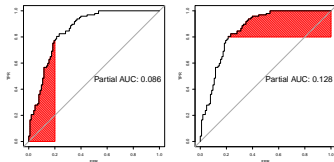
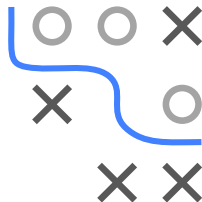


# Introduction to Machine Learning

## Evaluation Partial AUC



### Learning goals

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

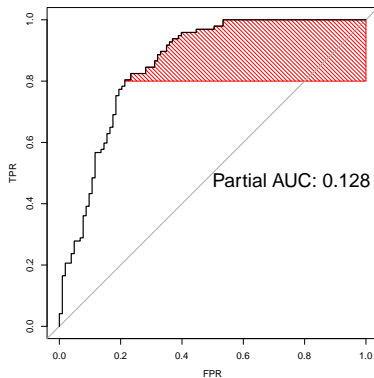
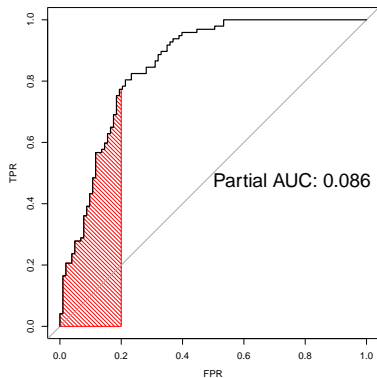
# PARTIAL AUC

- 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

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

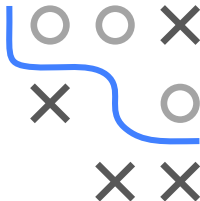
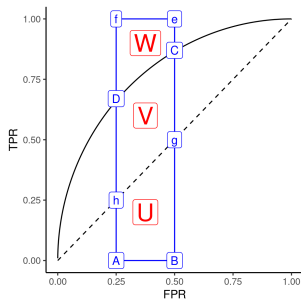


## CORRECTED PARTIAL AUC

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

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

- $pAUC$  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

