

BOOSTING ALGORITHM:

In machine learning, a boosting algorithm is a sequential learning technique that combines multiple weak learners to create a strong learner.

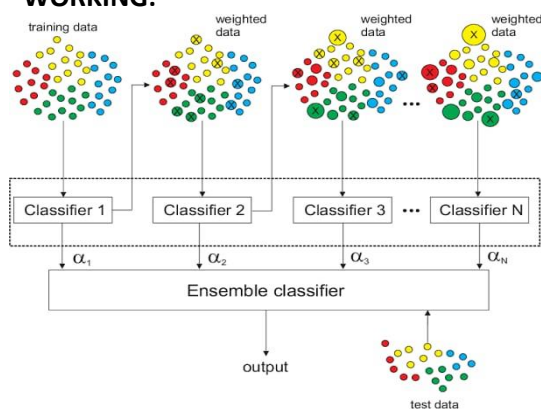
TYPES:

- Ada boosting
- XG boosting
- LG boosting

ADA BOOSTING:

Adaptive boosting is a machine learning algorithm that helps make predictions more accurate by combining many weak models into one strong model.

WORKING:

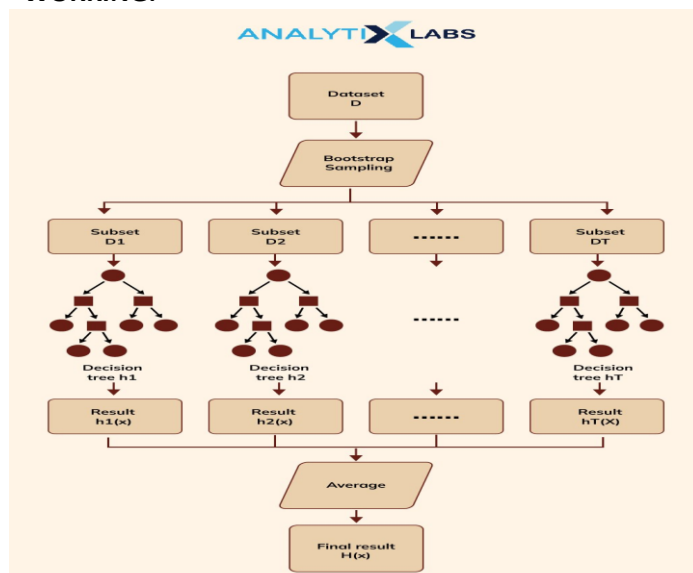


- Start with weak classifiers
- Weight the mistakes
- Build the next classifier
- Repeat

XG BOOSTING:

Also known as gradient boosting. Is designed to work faster and handle large datasets more effectively than other algorithm like adaboost. It also include technique to prevent overfitting.

WORKING:



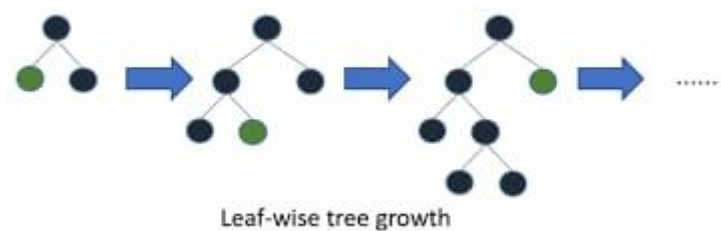
- XGBoost starts by training a simple model, like a decision tree

- Instead of starting over, XGBoost looks at the mistakes this first model made. It then trains a new model to fix those mistakes. This second model focuses on the points where the first model got things wrong
- XGBoost keeps adding more models, each one learning from the errors of the previous models. Over time, this team of models works together to make better and better predictions.
- XGBoost combines all these models to make one strong prediction.

LG BOOSTING:

LightGBM (LG boosting) is a smart and fast machine learning algorithm that helps make better predictions.

WORKING:



- LightGBM creates a series of **decision trees** to make predictions. Each tree helps improve the accuracy of the model
- Instead of building trees level by level (like some other methods), LightGBM grows trees by focusing on the leaves that make the biggest mistakes first. This helps the model learn faster and be more accurate
- After each tree is built, LightGBM looks at the errors made by the previous trees. Each new tree tries to fix these mistakes, making the overall prediction better
- Avoids Overfitting

ADVANTAGES:

- High Accuracy
- Focus on Difficult Cases
- Versatility
- Regularization
- Feature Importance

APPLICATIONS:

- i) Finance and Banking
- ii) Healthcare
- iii) Marketing and Sales
- iv) Natural Language Processing

DISADVANTAGES:

- Training Time
- Sensitivity to Noisy Data
- Complexity

