Random Classifier Baselines

We would like to see how well a classifier compares against a random classifier

Exercise

- Consider a classifier X that has **Accuracy = 50%** on a (test) dataset with a class taking 2 possible values (A, B).
- The distribution of the instances for each class value is A:50, B:50.
- How does X compare to a random classifier Y that outputs A, and B, 50%, 50% of the time, respectively.

Answer:

Y' accuracy:

(50*50/100 + 50*50/100)/100 = 50%

- So, X performs the same (accuracy-wise) as Y.

Exercise

- Consider a classifier X that has **Accuracy = 50%** on a (test) dataset with a class taking 4 possible values (A, B, C, and D).
- The distribution of the instances for each class value is A:25, B:25, C:25, and D:25.
- How does X compare to a random classifier Y that outputs A, B, C, and D 25%, 25%, 25%, and 25% of the time, respectively.

Answer:

Y' accuracy:

(25*25/100 + 25*25/100 + 25*25/100 + 25*25/100)/100 = 25%

- So, X does twice better than Y (accuracy-wise).

Exercise

- The distribution of the instances for each class value is A:25, B:25, C:25, D:25.
- Random classifier Y outputs A, B, C, and D, 25%, 25%, 25%, and 25% of the time, respectively.

- Precision and Recall (wrt A)?

Answer:

Y will say 25% of the time “A” and 75% of the time “not A”.

So, TP+FP = 25%

Out of 25% it says “A”, only ¼ of the time it will be right.

So, TP=25% / 4 = 6.25%

Finally, P = 25%

Precision = TP/(TP+FP) = 6.25/25 = 25%

Recall = TP/P = 6.25/25 = 25%

Exercise

- The distribution of the instances for each class value is A:10, B:40, C:25, D:25.
- Random classifier Y outputs A, B, C, and D, 50%, 30%, 10%, and 10% of the time, respectively.

- Precision and Recall (wrt A)?

Answer:

Y will say 50% of the time “A” and 50% of the time “not A”.

So, TP+FP = 50%

Out of 50% it says “A”, only 1/10 of the time it will be right.

So, TP=50% / 10 = 5%

Finally, P = 10%

Precision = TP/(TP+FP) = 5/50 = 10%

Recall = TP/P = 5/10 = 50%