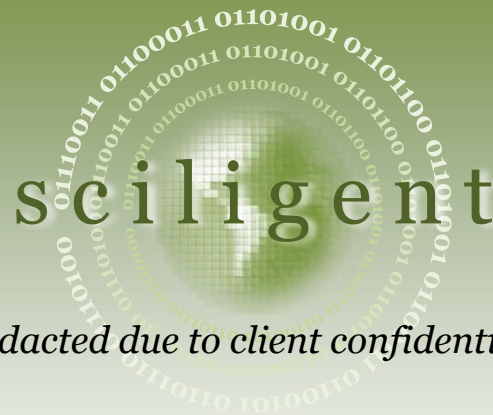


Example ROC Curve Analysis



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Artjay Javier

artjay.javier@sciligent.com

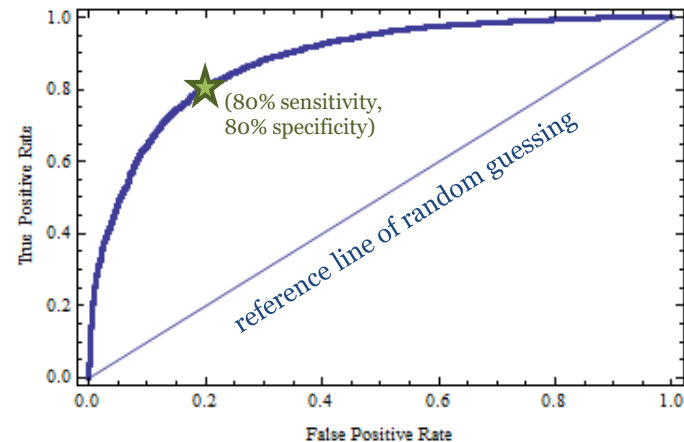
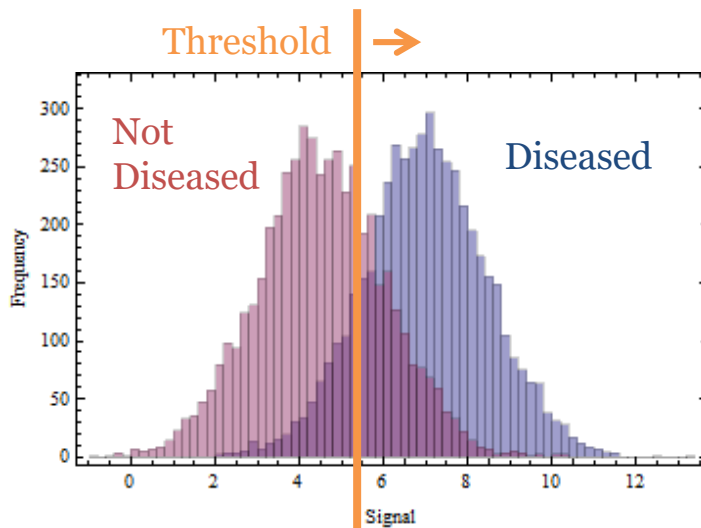
Managing Director, Sciligent, LLC

Introduction to ROC Analysis

- **Receiver Operating Characteristic (ROC) Analysis** is a popular statistical analysis used to describe diagnostic testing performance in many diverse fields.
- The **diagnostic threshold is allowed to “float”** to create a performance curve
- Considers **only positively diagnosed cases** and accuracy of positive diagnosis

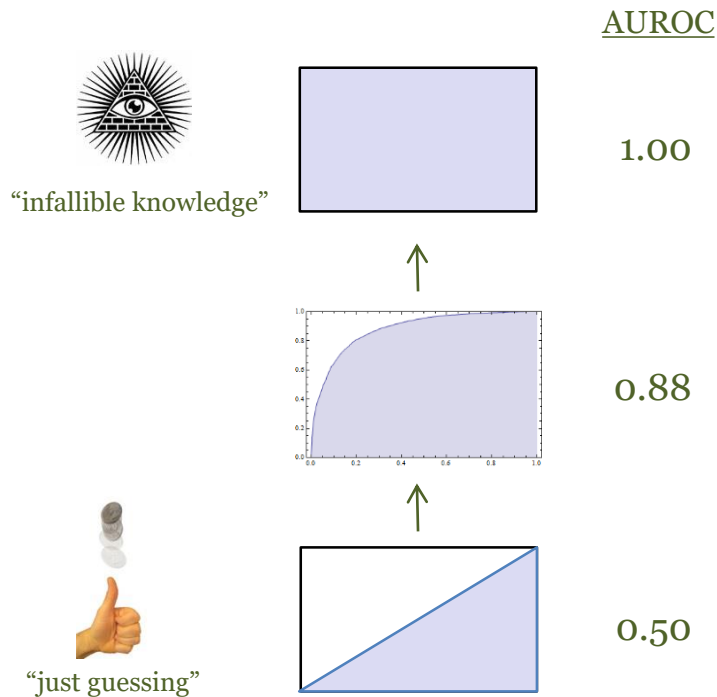
True Positive Rate = fraction of positively diagnosed and *actually diseased* relative to all *actually diseased cases*

False Positive Rate = fraction of positively diagnosed and *actually not diseased* relative to all *actually not diseased cases*

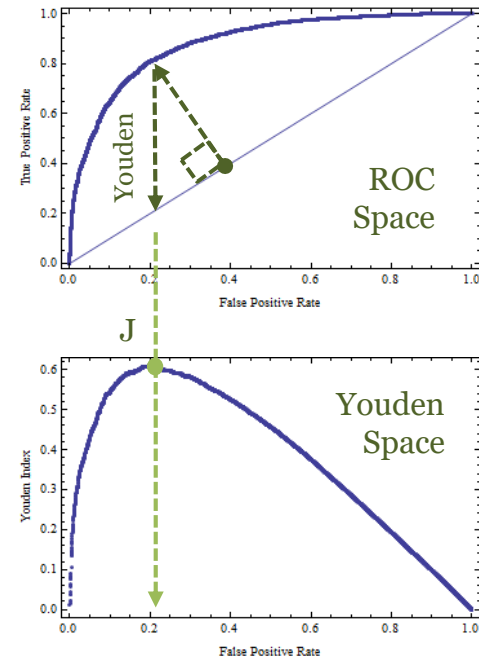


Useful ROC Metrics

- Total performance described as **Area Under the ROC (AUROC)**
- Optimal performance corresponding to diagnostic threshold can be found using **Youden's Index**, and maximizing it to find the **J-statistic**



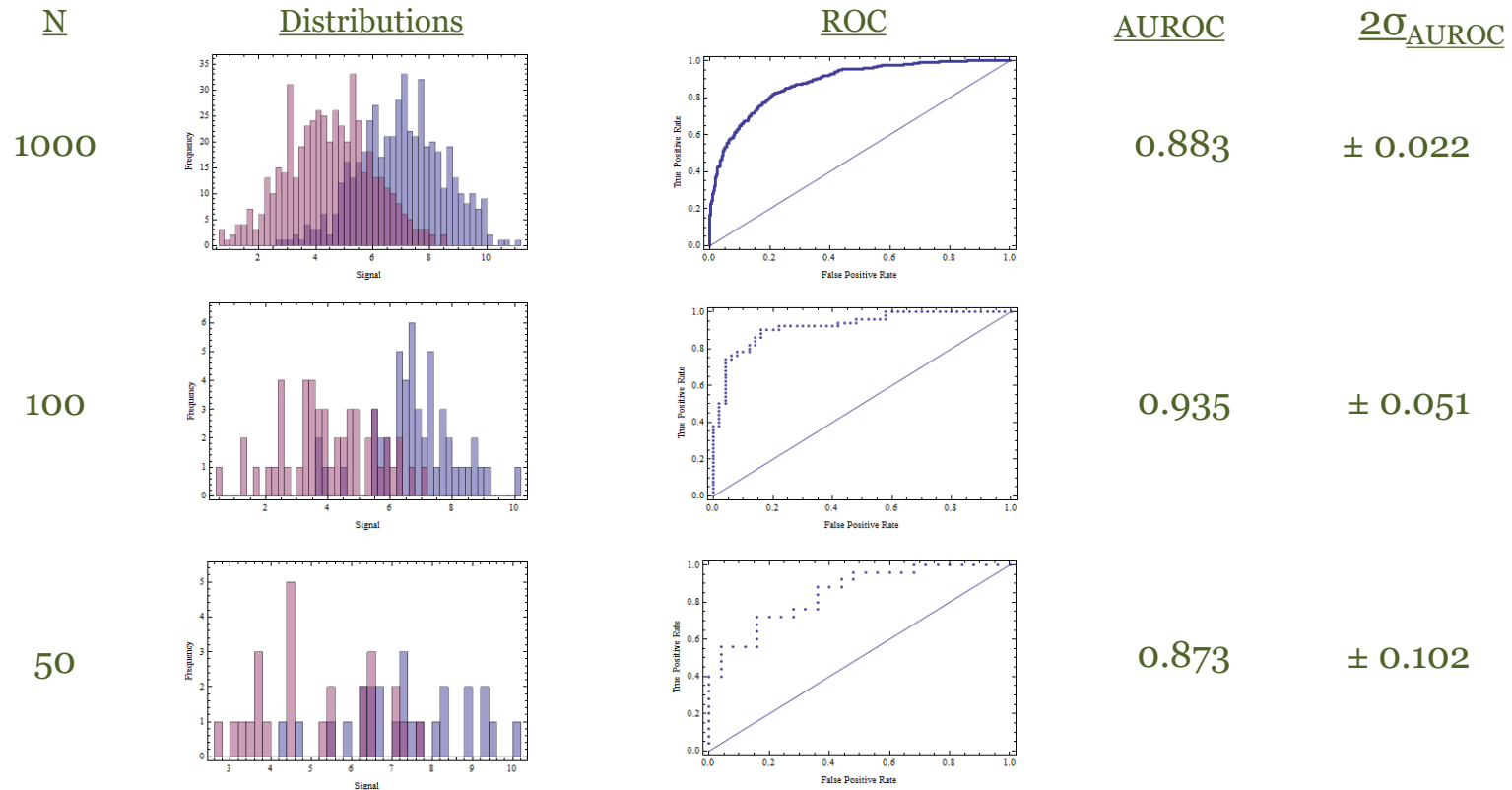
$$\text{Youden Index} = \text{True Positive Rate} - \text{False Positive Rate}$$



The optimal threshold corresponds to where Youden curve is maximized

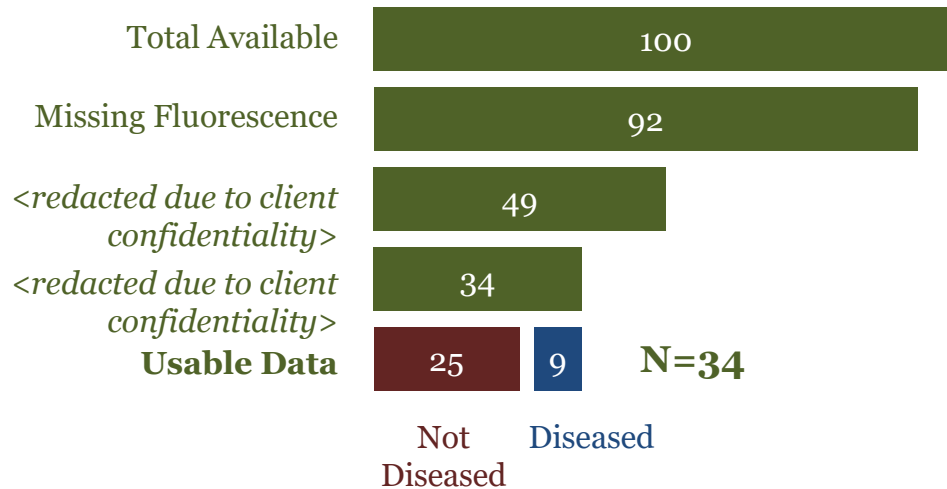
Sources of Error

- **AUROC standard error** is calculated based on standard deviations of distributions
- **Small number** of observations (N) produces large errors
- **Unsymmetric** diseased and not diseased populations contribute to error



Assessment of Data

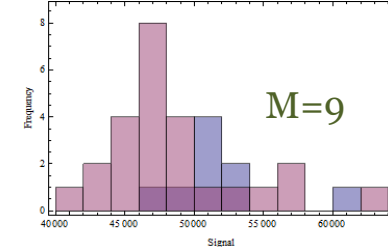
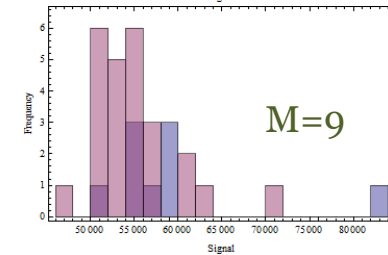
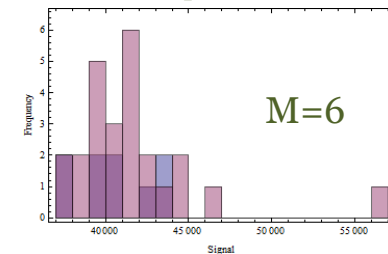
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Example Data

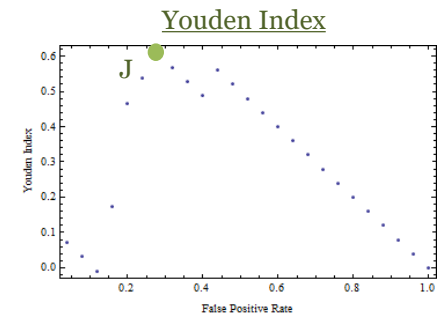
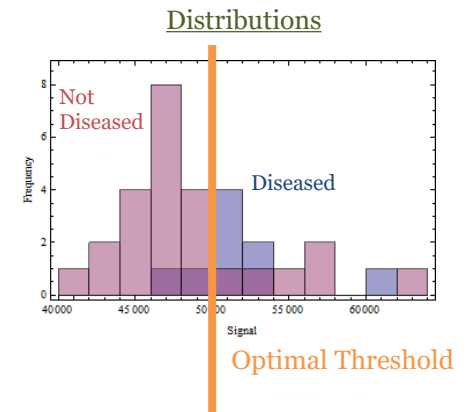
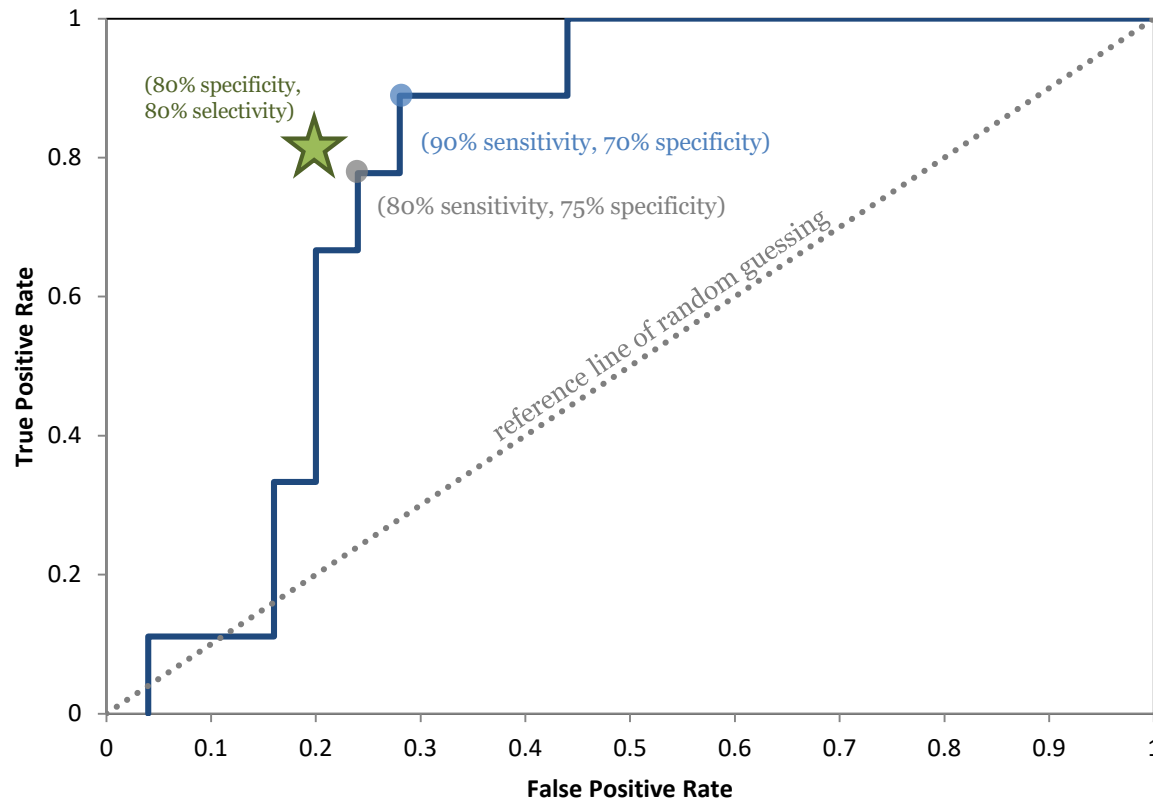
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Example Data



Best ROC Curve

– <redacted due to client confidentiality>



Summary & Outlook

- Summary
 - *<redacted due to client confidentiality>*
- Potential Areas of Improvement
 - *<redacted due to client confidentiality>*