Binary Classification and Performance Measures

Active Learning: Session 5, Feb 11, 2020

Suppose that Fereydoon has developed a binary classification model to classify Autism Spectrum Disorder (ASD) based on fMRI data. The model has been trained on a large pool of heterogeneous multi-site datasets with subjects aged 1-55 year-old, and with balanced number of the two classes (almost equal number of ASD-Positive vs ASD-Negative).

The following table shows the results of testing the model on a small dataset that contains fMRI data from only one site, recorded from 10 subjects (age range 2-18 year-old). Actual classes have been confirmed by expert psychiatrists.

Subject ID	Actual Class	Predicted Class
S1	ASD-Negative	ASD-Positive
S2	ASD-Negative	ASD-Positive
S3	ASD-Positive	ASD-Positive
S4	ASD-Negative	ASD-Negative
S5	ASD-Negative	ASD-Positive
S6	ASD Negative	ASD-Positive
S7	ASD-Negative	ASD-Positive
S8	ASD-Negative	ASD-Negative
S9	ASD-Positive	ASD-Negative
S10	ASD-Negative	ASD-Negative

(A) Count the following from the table:

➤ True Positive (TP): Number of rows where "Actual Class" is ASD-Positive and "Predicted Class" is also ASD-Positive.

➤ True Negative (TN): Number of rows where "Actual Class" is ASD-Negative and "Predicted Class" is also ASD-Negative.

➤ False Positive (FP): Number of rows where "Actual Class" is ASD-Negative but "Predicted Class" is ASD-Positive.

➤ False Negative (FN): Number of rows where "Actual Class" is ASD-Positive but "Predicted Class" is ASD-Negative.

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(B) Based on the numbers you just calculated in part (A), fill in the confusion matrix:

TP =	FP =
FN =	TN =

(C) What is the accuracy of the model?   Accuracy = (TN + TP)/(TN+TP+FN+FP)

(D) What is the Precision and Recall of this classification model? Precision = TP/(TP+FP)

Recall = TP/(TP+FN)