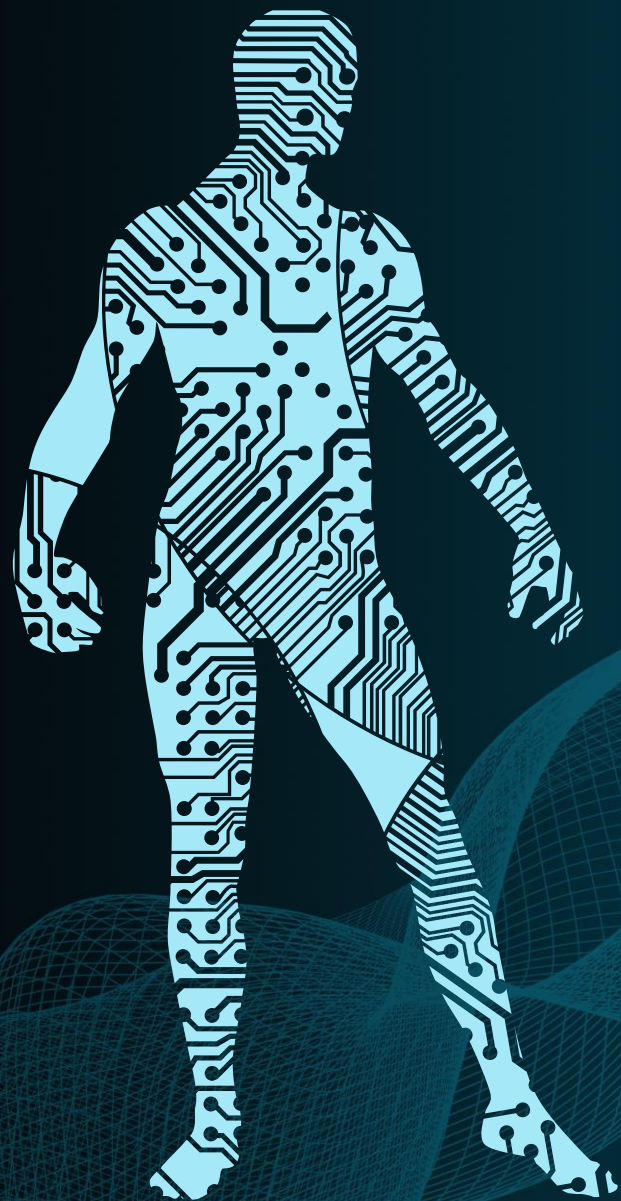




Boosting Algorithms

AdaBoost Algorithm



What is the AdaBoost Algorithm?

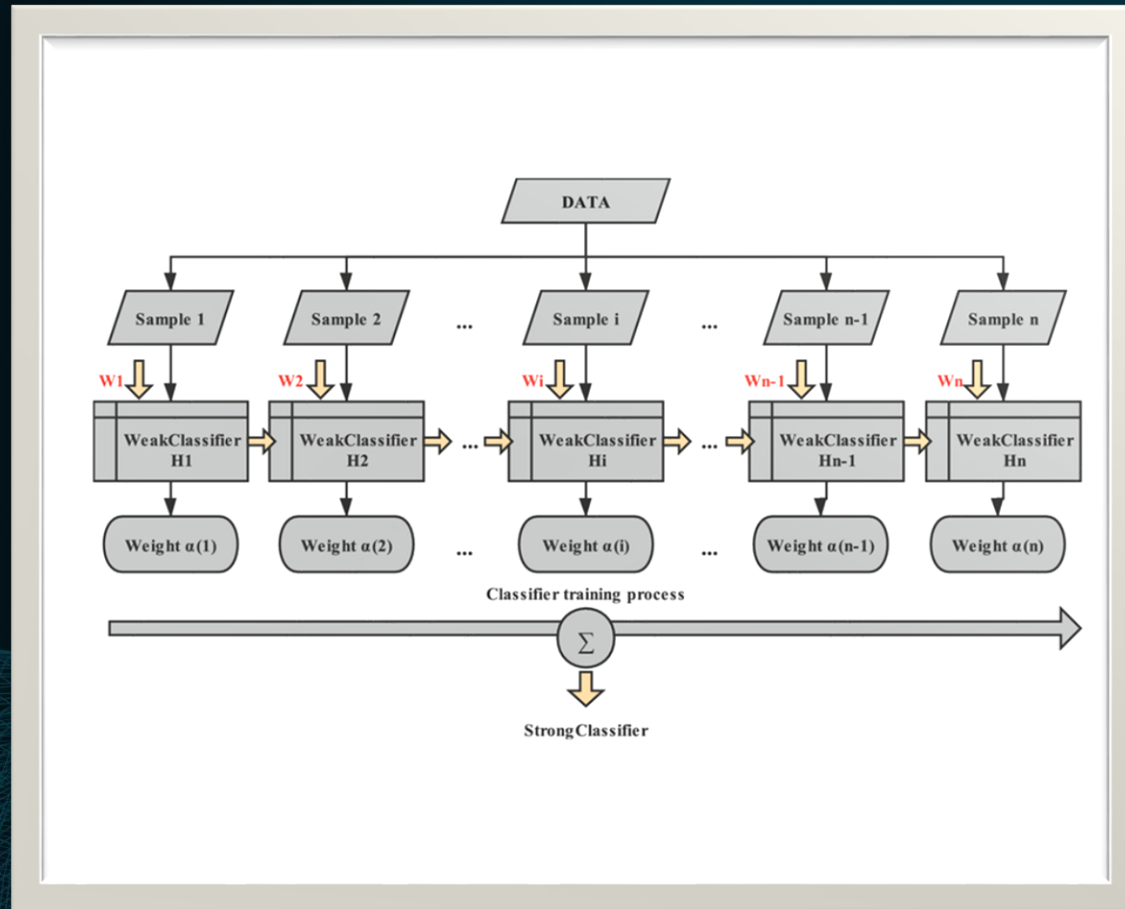
AdaBoost, short for Adaptive Boosting, is an ensemble machine learning algorithm that can be used in a wide variety of classification and regression tasks. It is a supervised learning algorithm that is used to classify data by combining multiple weak or base learners into a strong learner.

Working Steps of AdaBoost

- Step 1: Assigning Weights
- Step 2: Classify the Samples
- Step 3: Calculate the Influence
- Step 4: Calculate Total Error and Performance
- Step 5: Decrease Errors
- Step 6: Making New Dataset
- Step 7: Repeat Previous Steps



Flow chart of AdaBoost Algorithm



AdaBoost Algorithm Related Formulas

- The formula to calculate the sample weights

$$w(x_i, y_i) = \frac{1}{N}; \quad i = 1, 2, \dots, n$$

- The formula to calculate Performance of the Stump

$$\text{Performance of the Stump} = \frac{1}{2} \ln \left(\frac{1 - \text{Total Error}}{\text{Total Error}} \right)$$

- The formula to calculate New sample weight

$$\text{New sample weight} = \text{Old weight} * e^{\pm \text{Amount of say}(\alpha)}$$



AdaBoost Algorithm

Advantage	Disadvantage	Application
Improved Accuracy	Sensitivity to Noisy Data	Widely used in binary and multi-class classification problems
Easy to implement and understand	Strongly relies on the performance of weak learners	Effective in text categorization tasks
Requires fewer parameters to tune compared to other boosting algorithms	Can be slower to train compared to simpler algorithms	Applied in image recognition tasks
Has solid theoretical foundations	Complexity in Interpretation	Used in financial services for detecting fraudulent transactions
Focuses on harder-to-classify instances, improving the model iteratively	May not always find the best trade-off, particularly if the weak learners are not chosen appropriately.	Applied in healthcare for disease prediction and diagnosis based on medical data.

Reference:

- <https://www.analyticsvidhya.com/blog/2021/09/adaboost-algorithm-a-complete-guide-for-beginners/>



THANK YOU!

