Lab - 8

Implement Boosting ensemble method on a given dataset.

CGPA	Interactive	Practical knowledge	Communicate skills	Job profile
>=9	Yes	Good	Good	Yes
<9	No	Good	Moderate	Yes
>=9	No	Average	Moderate	No
<9	No	Average	Good	No
>=9	Yes	Good	Moderate	Yes
>=9	Yes.	Good	moderate	Yes.

Step -1 Dataset Summary.

Instance	CGPA	Job profile
1	>=9	Yes
2	<9	Yes
3	>=9	No
4	<9	No
5	>=9	Yes.
6	>=9	Yes

Step 2: Initialize weights.

In adaBoost, we start with equal weight for all samples.

Total = 6 sample

Each sample weight = 1/6 = 0.1667

Step 3 : Decision Stump Based on CGPA

If CGPA >=9 then predict "yes" else predict "No"

Instance	CGPA	True Label	Predict	Correct
1	>=9	Yes	Yes	✓
2	<9	Yes	No	✗
3	>=9	No	Yes	✗
4	<9	No	No	✓
5	>=9	Yes	Yes	✓
6.	>=9	Yes.	Yes.	✓

Step 4 : weight error (ε)

Error : Sum of weight of misclassified sample

Misclassified : Instance 2 and 3.
weight per Instance = 1/6.
$\varepsilon = 1/6 + 1/6 = 2/6 = 0.3333$.

Step 5 : Alpha (classifier weight)

$$\alpha = \frac{1}{2} \ln\left(\frac{1-\varepsilon}{\varepsilon}\right) = \frac{1}{2} \ln\left(\frac{1-0.333}{0.333}\right) =$$

$$= \frac{1}{2} \ln(2) \approx 0.3466.$$

Step 6: Final Decision Stump Rule

If CGPA >=9 → Predict Yes;
Else Predict No

Weighted Error: 0.3333.

Alpha : 0.3466.

Final answer

If CGPA >=9 then job profile = Yes;
else No

weighted Error = 0.3333.

Alpha = 0.3466.