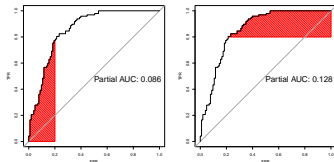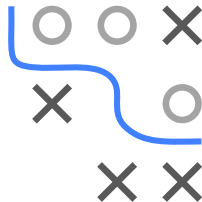# Introduction to Machine Learning

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
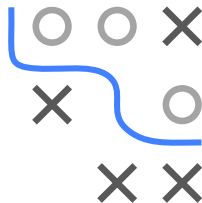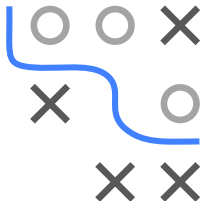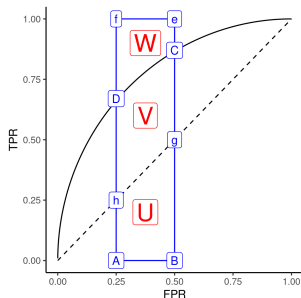
CORRECTED PARTIAL AUC

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

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

- 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