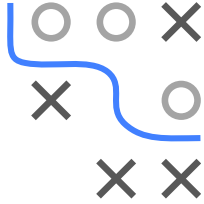
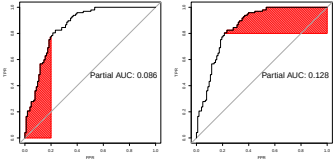
Introduction to Machine Learning



Evaluation: Partial AUC

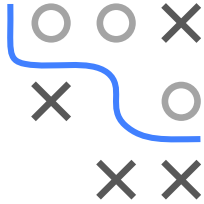


Learning goals

- Understand that entire AUC is not always relevant
- Learn about partial AUC

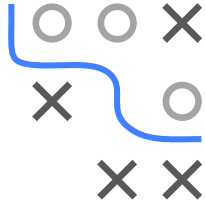
PARTIAL AUC

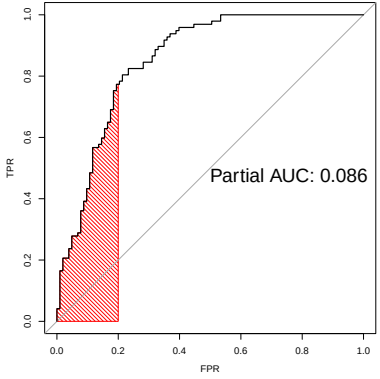
- TPR and FPR often treated asymmetrically in biomed contexts
- TPR = disease detection, is crucial
- But low FPR needed to avoid unnecessary treatments
- Common solution: Fix either TPR or FPR to a required value and optimize the other, but not easy to select exact point

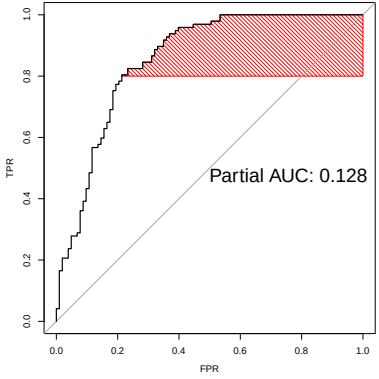


PARTIAL AUC / 2

- Can be useful to limit region under ROC curve
- E.g. FPR > 0.2 or TPR < 0.8 might not be acceptable for task, then we don't want to integrate over that region



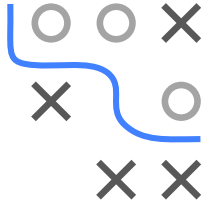




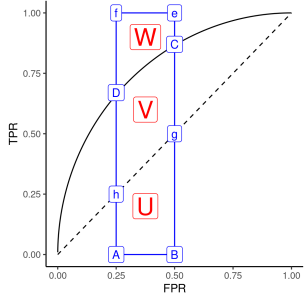
CORRECTED PARTIAL AUC

- Range of pAUC depends on cut-off values
- Normalize to $[0, 1]$:

$$\text{pAUC}_{\text{corrected}} = \frac{1}{2}\left(1 + \frac{\text{pAUC} - \text{pAUC}_{\text{min}}}{\text{pAUC}_{\text{max}} - \text{pAUC}_{\text{min}}}\right),$$



- pAUC is V+U = "A-B-C-D"
- pAUC_{min} is pAUC of random classifier, so U = "A-B-g-h"
- pAUC_{max} is U+V+W = "A-B-e-f"
- Compute percentage of V in V+W
- Rescale so random=0.5; optimal=1



2WAY PARTIAL AUC

- Can also limit both TPR and FPR
- 2way pAUC = compute area under 2way limited segment