



# 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 MCA

19CAT703 – MACHINE LEARNING

II YEAR III SEM

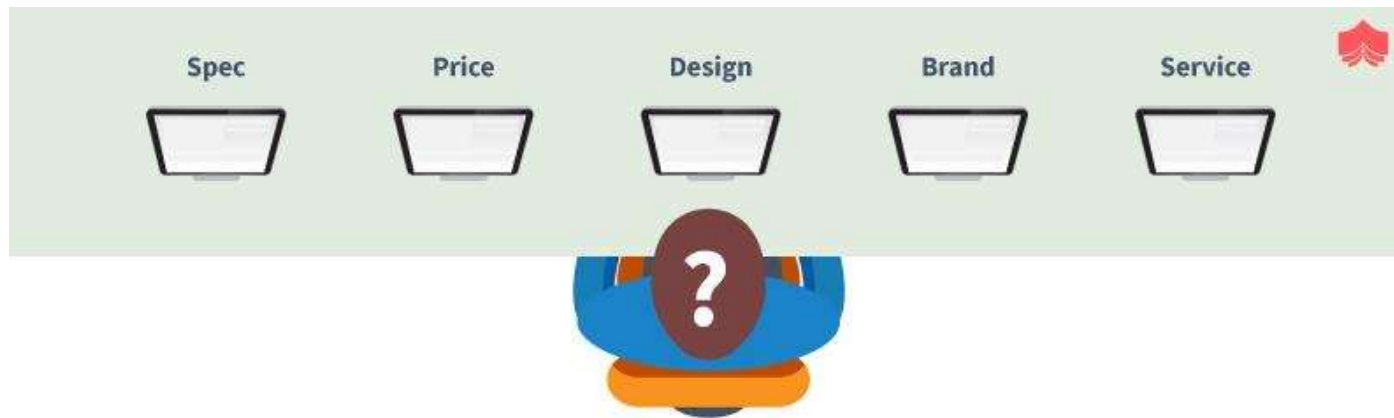
UNIT III – DISTANCE-BASED MODELS

TOPIC 25 – Ensemble learning



# Ensemble learning - Introduction

Use Case: To buy a Computer we have to check the following



Ensemble Learning: combine the decisions from multiple models to improve the overall performance.



## Ensemble: Primary use

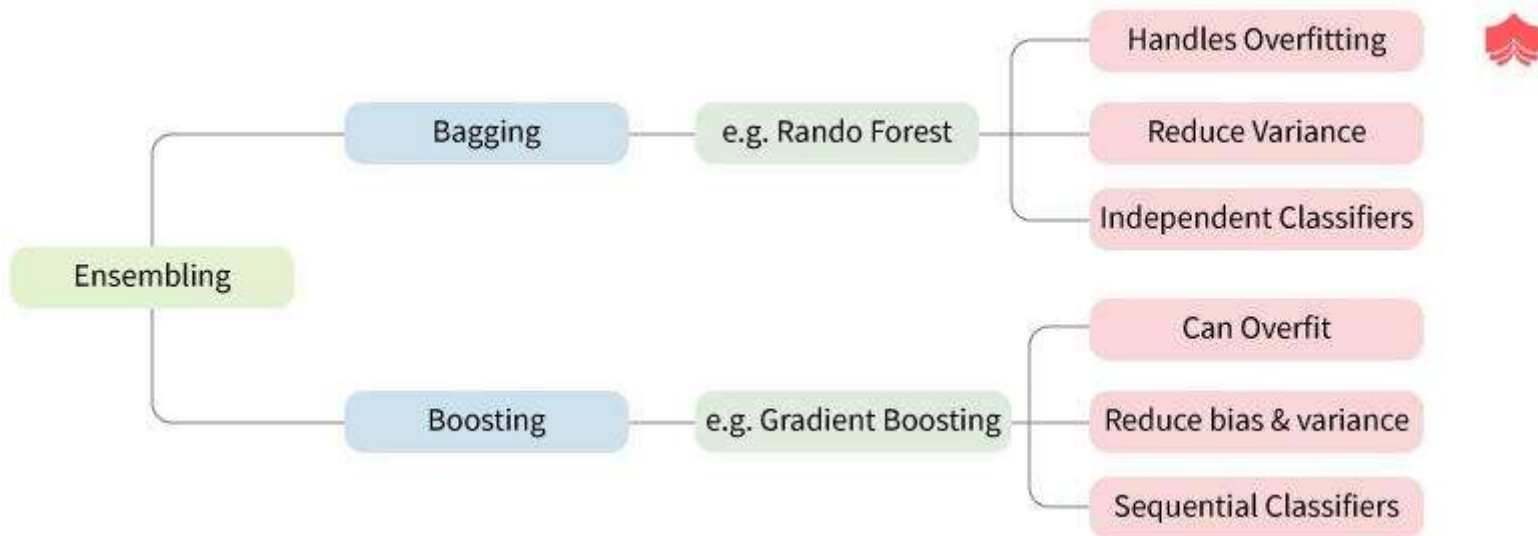
1. An ensemble is itself a supervised learning algorithm because it can be trained and then used to make predictions.
2. It combine several decision trees classifiers to produce better predictive performance than a single decision tree classifier.
3. Main principle is to group of weak learners come together to form a strong learner
4. To increasing the accuracy of the model.
5. Ensemble helps to reduce noise, variance and bias

Total error can be expressed as follows:

$$\text{Total Error} = \text{Bias} + \text{Variance} + \text{Irreducible Error}$$



# Ensemble Algorithm





# Advantages of Ensemble Algorithm

1. For improving the accuracy of the model and works in most of the cases.
2. Ensemble makes the model more robust and stable thus ensuring decent performance on the test cases in most scenarios.
3. To capture linear and simple as well nonlinear complex relationships in the data.



# Basic Ensemble Techniques

**Max Voting**

**Averaging**

**Weighted Average**

**Ensemble Methods**

**Bootstrap**

**Bagging**



# REFERENCE

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4. Abu-Mostafa, M. Magdon-Ismail, and H.-T. Lin, —Learning from Data, AML Book Publishers, 2012. 2 P. Flach, —Machine Learning: The art and science of algorithms that make sense of data, Cambridge University Press, 2012.
- 5.

