Digital Transformation of Healthcare

Evaluating Predictions

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Objectives

After this lecture students will be able to

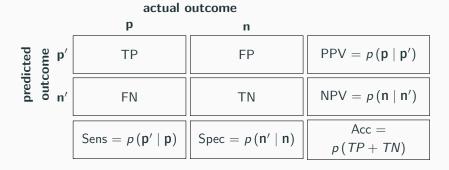
- Distinguish between classification and regression metrics
- Compare and contrast the use of different metrics to evaluate predictions

Metrics for Evaluation of Classification Models

Confusion Matrix

actual outcome p n TP FP PPV = $\frac{TP}{TP + FP}$ Sens = $\frac{TP}{TP + FN}$ Spec = $\frac{TN}{FP + TN}$ Acc = $\frac{TP + TN}{TP + TN + FP + FN}$

Confusion Matrix



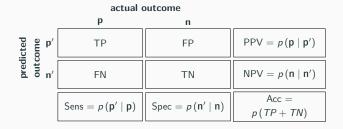
actual outcome

| | р | n | |
|-----------------------------|---|----------------------------------|--|
| predicted outcome u d | TP | FP | $PPV = p(\mathbf{p} \mid \mathbf{p}')$ |
| pred outc | FN | TN | $NPV = p(n \mid n')$ |
| | $Sens = p(\mathbf{p}' \mid \mathbf{p})$ | $Spec = p\left(n' \mid n\right)$ | Acc = p(TP + TN) |

| Condition | Stats | Example |
|-----------------------------------|----------|---|
| High Sensitivity, Low Specificity | p' >> n' | test is always positive |
| Low Sensitivity, High Specificity | n'>>p' | test is always negative |
| High PPV, Low NPV | p >> n | high disease prevalence |
| Low PPV, High NPV | n >> p | low disease prevalence |
| High PPV, Low Sensitivity | FN >> FP | say they are negative most of the time for a high preva |
| High Sensitivity, Low NPV | | |
| High Specificity, Low NPV | | |
| High PPV, Low Specificity | | |
| | | |

Mean rates (events per 1000 patient days) of incidents in Phase 1 and Phase 2. Paired comparisons were made using t-tests

Confusion Matrix



- Sensitivity and 1 Specificity
- PPV and 1 NPV
- Sensitivity and PPV
- Sensitivity and 1 NPV
- Specificity and 1 PPV
- Specificity and NPV

- Sensitivity = TP:FN (say everyone is positive)
- Specificity = TN:FP (say everyone is negative)
- PPV = TP:FP (high prevalence disease)
- NPV = TN:FN (low prevalence disease)
- Accuracy = (TP + TN):(FP + FN)