

Introduction to Boosting

Ensembles

(Bootstrap Aggregation)

(Base learner) Bagging

→ Random forest classifier
→ Random forest regressor.

Boosting

① AdaBoost

② Gradient Boosting

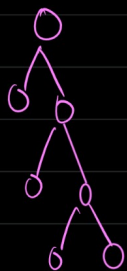
③ XG Boost.

{ Bagging: base learner (Decision Trees)

Boosting: weak learners

(Decision trees)

⇒ for both regression & classification problem suitably.



DT → lead to overfitting (high variance)

↓
To reduce this

Bagging → Random forest

* Bagging reduces the variance

(multiple overfitted model combined reduces the variance)

* Boosting (Boost $\overline{5\pi 1}$)

Principles:-

Build a first model on training dataset and then build a second model to rectify the errors present in the first model. This procedure is continued until and unless the errors are minimised / data is correctly predicted.



(Model is very simple/
Not trained properly -
not learned much
from data)

Analogy:-

→ Football → pass the ball

→ easy to break on stick but hard for a group.

* Prediction

Bagging

→ classification: Voting
→ Regression: Average.

Boosting

$M_1 \rightarrow M_2 \rightarrow M_3 \dots M_n$

$\alpha_1(M_1) + \alpha_2(M_2) + \dots + \alpha_n(M_n)$

Strong learners

$\alpha_1, \alpha_2 \dots \alpha_n \Rightarrow$ weights