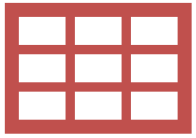
AdaBoostRegressor Scikit-learn

Hope Learning – Ilango.P 11th August 2025

Overview



AdaBoostRegressor is a meta-estimator that fits a sequence of regressors on modified versions of the data.

It implements the AdaBoost.R2 algorithm and improves performance of weak learners.

Focuses more on difficult cases by adjusting instance weights based on prediction errors.

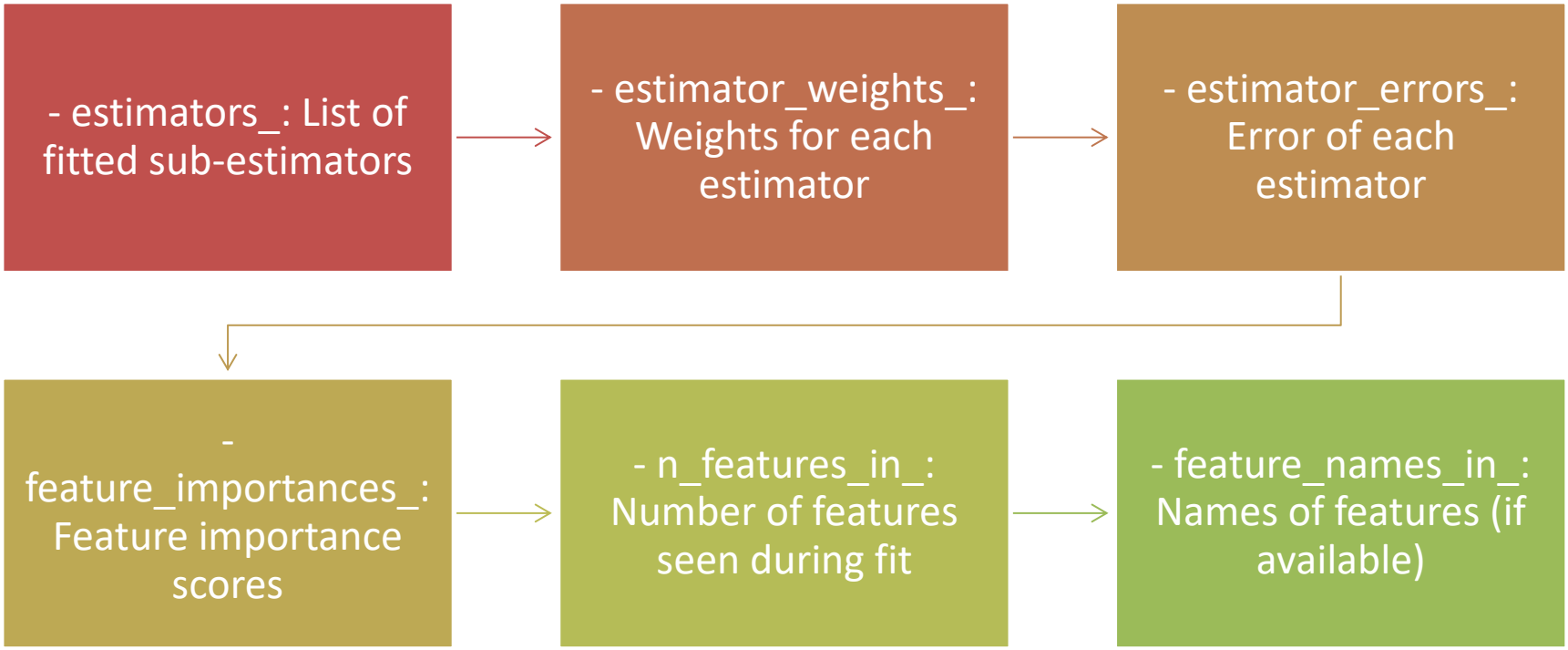
Constructor Parameters

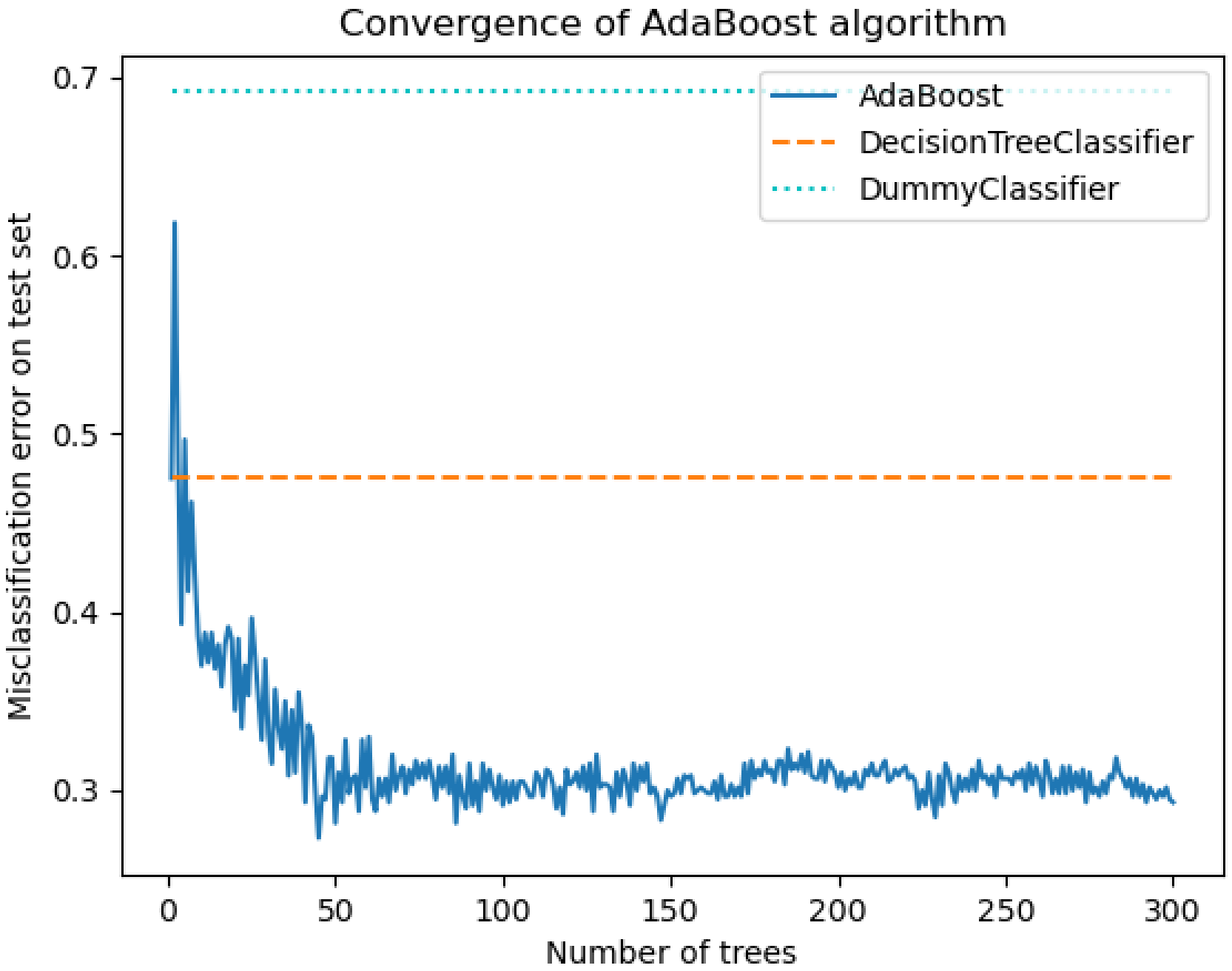
- **Function:**

  AdaBoostRegressor(estimator=None, n_estimators=50, learning_rate=1.0, loss='linear', random_state=None)

- **Parameter:**
  - - estimator: Base regressor (default: DecisionTreeRegressor(max_depth=3))
  - - n_estimators: Number of boosting rounds
  - - learning_rate: Weight applied to each regressor
  - - loss: Loss function ('linear', 'square', 'exponential')
  - - random_state: Controls randomness

Attributes


- estimators_: List of fitted sub-estimators
- estimator_weights_: Weights for each estimator
- estimator_errors_: Error of each estimator
- feature_importances_: Feature importance scores
- n_features_in_: Number of features seen during fit
- feature_names_in_: Names of features (if available)


Convergence of AdaBoost algorithm
AdaBoost
DecisionTreeClassifier
DummyClassifier
Misclassification error on test set
0.7
0.6
0.5
0.4
0.3
0
50
100
150
200
250
300
Number of trees

Key Methods

- fit(X, y): Train the model

- predict(X): Predict regression values

- score(X, y): Return R^2 score

- staged_predict(X): Generator for predictions after each stage

- staged_score(X, y): Generator for scores after each stage

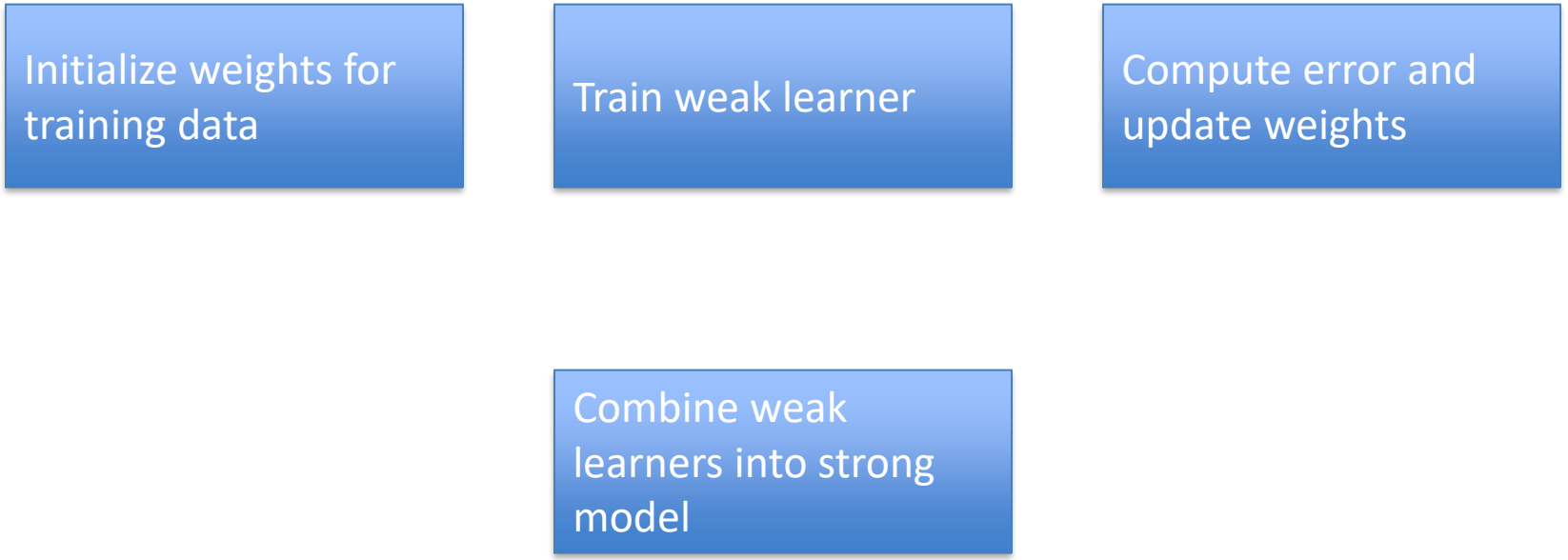
Example Usage

```
from sklearn.ensemble import
AdaBoostRegressor
```

```
regressor = AdaBoostRegressor(learning_rate =
0.5, n_estimators = 100)
```

```
regressor.fit(X_train,y_train)
```

AdaBoost Algorithm Diagram



Training Process Flowchart