AdaBoost Regressor in Machine Learning

By Ramani Nagarajan

Agenda

- Overview
- How AdaBoost Regressor Works
- Example: AdaBoost Regressor in Python

Overview

- AdaBoost Regressor is an ensemble learning algorithm designed to improve the performance of regression models by sequentially combining multiple weak learners (often shallow decision trees). It works by emphasizing data points that the previous models predicted poorly:

How AdaBoost Regressor Works

Initialization: Assign equal weights to all observations in the training set.

Weak Learner Training: Train a weak learner (typically a shallow decision tree) using the weighted data.

Error Calculation: Compute the error of this learner on the weighted data. Observations with higher errors receive more weight in the next iteration.

Update Weights: Increase the weights of mispredicted samples so that the next weak learner focuses more on these "hard" cases.

Iterative Boosting: Repeat the process for a set number of estimators (trees or learners), each time combining all learners' outputs using weighted sums to form the final prediction.

Final Prediction: The ensemble's prediction is the weighted sum of the predictions of all weak learners, with weights corresponding to each learner's accuracy.

Example: AdaBoost Regressor in Python

```
import pandas as pd
##Open CSV and assign values
dataset=pd.read_csv("50_Startups.csv")

dataset=pd.get_dummies(data,dtype=int,drop_first=True)
dataset.columns


independent=dataset[['R&D Spend', 'Administration', 'Marketing Spend','State_Florida', 'State_New York']]
dependent=dataset[["Profit"]]

##-SPLIT TRAIN & TEST

from sklearn.model_selection import train_test_split as tts

X_Train,X_Test,Y_Train,Y_Test=tts(independent,dependent,test_size=0.30,random_state=0)
```

```
##STANDARDIZATION

from sklearn.ensemble import AdaBoostRegressor


regressor = AdaBoostRegressor(random_state=0, n_estimators=100,loss=vLoss)

regressor=regressor.fit(X_Train,Y_Train)


##EVALUATION

y_predict = regressor.predict(X_Test)
#R-SQUARE
from sklearn.metrics import r2_score
r_score = r2_score(Y_Test,y_predict)

r_score
```

Thank you