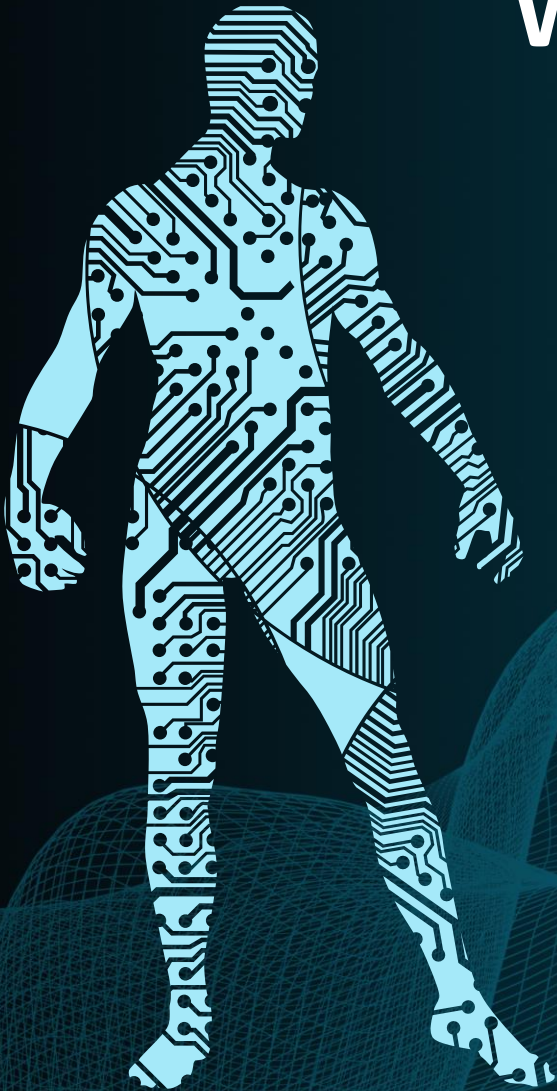




Boosting Algorithms

XGBoost Algorithm

What is the XGBoost Algorithm?



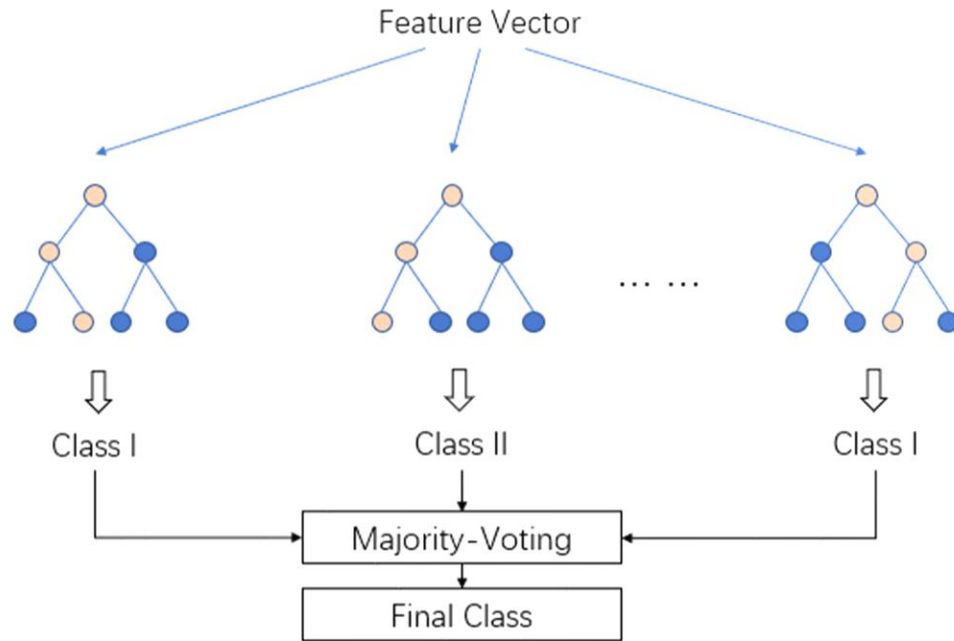
- XGBoost, or Extreme Gradient Boosting, is a machine learning algorithm under ensemble learning. It is trendy for **supervised** learning tasks, such as regression and classification. XGBoost builds a predictive model by combining the predictions of multiple individual models, often decision trees, in an iterative manner.
- The algorithm works by sequentially adding weak learners to the ensemble, with each new learner focusing on correcting the errors made by the existing ones. It uses a gradient descent optimization technique to minimize a predefined loss function during training.
- Key features of XGBoost Algorithm include its ability to handle complex relationships in data, regularization techniques to prevent overfitting and incorporation of parallel processing for efficient computation.

Working Steps of XGBoost

- Step 1: Initialize with a Simple Model.
- Step 2: Calculate Residuals.
- Step 3: Build a Tree to Predict Residuals.
- Step 4: Update Predictions.
- Step 5: Calculate New Residuals.
- Step 6: Build Another Tree.
- Step 7: Combine Predictions.



Flow chart of XGBoost Algorithm



Unique Features of XGBoost Model

- Regularization
- Handling sparse data
- Weighted quantile sketch
- Block structure for parallel learning
- Cache awareness
- Out-of-core computing



XGBoost Algorithm

Advantage	Disadvantage	Application
High Performance	Complexity	Used for tasks like fraud detection, churn prediction, and price forecasting.
Scalability	Significant Memory Usage	Used in ranking applications
Flexibility	slower to train compared to simpler models	Applied in forecasting applications
Regularization	Results can be less interpretable compared to simpler models	Effective in detecting anomalies in data due to its robustness and accuracy
Automatically can handles missing data	Dependency on Parameters	Used in genomics and other biological data analysis tasks.

Reference:

- <https://www.analyticsvidhya.com/blog/2018/09/an-end-to-end-guide-to-understand-the-math-behind-xgboost/>



THANK YOU!

