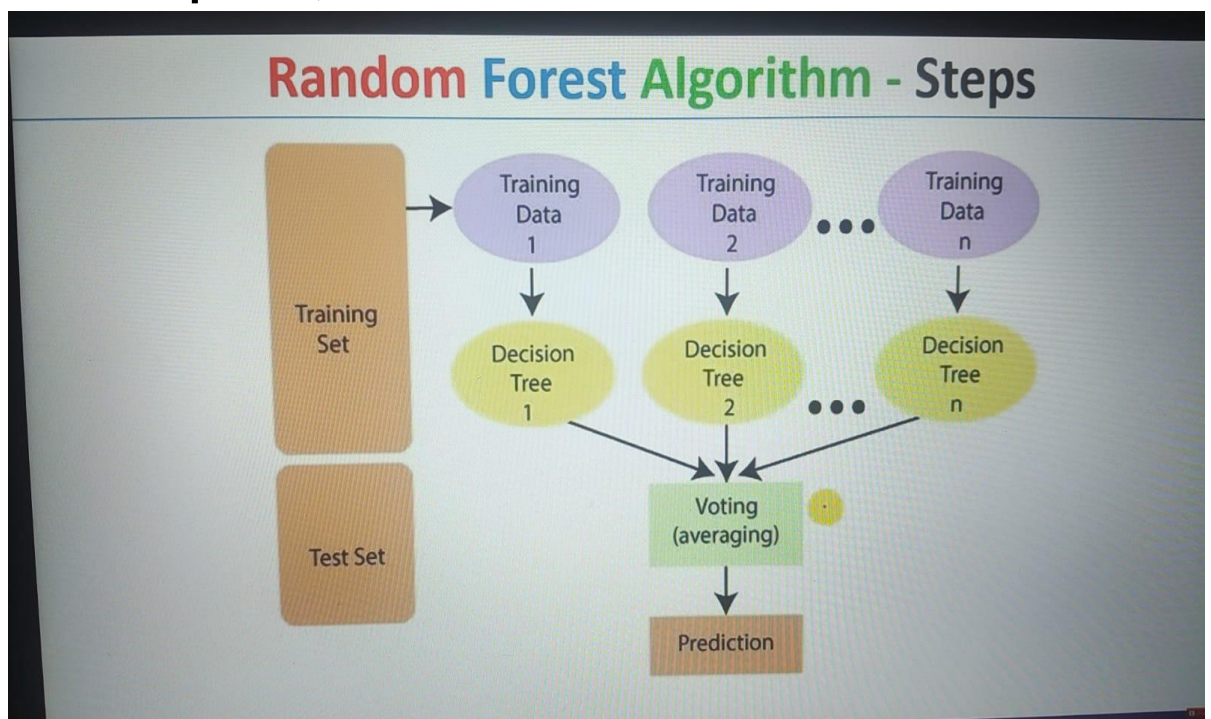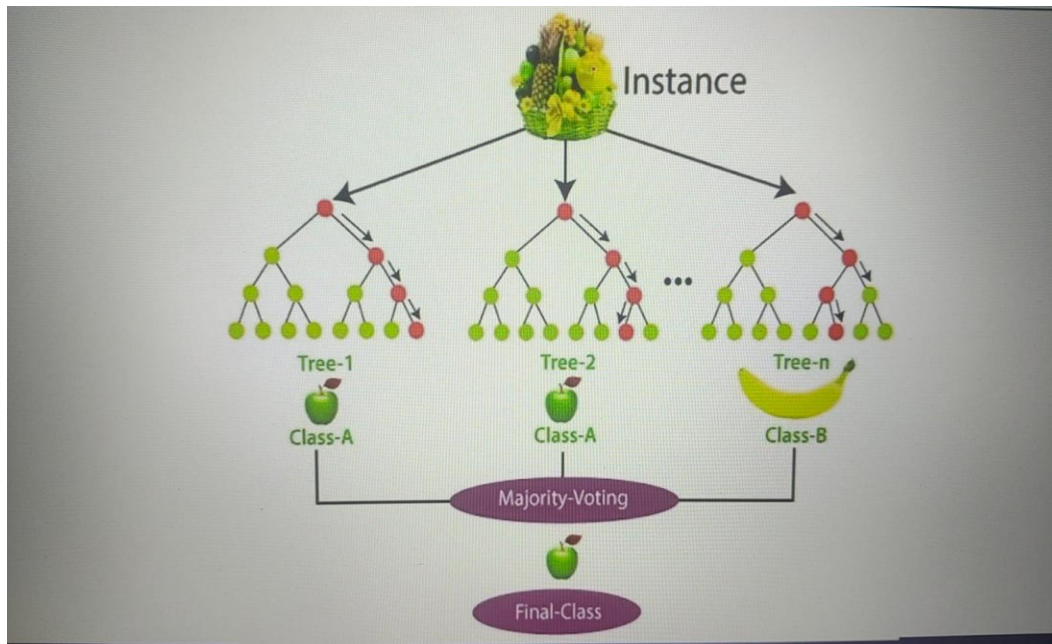# Random forest alogtithm

1. Random forest is commly-used machine learing algorithm
2. Random forest became popular because of its ease of use and flexibility in handling both classification and regression problems

Example-;

• Strengths

1. It takes less training time as compard to other algorithms
2. It predicts outputs with high accuracy
3. It can aslo maintain accuracy whaeen large proportion of data is missing

• Weakness

1. A Weakness of random forest algorithms is when used for regression they cannot predict beyond the ranfe in the training data

XG BOOST ALGORITHM

1. XGBoost (Extreme Gradient Boosting) is a powerful, open-source machine learning algorithm that uses gradient-boosted decision trees for both regression and classification tasks, known for its speed, efficiency, and ability to handle large datasets.

Example-;
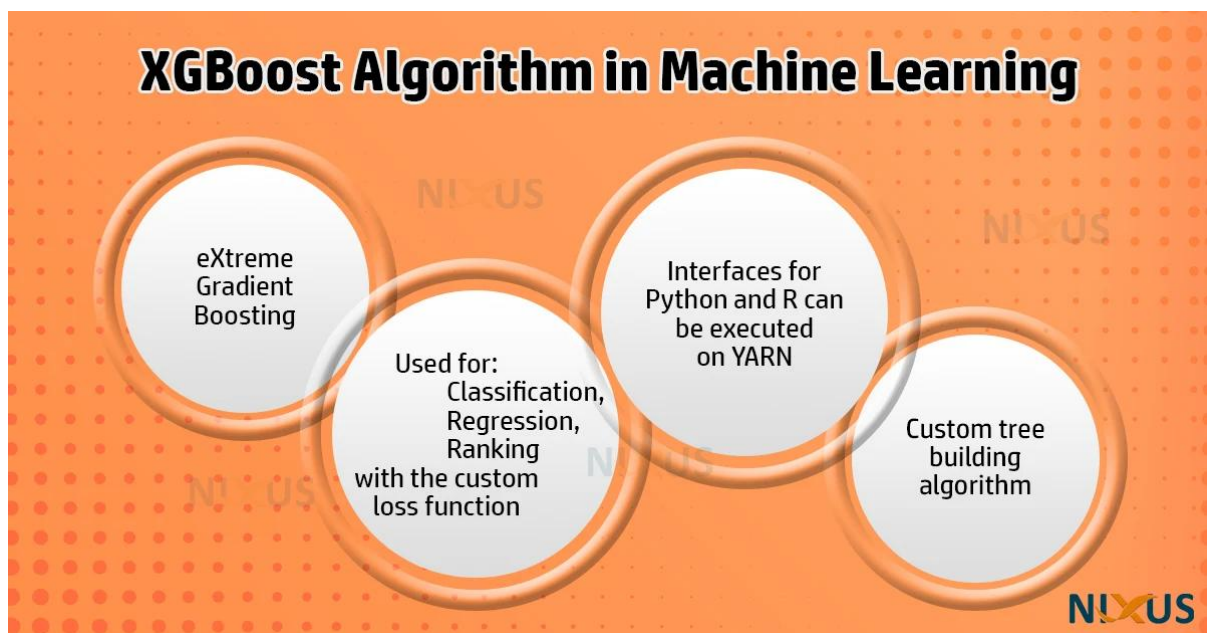
•Strengths

- High performance and accuracy, particularly with structured data.
- Efficiently handles missing values and outliers.
- Includes built-in regularization to prevent overfitting.
- Scales well to large datasets.
- Offers flexibility in tuning and optimization.

●Weakness

1.   Complexity and Hyperparameter Tuning ---

*XGBoost has numerous hyperparameters that require careful tuning for optimal performance, which can be a challenging process.

2.   Overfitting:

   *If not properly regularized, XGBoost can overfit the training data, especially with deep trees and high learning rates.

KNN Agorithm

1. The k-Nearest Neighbors (KNN) algorithm is a simple, supervised machine learning method used for both classification and regression tasks, making predictions based on the proximity of data points to their nearest neighbors.

Example-;
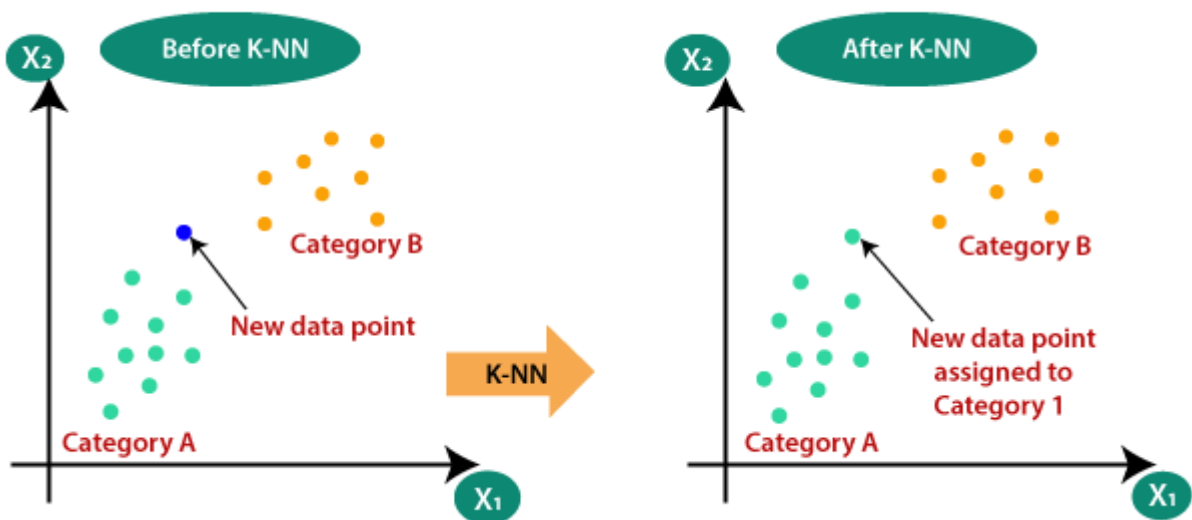
●Strengths

1. **Simplicity and Intuition:** KNN is easy to understand and implement,

making it a good choice for beginners and scenarios where interpretability is important.

2. **Versatility: It can be used for both classification and regression tasks, offering flexibility in various machine learning applications.**
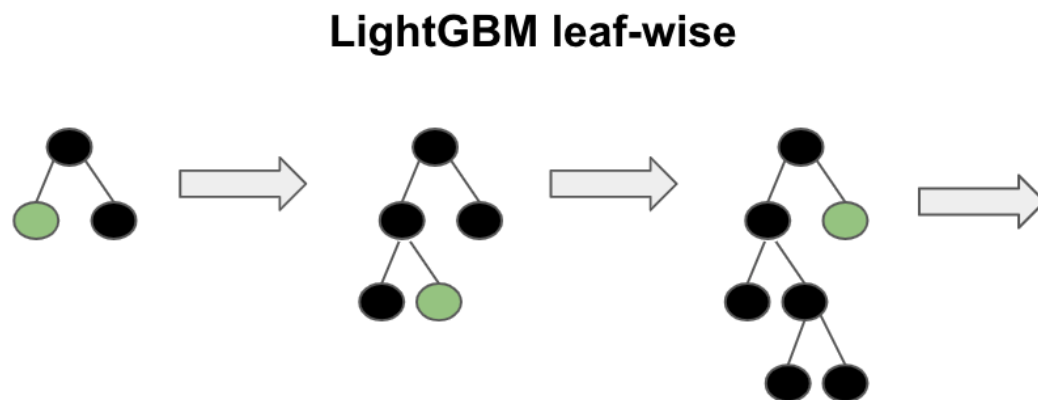
•weakness

- **Difficulty in Handling Large Datasets: The computational cost of calculating distances between a new point and all points in the training set becomes prohibitive for large datasets.**

Light GBM Algorithm

- LightGBM is a high-performance, open-source gradient boosting

framework for machine learning, developed by Microsoft

Example-;

LightGBM leaf-wise

•Strengths

- **High Accuracy:** LightGBM often achieves comparable or even better predictive accuracy than other boosting algorithms, making it a popular choice for competitions and real-world applications.

- **Versatile Applications:** LightGBM can be used for various machine learning tasks, including classification, regression, and ranking**.**

- # Weakness

1. **Overfitting on Small Datasets:** LightGBM's leaf-wise growth (splitting leaves instead of levels) can lead to the creation of complex trees that overfit the training data, especially when the dataset is small.