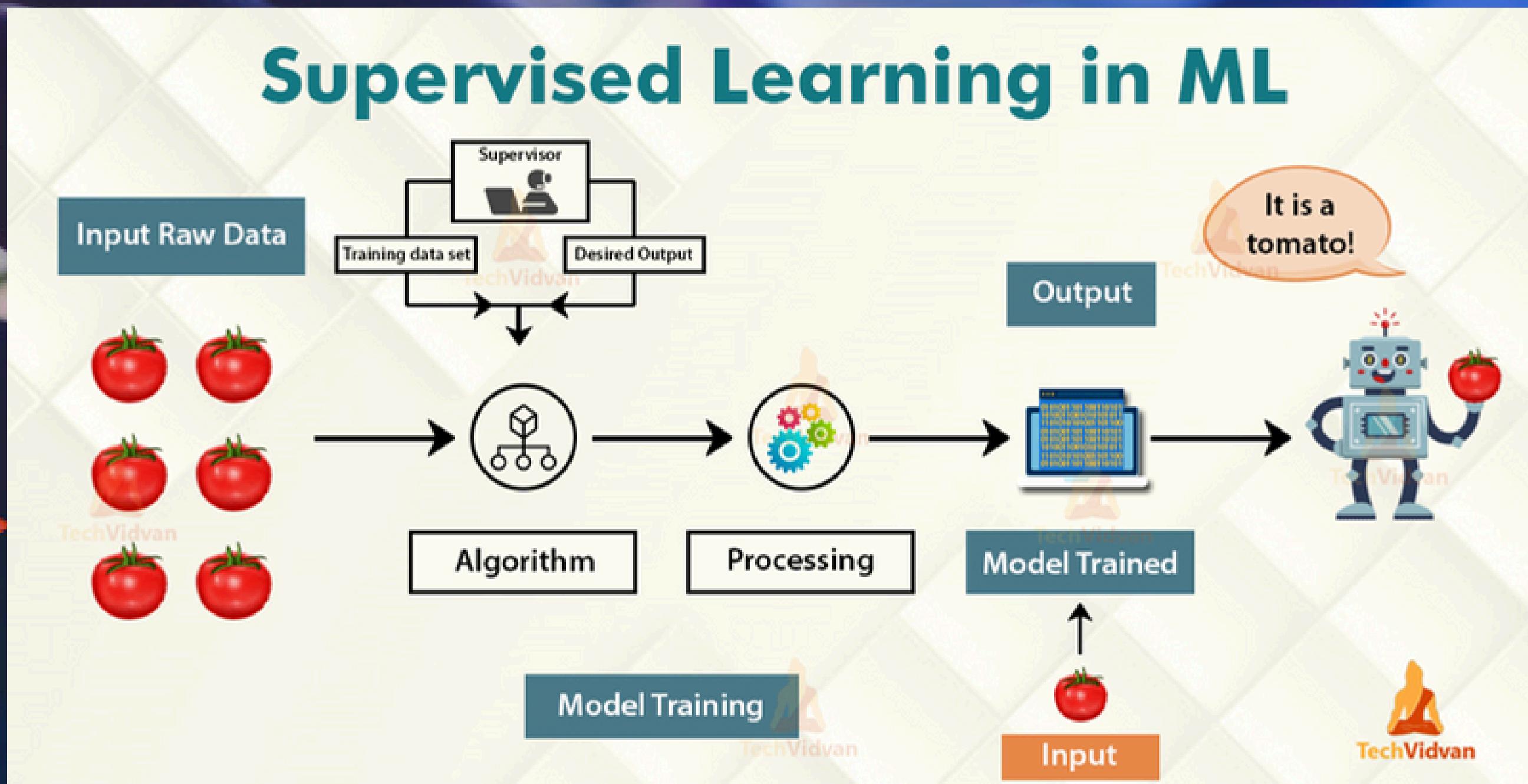
04

Reinforcement Learning

CONTENTS

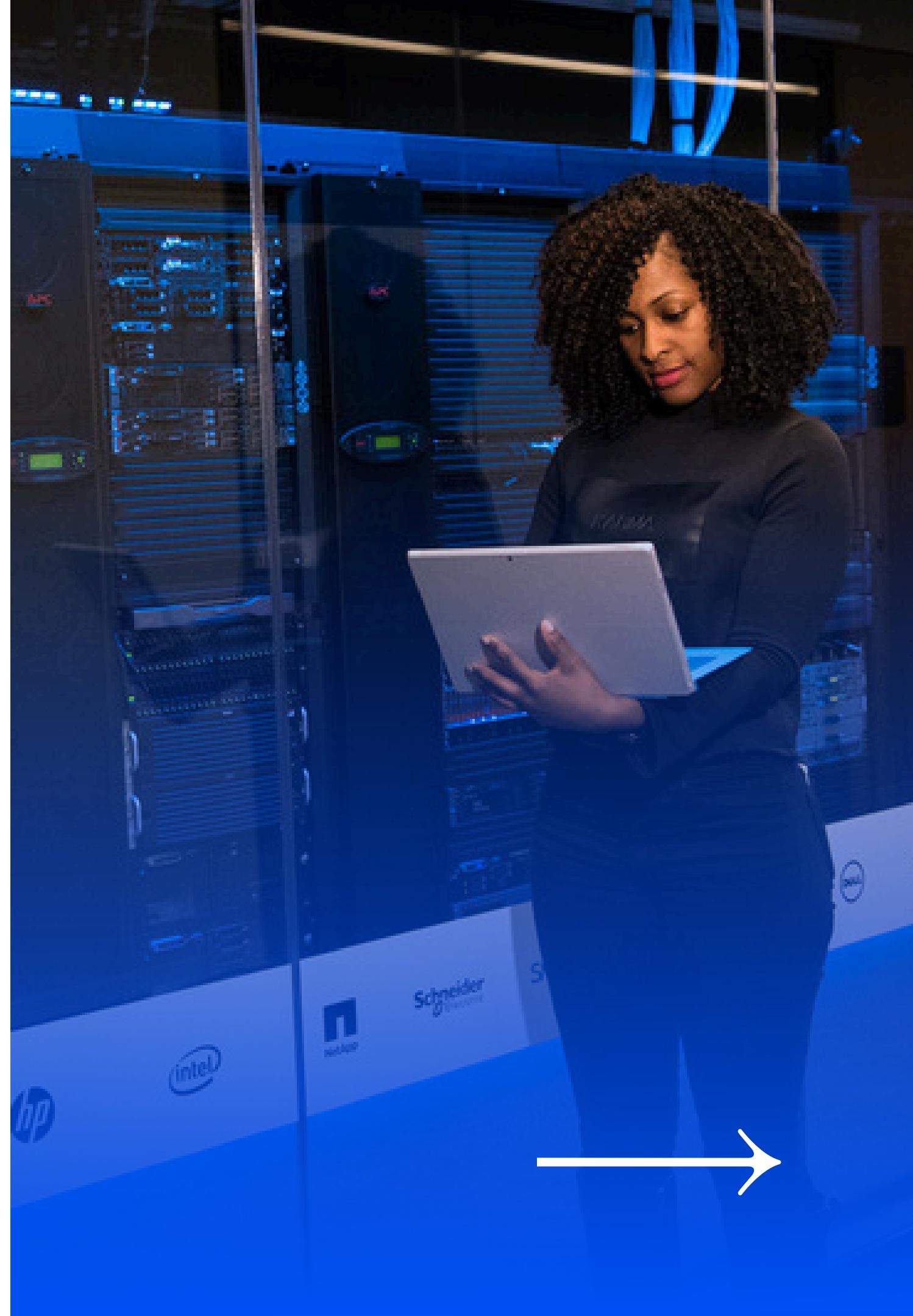


SUPERVISED LEARNING



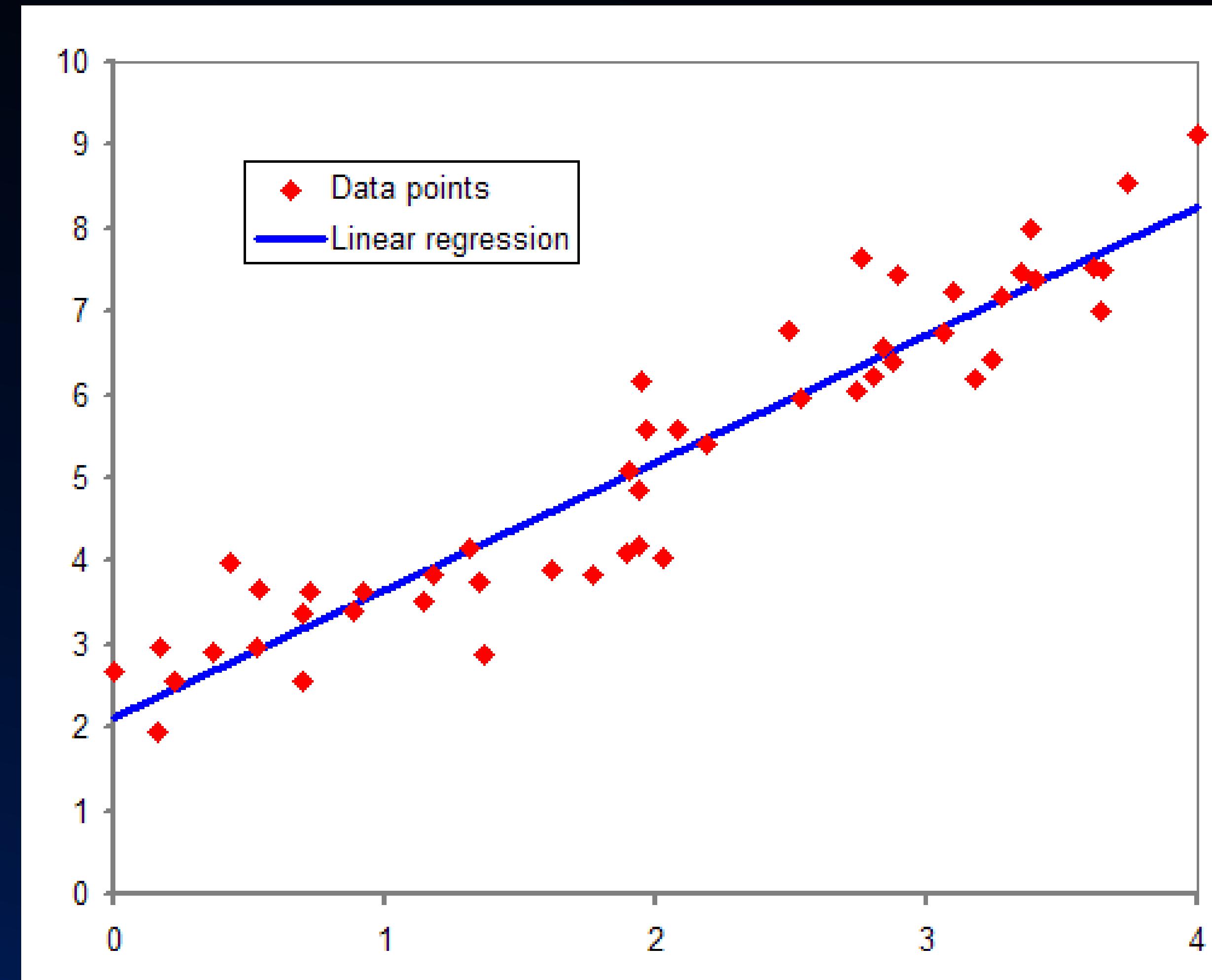
SUPERVISED LEARNING TYPES

- Regression
- Random Forest
- SVM Classification
- KNN
- Logistic Regression
- Naive Bayes Theorem
- Decision Trees



SUPERVISED LEARNING TYPE: REGRESSION

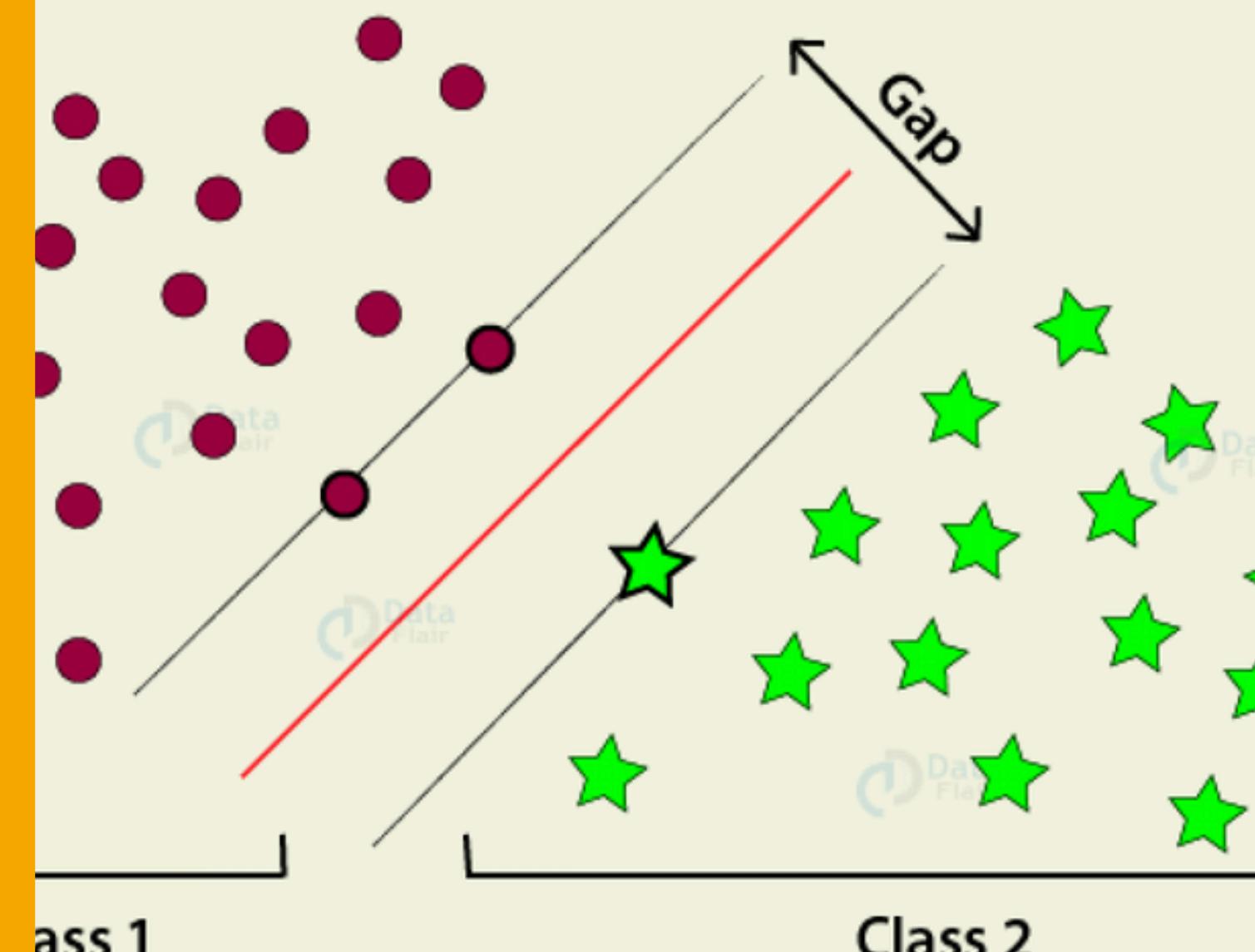
Regression is used to understand the relationship between dependent and independent variables. It is commonly used to make projections, such as for sales revenue for a given business.



SUPERVISED LEARNING TYPE: SVM

An SVM model is basically a representation of different classes in a hyperplane in multidimensional space. The hyperplane will be generated in an iterative manner by SVM so that the error can be minimized. The goal of SVM is to divide the datasets into classes to find a maximum marginal hyperplane (MMH).

Introduction to SVM

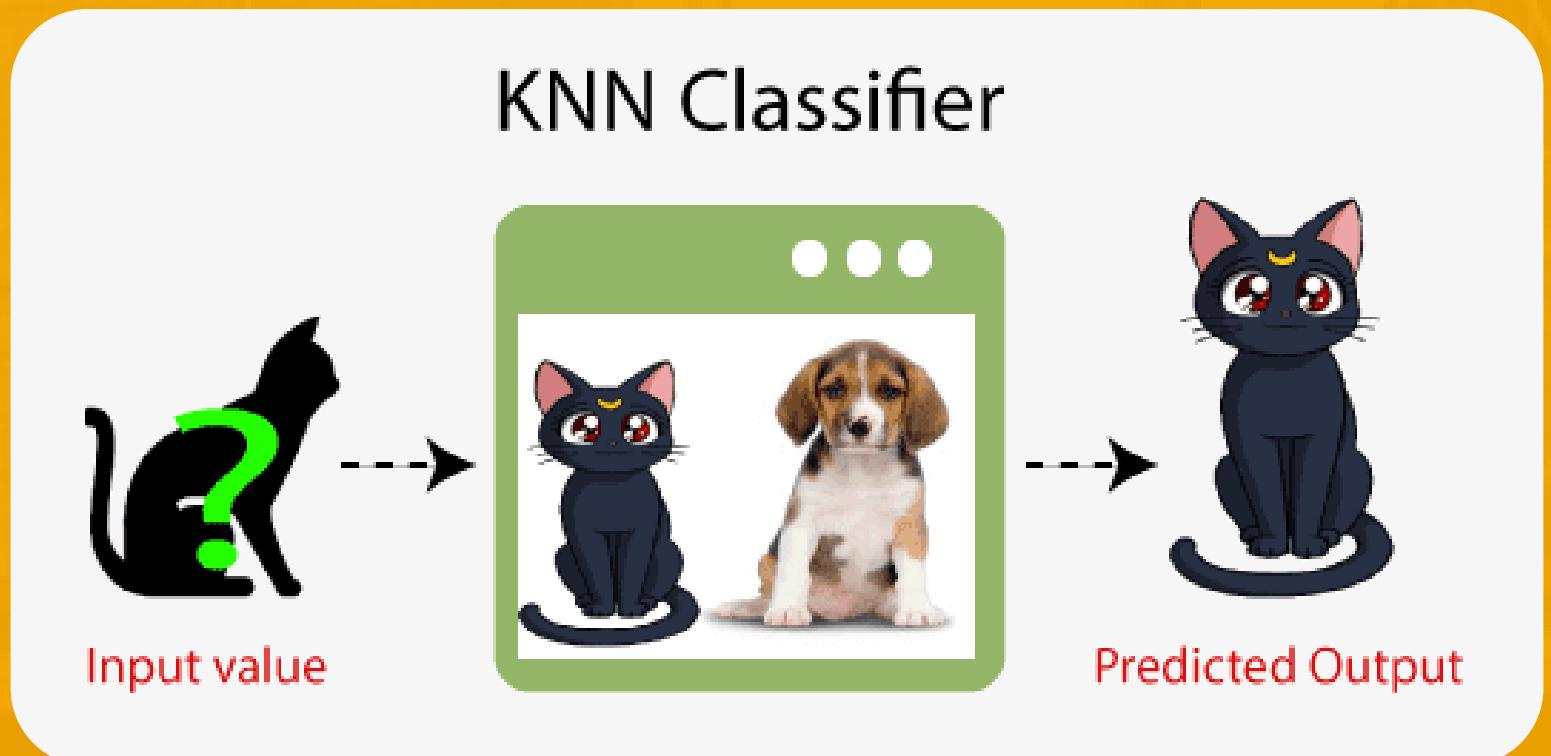


See how we're working
towards our goals



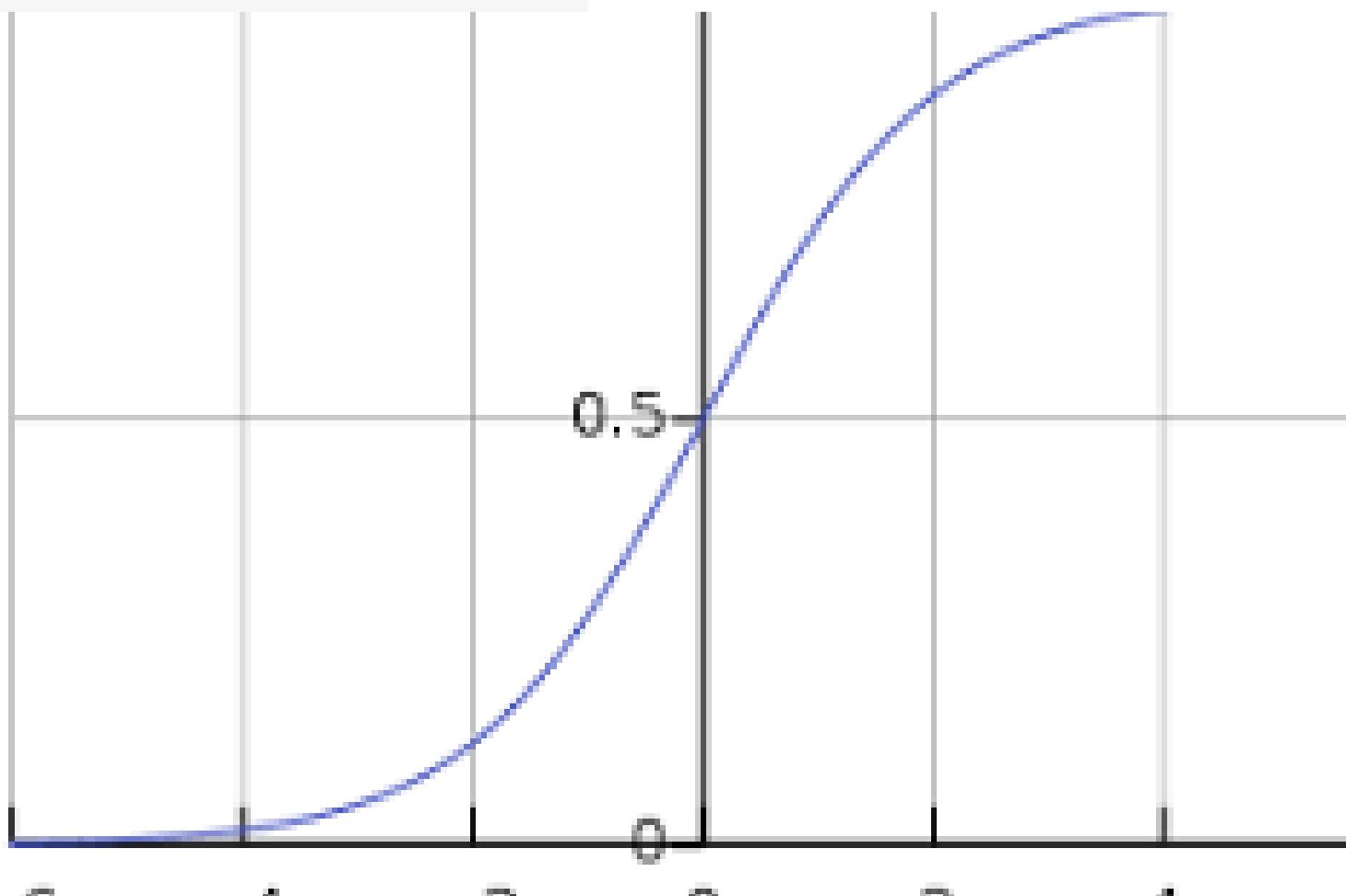
Supervised Learning type: **KNN**

- K-Nearest Neighbor algorithm stores all the available data and classifies a new data point based on the similarity. This means when new data appears then it can be easily classified into a well suited category by using K- NN algorithm.



Supervised Learning type: Logistic Regression

Logistic regression is a supervised learning classification algorithm used to predict the probability of a target variable. The nature of target or dependent variable is dichotomous, which means there would be only two possible classes.



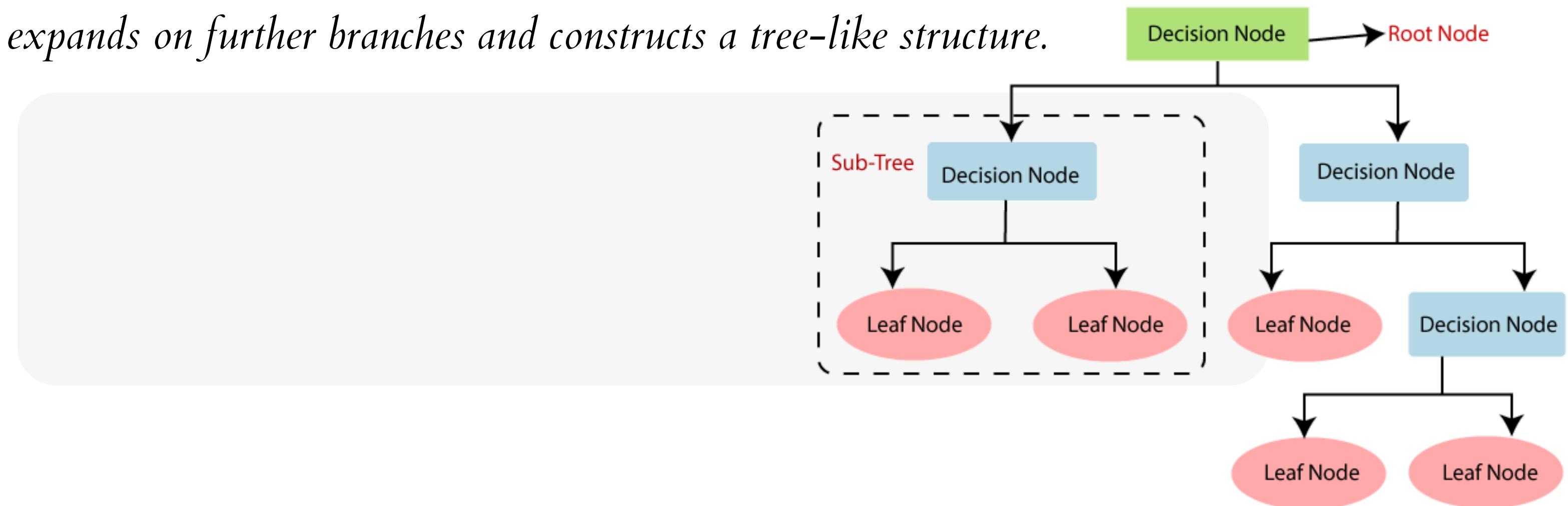
Supervised Learning type: **Naive Bayes**

- It is a probabilistic classifier, which means it predicts on the basis of the probability of an object.

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)}$$

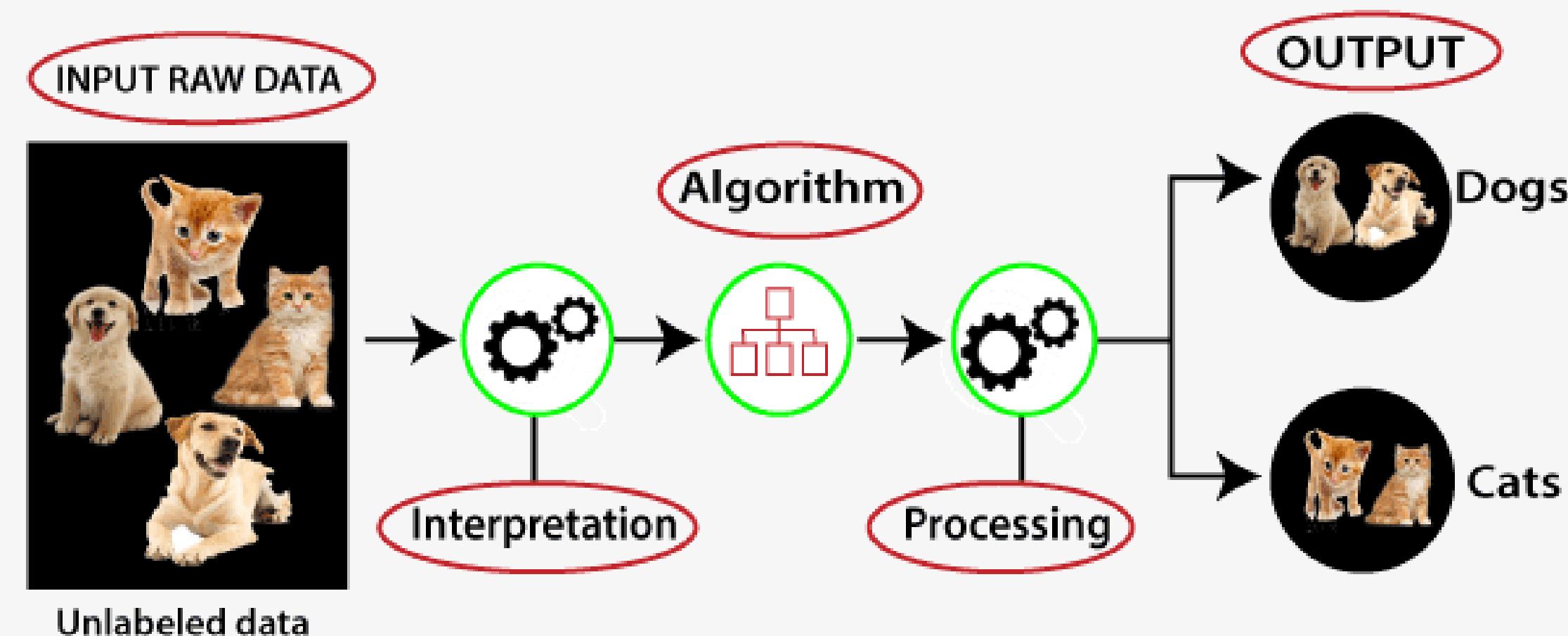
SUPERVISED LEARNING TYPE: DECISION TREE

- *It is a graphical representation for getting all the possible solutions to a problem/decision based on given conditions.*
- *It is called a decision tree because, similar to a tree, it starts with the root node, which expands on further branches and constructs a tree-like structure.*

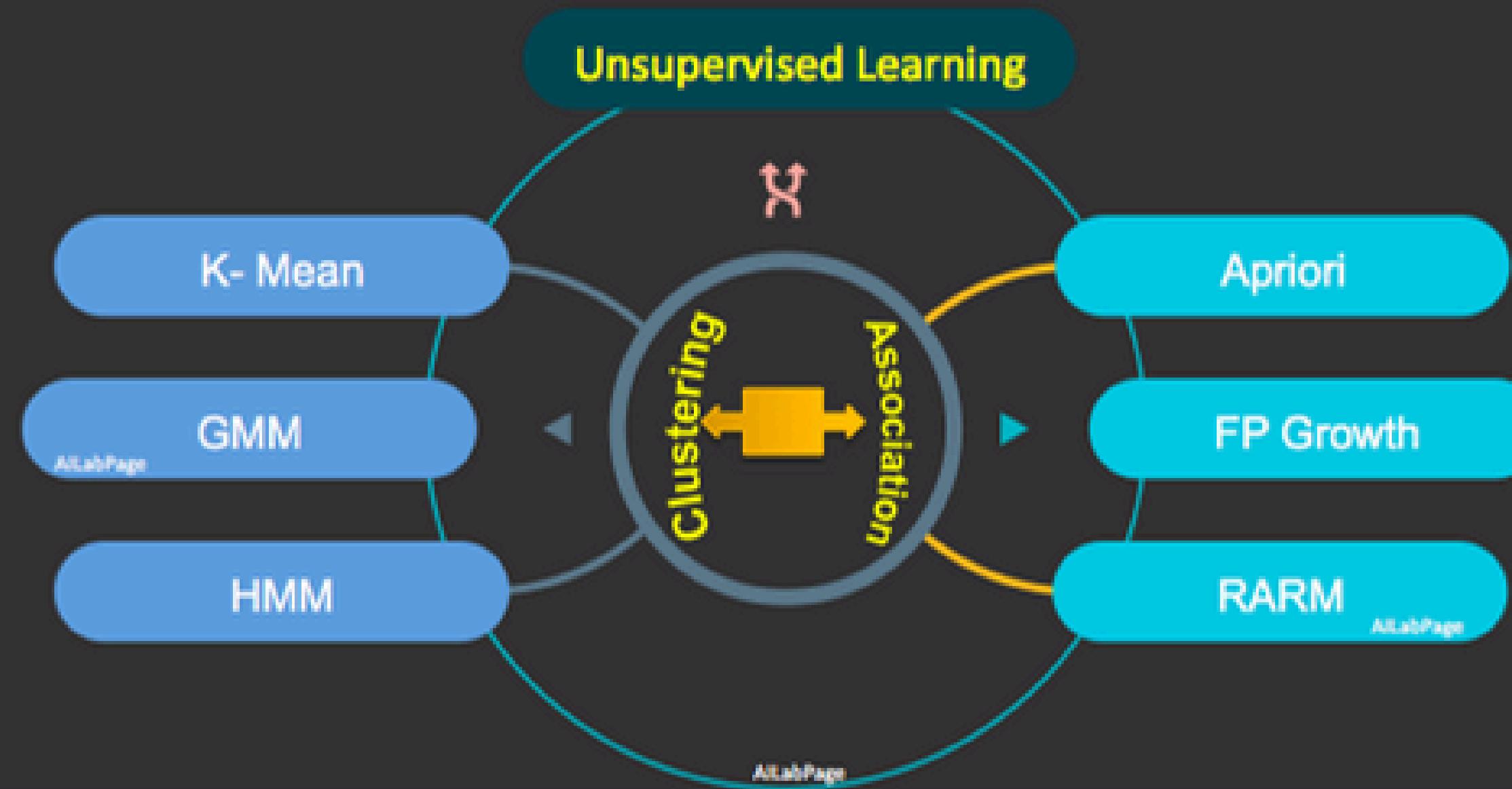


Unsupervised Learning:

Unsupervised learning is a type of machine learning in which models are trained using unlabeled dataset and are allowed to act on that data without any supervision.



Common Algorithms in Unsupervised Learning

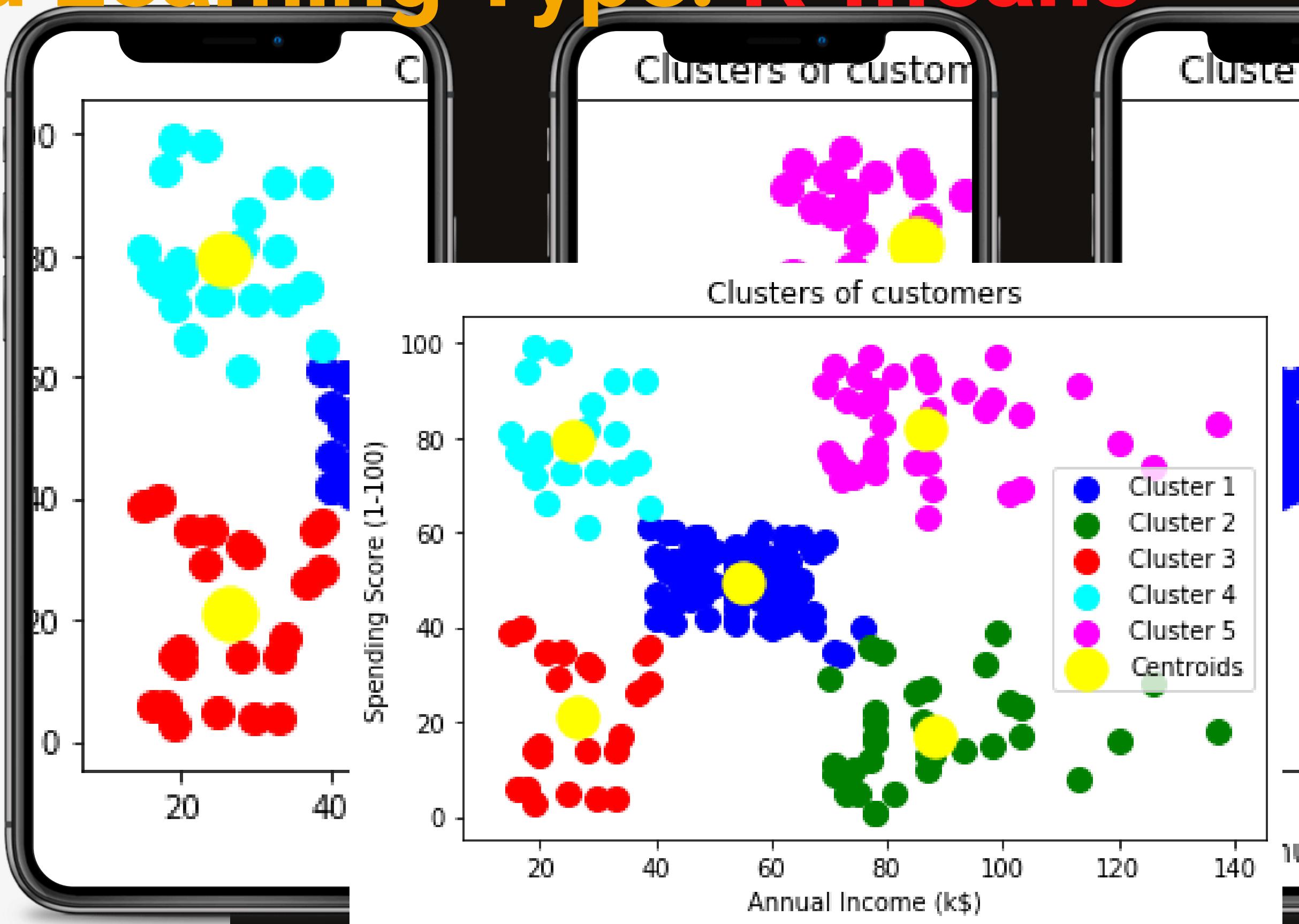


- ✓ Only inputs are known
- ✓ Model training for pattern recognition
- ✓ Find hidden gems
- ✓ GMM - Gaussian mixture models
- ✓ HMM - Hidden Markov models

- ✓ Rule discovery for Association
- ✓ Association Recommendations
- ✓ Association among features in data
- ✓ FP Growth – Frequent Pattern Growth
- ✓ RARM – Rapid Association Rules Mining

Unsupervised Learning Type: K-means

K-means algorithm identifies k number of centroids, and then allocates every data point to the nearest cluster, while keeping the centroids as small as possible.



Unsupervised Learning Type: Apriori Algorithm

The Apriori algorithm uses frequent itemsets to generate association rules, and it is designed to work on the databases that contain transactions.

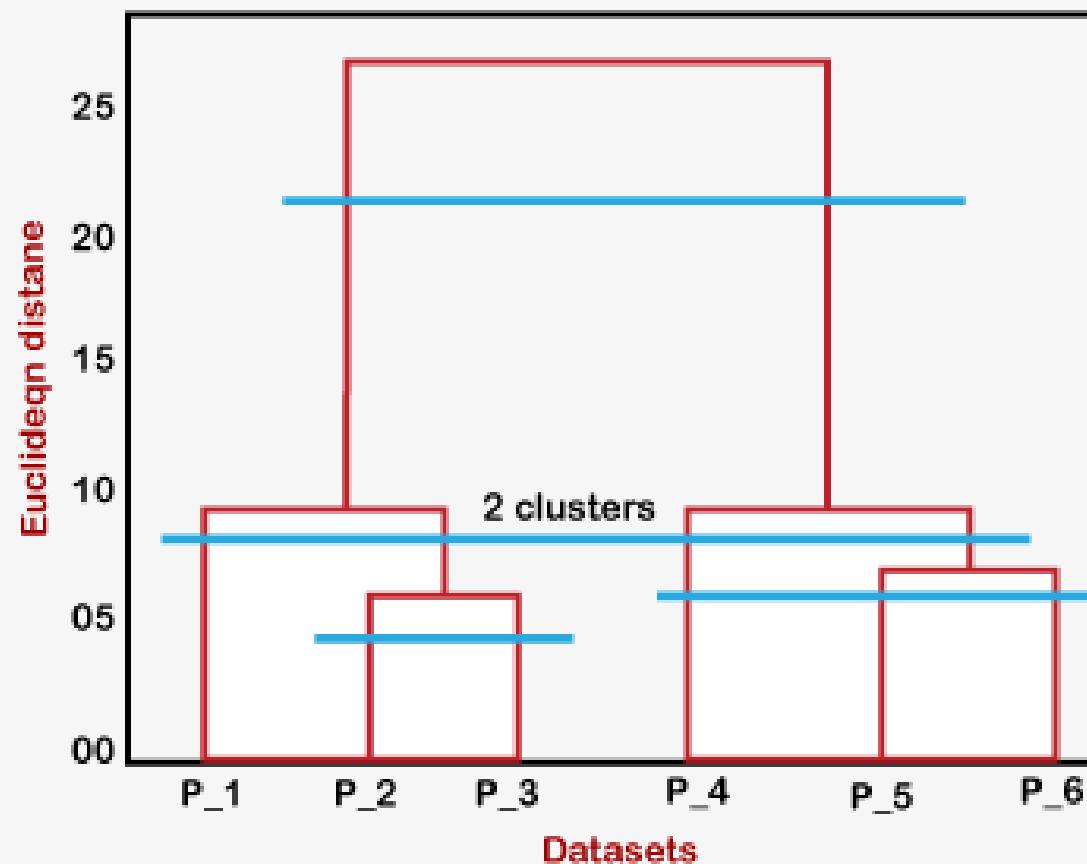
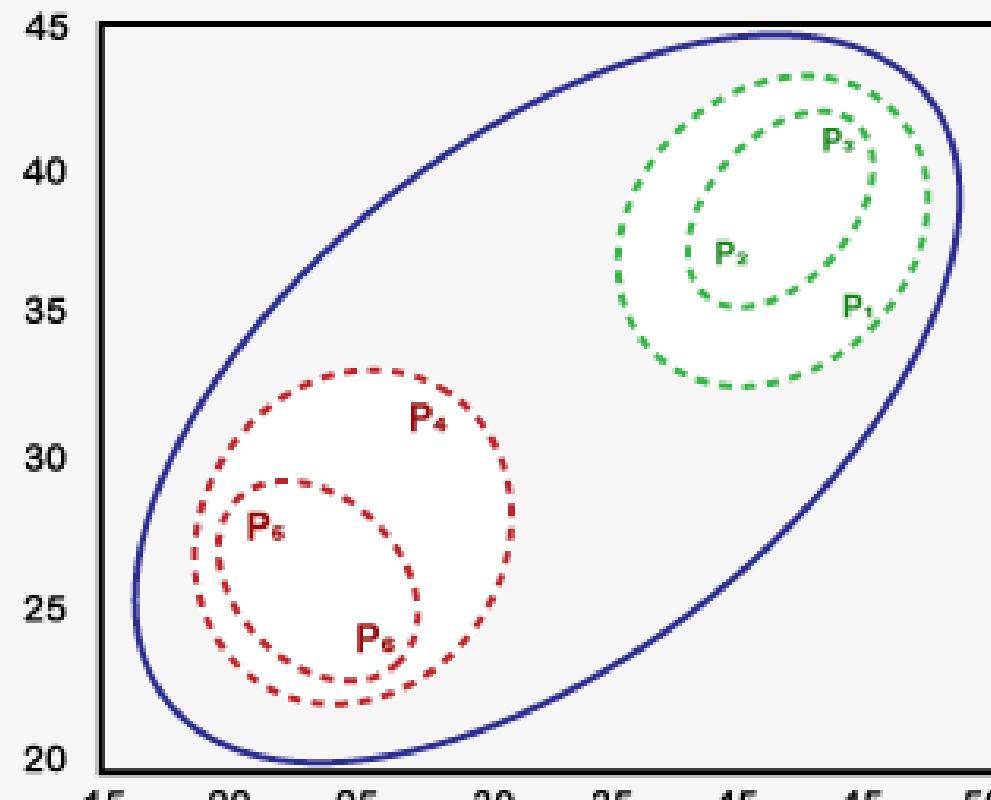
APRIORI

-An algorithm behind
“You may also like”



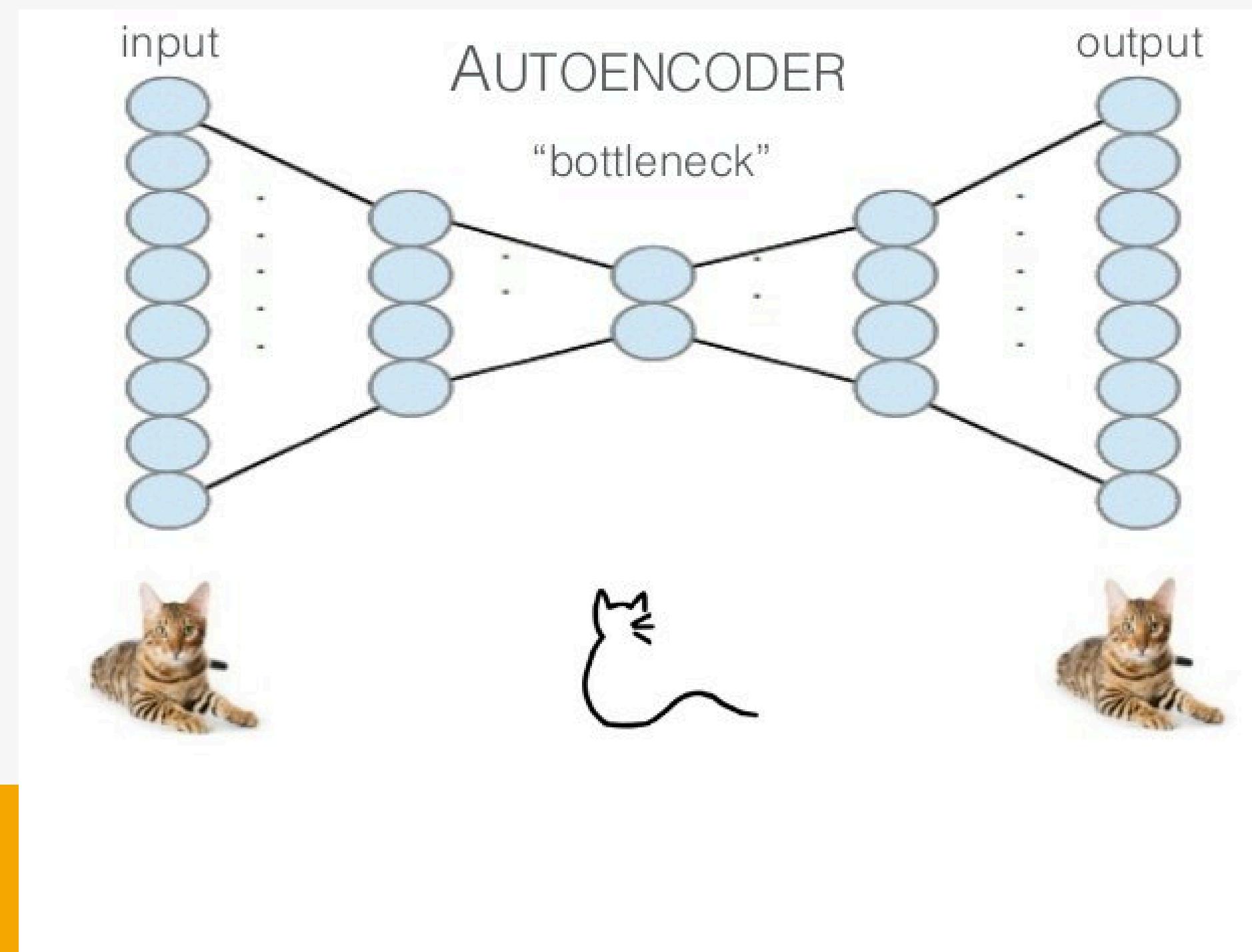
@HarshaManoj

Unsupervised Learning Type: Hierarchical Clustering



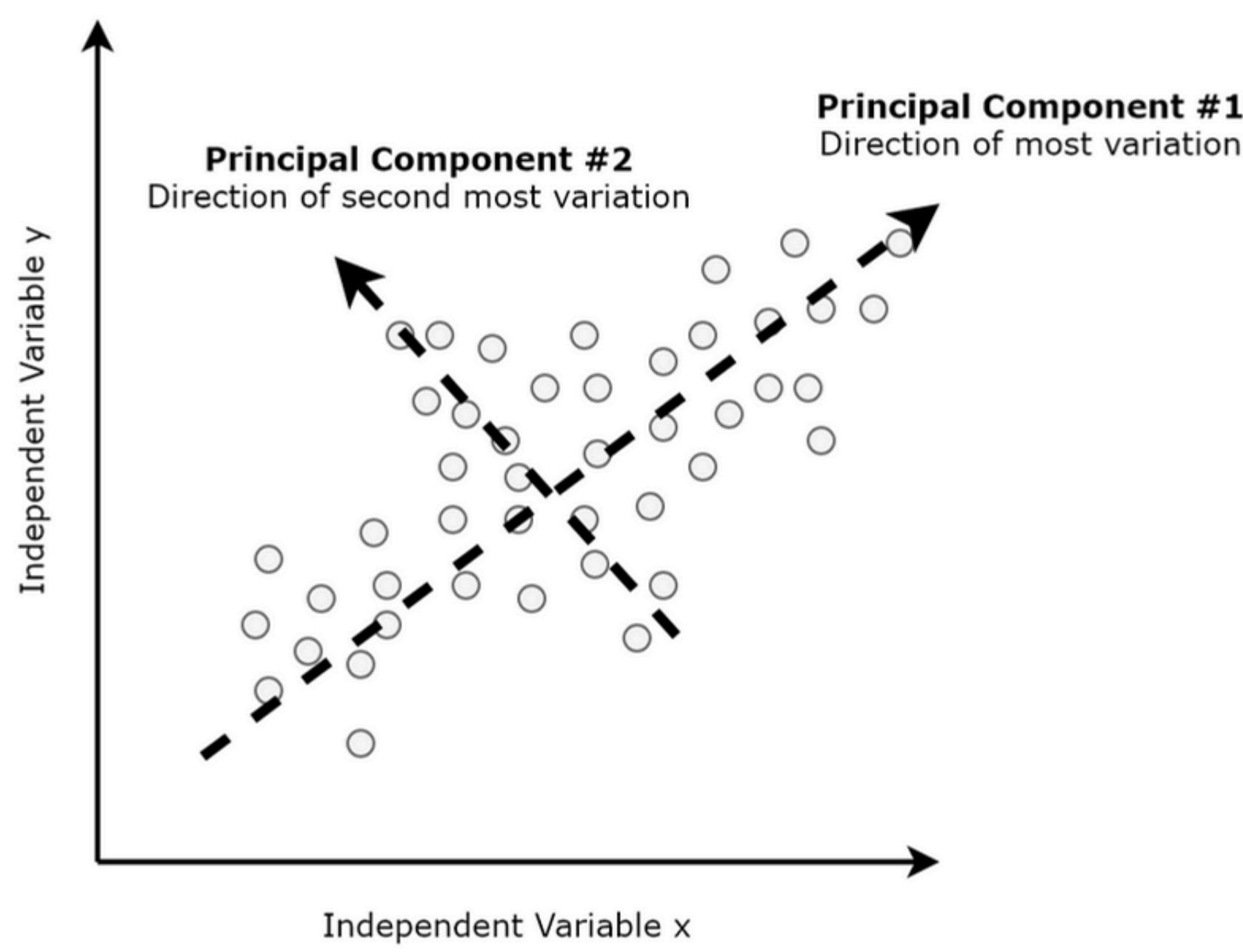
It is used to group together the unlabeled data points having similar characteristics.

Unsupervised Learning Type: Autoencoders



in which we leverage neural networks for the task of representation learning . Specifically, we'll design a neural network architecture such that we impose a bottleneck in the network which forces a compressed knowledge representation of the original input..

Unsupervised Learning Type: Principal Component Analysis



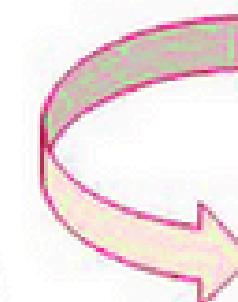
is used for the dimensionality reduction in machine learning. It is a statistical process that converts the observations of correlated features into a set of linearly uncorrelated features with the help of orthogonal transformation.

Unsupervised Learning Type: Singular Value Decomposition(SVD)

Item x subject matrix
(ISM)

| | S1 | S2 | S3 | S4 | S5 |
|-------|----|----|----|----|----|
| dog | 1 | 1 | 1 | 1 | 1 |
| cat | 1 | 1 | 0 | 1 | 0 |
| cow | 0 | 0 | 1 | 0 | 1 |
| lion | 0 | 0 | 1 | 1 | 0 |
| tiger | 1 | 1 | 0 | 0 | 1 |

Singular decomposition
analysis (SVD)



Reducing dimensions
from r to k

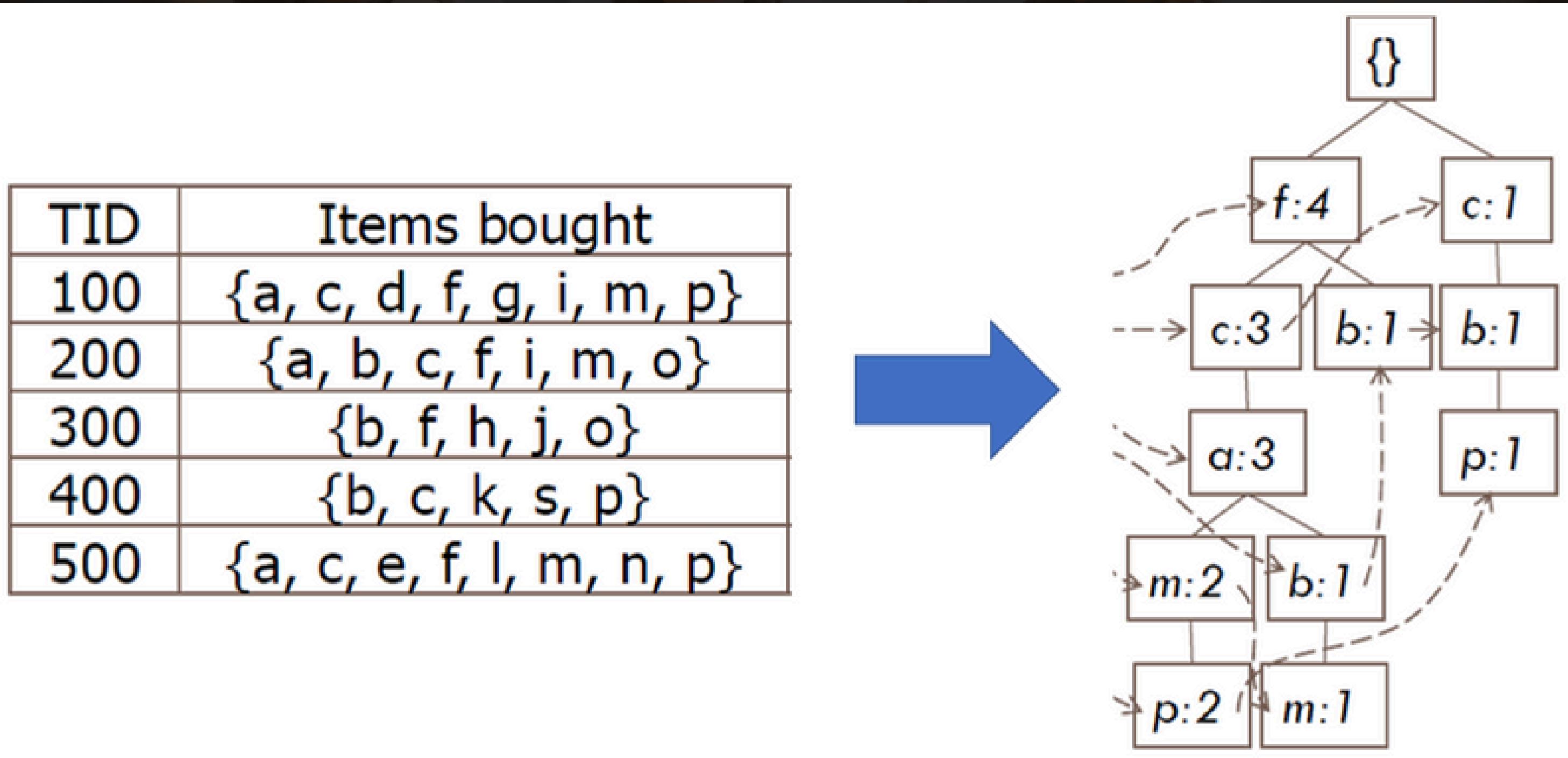
$$\begin{aligned} C_{m \times n} &= U_{m \times r} \times \Sigma_{r \times r} \times V'_{r \times n} \\ \tilde{C}_{m \times n} &= U_{m \times k} \times \Sigma_{k \times k} \times V'_{k \times n} \end{aligned}$$

Item
vectors

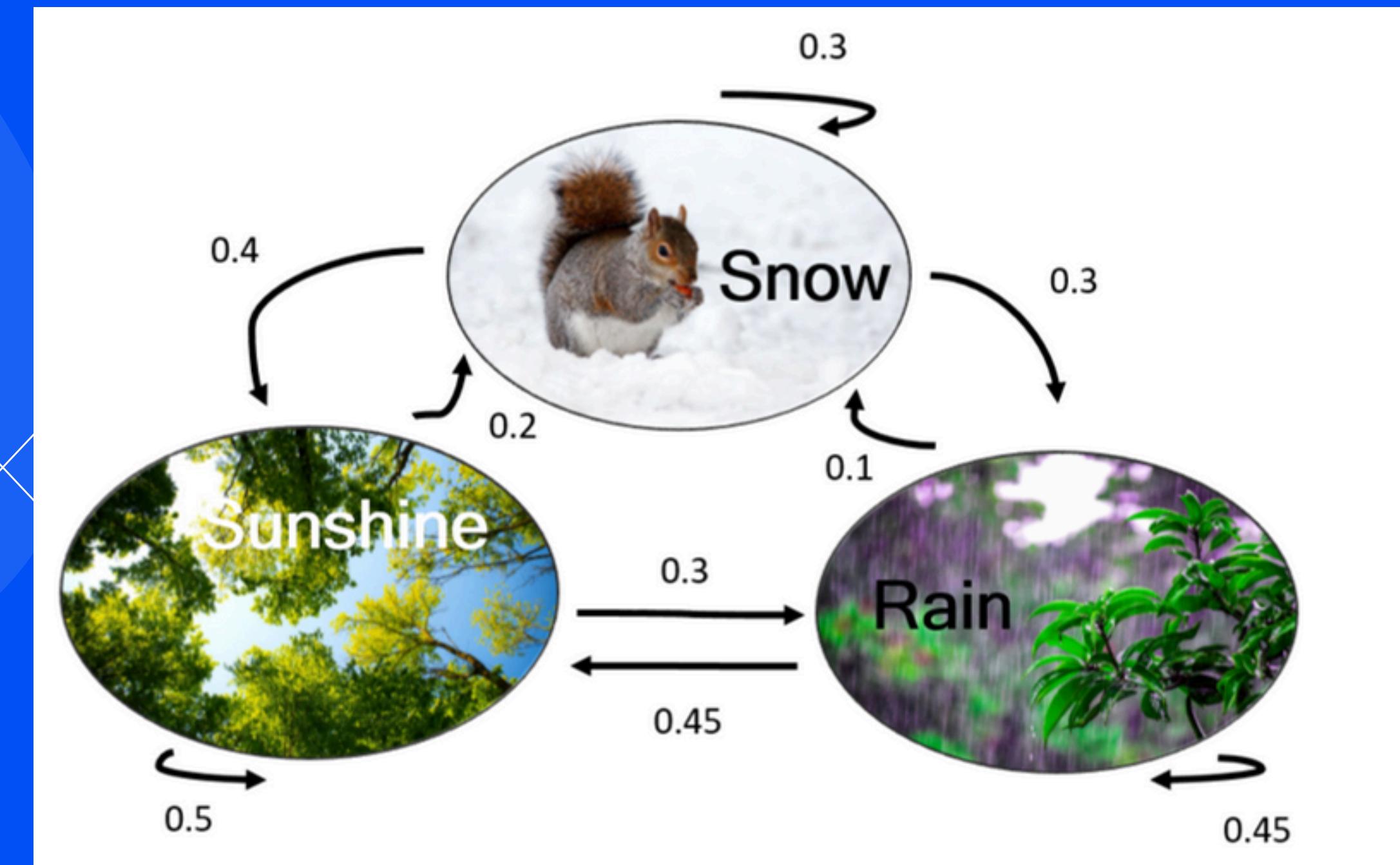
Singular
values

Subject
vectors

Unsupervised Learning Type: FP (Frequent Pattern) Growth

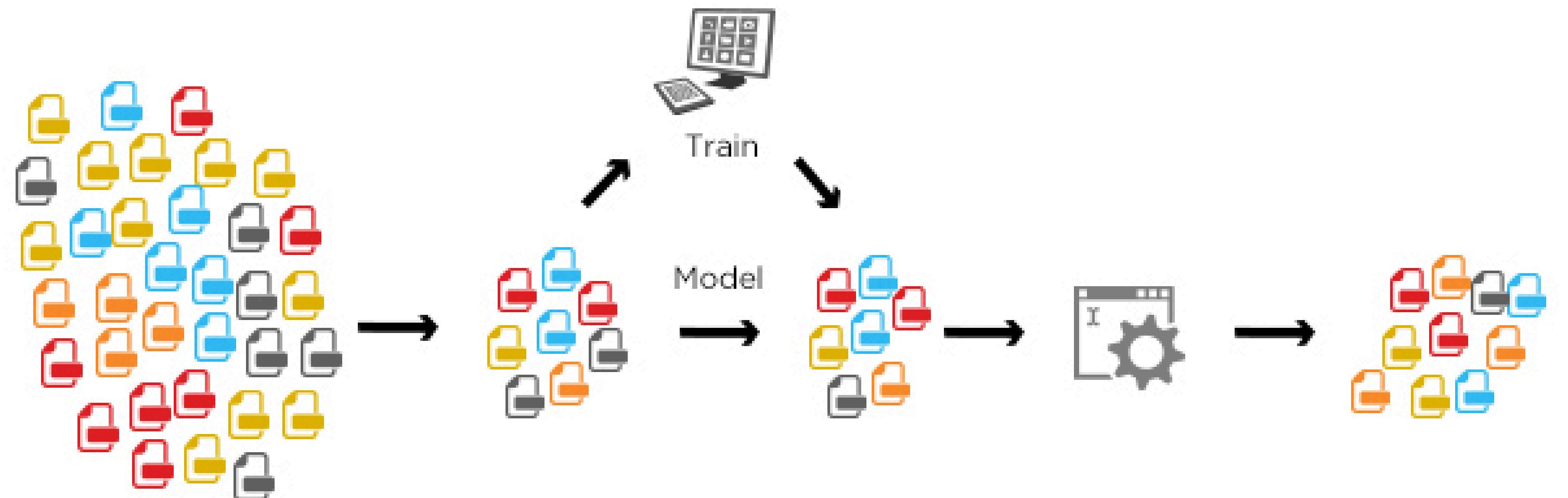


Unsupervised Learning Type: Hidden Markov model (HMM)



Semisupervised Learning:

Semi-Supervised Learning



Raw Data

Sample Data,
Code and test new sample
data - feedback

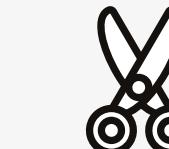
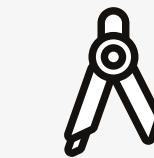
Algorithm

Product of trained
algorithm

REINFORCEMENT LEARNING



Free Resources Page



<https://sachinplacement.blogspot.com/>

Thank you!

Now, let's get back to code....