Lesson:
ROC Curves
Part c:
How does this relate to logistic regression?

Two Types of Error

False positive ("false alarm"), FP
alarm sounds but person is not carrying metal
= 1 - specificity

False negative ("miss"), FN
alarm doesn’t sound but person is
carrying metal = 1 - sensitivity

Typical Results of Testing

Non-diseased
patient
Diseased
patient
Threshold
False Negatives
False Positives
Negative Test
π < 0.5
Positive test
π > 0.5
Test result value (Logistic \( P(Y=1) = \pi \))
ROC Curves in SAS

/* area under the curve is a statistic - generally speaking, the larger the better */
proc logistic data=diabetes descending;
  model event=diabetes gender diabetes_gender /noscore;
 ods; /* plotting the roc curve */
  symbol1 i=join v=none c=blue;
  proc gplot data=roc1;
  title 'ROC Curve';
  plot _sens_*_1mspec_=1 / vaxis=0 to 1 by .1 cframe=ligr;
  run;

Model event=diabetes gender diabetes_gender

Association of Predicted Probabilities and Observed Responses

<table>
<thead>
<tr>
<th>Percent Concordant</th>
<th>Somers’ D</th>
<th>Spearman</th>
<th>Gini</th>
</tr>
</thead>
<tbody>
<tr>
<td>47.7</td>
<td>0.206</td>
<td>0.286</td>
<td>0.603</td>
</tr>
<tr>
<td>27.1</td>
<td>0.276</td>
<td>0.286</td>
<td></td>
</tr>
<tr>
<td>25.2</td>
<td>0.055</td>
<td></td>
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<tr>
<td>41741</td>
<td></td>
<td>0.603</td>
<td></td>
</tr>
</tbody>
</table>
Model event=diabetes gender
diabetes_gender

Comparative Performance

ROC Curve

( Chest film study by E. James Potchen, M.D., 1999 )