

3] Training Labels associated with binary classifier:

$$t = \{1, 1, 0, 0, 1, 0, 0, 1, 1, 0\}$$

Confidence values of target

$$c = \{0.85, 0.9, 0.1, 0.05, 0.7, 0.2, 0.1, 1.0, 0.8, 0.9\}$$

Weighted Sum  $z = \vec{w}x + w_0$

$$z = \{4, 5, -5, -6, 1, -1.5, -1, -1, 4.5, 5.5\}$$

if  $z \geq \delta$   
 $\rightarrow y = 1$   $y = \text{phi}(z)$

①

$$\delta = \{-5.5, -4, -1, -0.5, 0, 1.5, 3, 4, 5, 5.5\}$$

Prediction for each  $\delta$

- $y_{-5.5} = \{1, 1, 1, 0, 1, 1, 1, 1, 1, 1\}$  TP=5 FP=4 FN=0
- $y_{-4} = \{1, 1, 0, 0, 1, 1, 1, 1, 1, 1\}$  TP=5 FP=3 FN=0
- $y_{-1} = \{1, 1, 0, 0, 1, 0, 1, 1, 1, 1\}$  TP=5 FP=2 FN=0
- $y_{-0.5} = \{1, 1, 0, 0, 1, 0, 0, 0, 1, 1\}$  TP=4 FP=1 FN=1
- $y_0 = \{1, 1, 0, 0, 1, 0, 0, 0, 1, 1\}$  TP=4 FP=1 FN=1
- $y_{1.5} = \{1, 1, 0, 0, 0, 0, 0, 0, 1, 1\}$  TP=3 FP=1 FN=2
- $y_3 = \{1, 1, 0, 0, 0, 0, 0, 0, 1, 1\}$  TP=3 FP=1 FN=2
- $y_4 = \{1, 1, 0, 0, 0, 0, 0, 0, 1, 1\}$  TP=3 FP=1 FN=2
- $y_5 = \{0, 1, 0, 0, 0, 0, 0, 0, 0, 1\}$  TP=1 FP=1 FN=4
- $y_{5.5} = \{0, 0, 0, 0, 0, 0, 0, 0, 0, 1\}$  TP=0 FP=1 FN=5

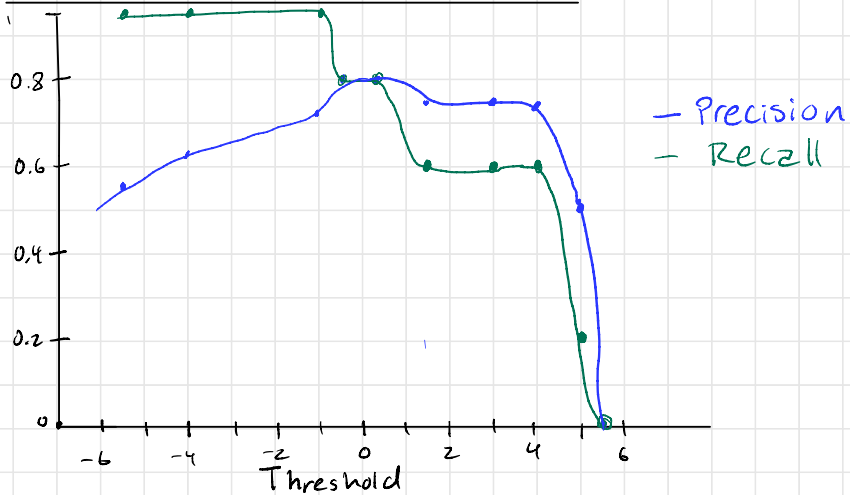
|           | $\delta$ |       |      |      |     |      |      |      |     |     |
|-----------|----------|-------|------|------|-----|------|------|------|-----|-----|
|           | -5.5     | -4    | -1   | -0.5 | 0   | 1.5  | 3    | 4    | 5   | 5.5 |
| Precision | 0.56     | 0.625 | 0.71 | 0.8  | 0.8 | 0.75 | 0.75 | 0.75 | 0.5 | 0   |
| Recall    | 1        | 1     | 1    | 0.8  | 0.8 | 0.6  | 0.6  | 0.6  | 0.2 | 0   |

$$\text{Precision} = \frac{TP}{TP+FP}$$

$$\text{Recall} = \frac{TP}{TP+FN}$$

②

Precision-recall curve



③ I would use a threshold of  $-0.5$  or  $0$  to get a precision  $\geq 80\%$ .

④. if  $z \geq 1$   
 $t = \{1, 1, 0, 0, 1, 0, 0, 1, 1, 0\}$   
 $y = \{1, 1, 0, 0, 1, 0, 0, 0, 1, 1\}$

$$TP = 4$$

$$FP = 1$$

$$FN = 1$$

$$TN = 4$$

| actual/predict | class 0 | class 1 |
|----------------|---------|---------|
| class 0        | 4       | 1       |
| class 1        | 1       | 4       |