

08/08/2025

Lab 8
Implementing Boosting algorithm on
a given dataset.

To create

Step by Step Solution for Decision Stump for CGPA

Learning

Validation

Sample Data Recaps	Interaction	Practical Knowledge	Communication Skill	Job profile
CGPA	Yes	Good	Good	Yes
>=9		Good		Yes
<9	No	Average	Moderate	No
>=9	No	Average	Moderate	No
<9	Yes	Good	Good	Yes
>=9	Yes	Good	Moderate	Yes
<9	Yes	Good	Moderate	Yes

Step 1 Indicator Sample weights

$w_i = \frac{1}{n} \approx 0.167$ for each sample.

Step 2 Build Decision Stump on CGPA

Condition CGPA >= 9 → predict Yes, else predict No

Apply this rule to all rows

Index	CGPA	Actual label	Predicted label	Correct
0	>=9	Yes	Yes	✓
1	<9	Yes	No	✗
2	>=9	No	Yes	✗
3	<9	No	No	✓
4	>=9	Yes	Yes	✓
5	>=9	Yes	Yes	✓

Step 2) Calculate weighted error

$$\text{Error} = \sum_{\text{misclassified}} w_i = w_1 + w_2 = \frac{1}{6} + \frac{1}{6} = \frac{2}{6}$$

Step 3) compute stump weight (alpha)

$$\alpha = \frac{1}{2} \ln \left(\frac{1 - \text{error}}{\text{error}} \right) = \frac{1}{2} \ln \left(\frac{1 - 0.333}{0.333} \right) \\ = \frac{1}{2} \ln(2) \approx 0.3466$$

Final Answer to write in observation board

Decision Step on CHDS

* Rule: if $\text{CHDS} > 9 \rightarrow$ predict yes, else no,

* weighted error: 0.333,

* Alpha (Stump weight) ≈ 0.3466

✓ correctly classified points 0, 3, 4, 5

x misclassified points 1, 2, 6

Towards

1. For "Inaccuracy" dataset

what is the best accuracy score and confusion matrix
the Classifier you obtained and along here may
find it

1. Using n estimator = 101

Accuracy 81.80%

Confusion matrix

[[6780 632]

[1144 1011]

2. Put result from fine tuning (on estimator) in
 range ~~73~~ steps 2.

Put array 83,3376

Put adjustment matrix

[[7015 399]

[1223 1132]].

$$(0.1, 0.1) = 1$$

$$(0.5, 0.2) = 1$$

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$$(0.5, 0.2) = 1$$

$$(0.5, 0.2) = 1$$

$$(0.2, 0.1) = 1$$

$$(0.1, 0.2) = 1$$

2. Put result from fine tuning

$$(0.1, 0.2) = 1$$

$$(0.5, 0.2) = 1$$

range

$$(0.5, 0.2) = 1$$

$$(0.5, 0.2) = 1$$