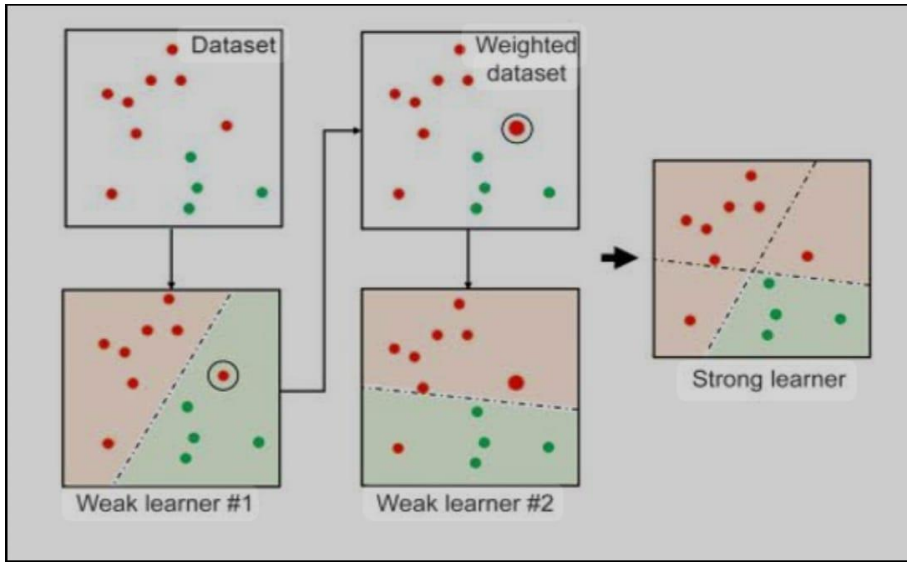
AdaBoost (Adaptive Boosting) is a machine learning meta-algorithm formulated by Yoav Freund and Robert Schapire in 1995. It combines multiple weak learners to create a strong learner.

Key Concepts:

- **Weak Learner:** A model that performs slightly better than random guessing.
- **Strong Learner:** A model that performs significantly better than random guessing.
- **Adaptive:** The algorithm adapts by focusing more on the data points that were misclassified by previous weak learners.

ADABOOST

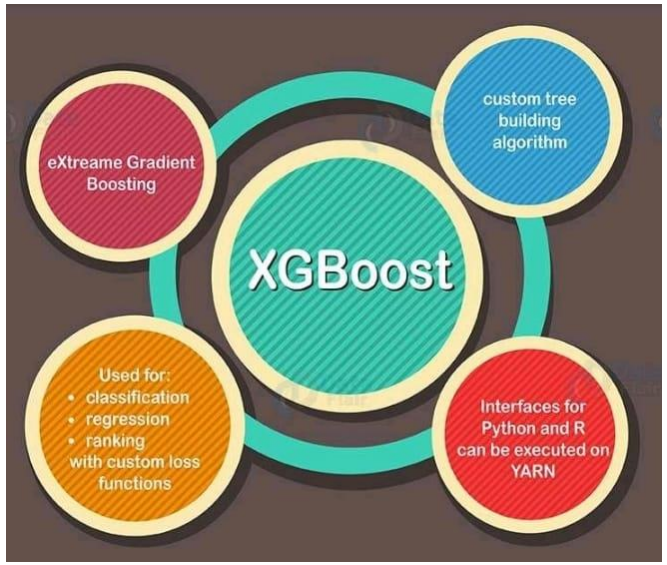


XGBoost (eXtreme Gradient Boosting) is a powerful machine learning algorithm that excels at tasks like regression, classification, and ranking. It belongs to the ensemble learning family, specifically the gradient boosting framework.

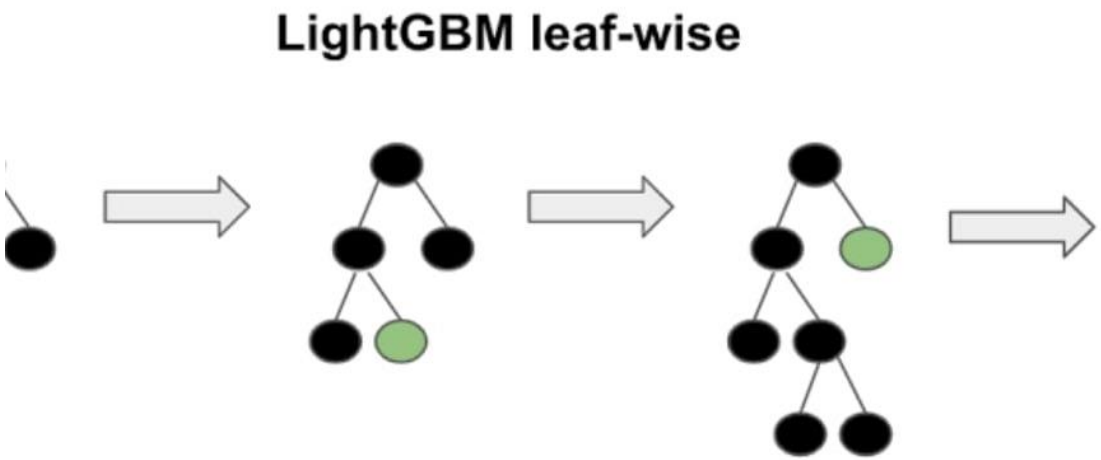
Key Concepts:

- **Gradient Boosting:** A technique that builds a strong learner by sequentially adding weak learners (usually decision trees). Each new tree focuses on correcting the errors made by the previous ones.
- **Decision Trees:** Simple, tree-like models that make decisions based on a series of if-else conditions.

XG BOOST



LG BOOST



LightGBM (Light Gradient Boosting Machine) is a powerful and efficient gradient boosting framework designed for fast, distributed, high-performance gradient boosting based on decision tree algorithms. It's particularly well-suited for handling large datasets and complex machine learning tasks.

Key Concepts:

- **Gradient Boosting:** Like XGBoost, LightGBM builds an ensemble of weak learners (typically decision trees) sequentially, where each subsequent tree corrects the errors of the previous ones.
- **Decision Trees:** These are tree-like models that make decisions based on a series of if-else conditions. They are fundamental building blocks in many machine learning algorithms, including LightGBM.

COMPARE ADABOOST,XGBOOST AND LGBOOST

Feature	Adaboost	XGBoost	LightGBM
Concept	Adaptive Boosting	Gradient Boosting with Regularization	Gradient Boosting with Leaf-wise Tree Growth
Speed	Slow	Fast	Very Fast
Memory Usage	Low	Moderate	Low
Accuracy	Good	High	High
Overfitting	Can be prone	Less prone with regularization	Less prone
Handling Large Datasets	Can be challenging	Good	Excellent