

## Random Forest Classifier:

The Random Forest Classifier stands as a widely utilized machine learning algorithm adept at both classification and regression tasks. It operates as a meta-estimator, constructing numerous decision tree classifiers across diverse subsets of the dataset and leveraging averaging to enhance predictive accuracy while mitigating overfitting.

Aspects of the Random Forest Classifier:

1. **Ensemble Learning:** Grounded in ensemble learning, it amalgamates multiple classifiers to address complex problems and elevate model performance.
2. **Decision Trees:** The classifier fabricates a multitude of decision trees during training, yielding a final classification outcome based on the modal class of the classification classes<sup>3</sup>.
3. **Parameters:** Crucial parameters such as **n\_estimators** (number of trees in the forest), **criterion** (split quality assessment function), **max\_depth** (maximum tree depth), **min\_samples\_split** (minimum samples for node splitting), and **max\_features** (number of features considered for optimal split) govern its behavior.
4. **Advantages:** It exhibits swift training, high predictive accuracy, operational efficiency even with extensive datasets, and resilience to missing data.

Steps:

1. Random selection of K data points from the training set.
2. Development of decision trees linked to the selected data points (Subsets).
3. Specification of the desired number N for decision tree construction.
4. Iterative execution of Steps 1 & 2.
5. For new data points, determination of predictions from each decision tree, followed by allocation to the category winning majority votes.

In Python, implementation of the Random Forest Classifier is facilitated through the **RandomForestClassifier** class within the **sklearn.ensemble** module.

Example: Suppose you want to host a party at a certain venue in your city, let's say Lucknow. You are not sure whether you want to host the party in Dayal Paradise in Gomti Nagar or The Regnant in Nirala Nagar. So, you go to your friend and ask her what she suggests. Let's say, Shivangi tells you to host the party at Dayal Paradise since it is closer to your house and it would be easily accessible without much of a headache. Similarly, all your friends gave you suggestions where you could host the party. At last you can either host the party at the place of your choice or you decide on a place suggested by your friends.

Similarly in Random Forest, we train a number of decision trees, and the class which gets the maximum votes gets to be the final result if it's a classification problem and average if it's a regression problem.