

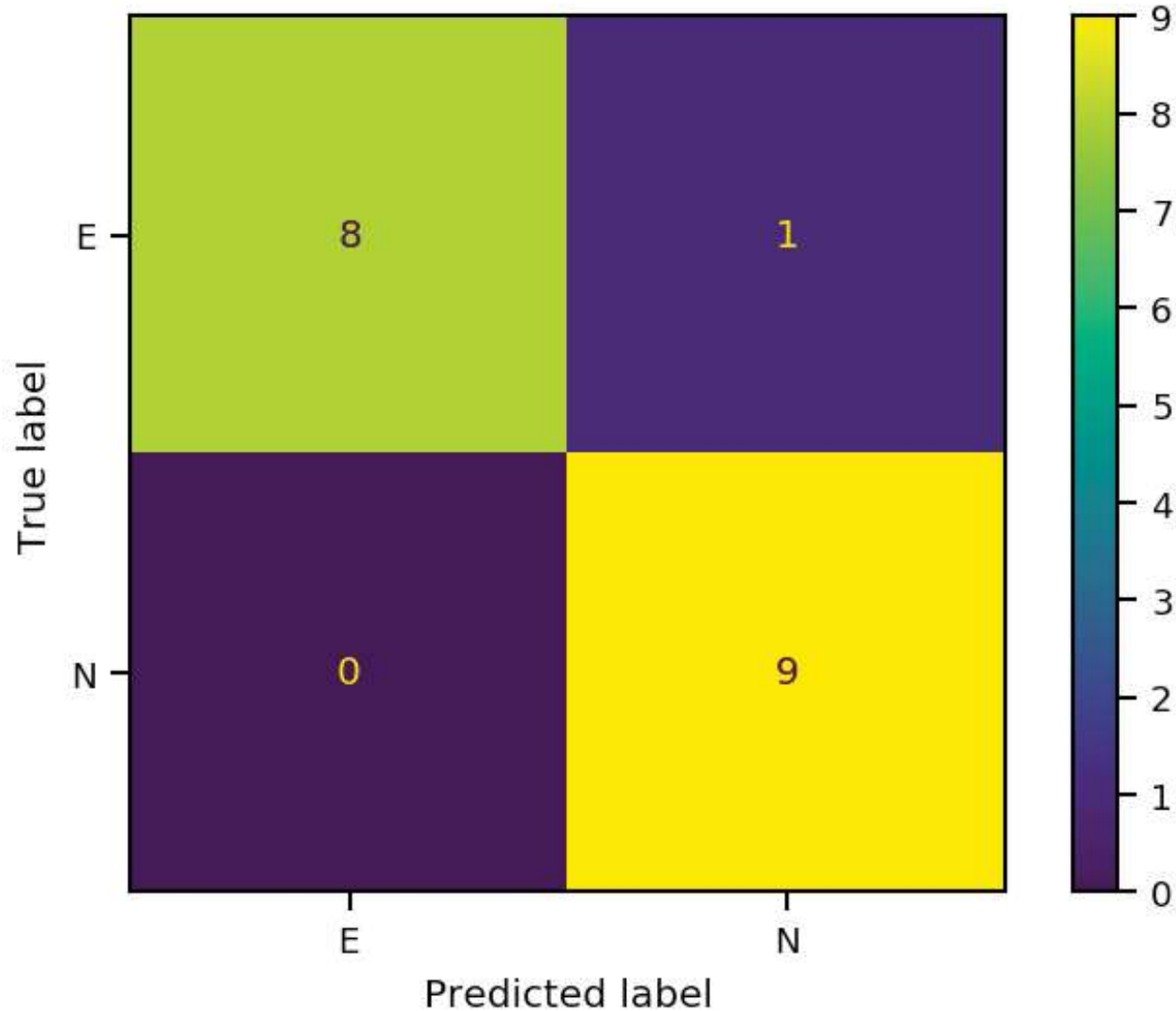
Lecture 16:

Classification

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Diagnostics for classification

Confusion matrix



Accuracy score

$$\text{obs} \begin{cases} x_1, x_2, \dots, x_{N^v} \\ y_1, y_2, \dots, y_{N^v} \end{cases}$$

$$\text{pred} \quad \hat{y}_1, \hat{y}_2, \dots, \hat{y}_{N^v}$$

$$\text{acc}(\hat{y}_{1:N^v}, y_{1:N^v}) = \text{\% of observations correctly}$$

$$= \frac{1}{N^v} \sum_{i=1}^{N^{\text{predicted}}} \mathbb{1}_{\{\underline{y_i}\}}(\underline{\hat{y}_i})$$

Imbalanced data



N N N N N N D N N N ...

Stupid Model(x) = N with 100% prob.

→ 99% accuracy because D happens only 1% of the time.

Because of imbalance between N and D.



PREDICTIVE
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True positives = TP = # of correctly predicted D.

True negatives = TN = # of correctly predicted N.

False positives = FP = # of predicted D that were wrong.

False negatives = FN = # of predicted N that were wrong.

Sensitivity = $\frac{TP}{TP + FN}$ = % of D that were predicted correctly.

Specificity = $\frac{TN}{TN + FP}$ = % of N that were predicted correctly.

Balanced accuracy = $\frac{1}{2} (\text{Sensitivity} + \text{Specificity})$

= $\frac{1}{2} (\% \text{ of corr. pred. D's} + \% \text{ of corr. pred. N})$

Stupid Model's balan. acc. = $\frac{1}{2} (0 + 1) = 0.5$

More Metrics

- Cross entropy loss
- Receiver operating characteristics curve
- f1-score
- Brier score
- ...