ROC & AUC

Precision or Recall?

Data	Accuracy	Precision	Recall
1 1 1 1 1 0 1 0 1 1			
1 1 1 1 1 0 1 0 1 1	80%	0%	0%
1 1 0 1 1 1 1 0 1 1	80%	50%	50%
1 1 0 0 1 0 1 0 1 0	70%	40%	100%

1: Not fraud
0: Fraud

Accuracy = correctly classified/total data

Precision = Actually positive among predicted positive / totally positive prediction

Recall = Correctly predicted positive among actually positive /Actually positive

ROC

X	Y	Y(T0)	Y(T3)	Y(T5)	Y(T6.5)	Y(T9.5)
1	0	1	0	0	0	0
4	0	1	1	0	0	0
5	0	1	1	0	0	0
6	1	1	1	1	0	0
7	1	1	1	1	1	0
9	1	1	1	1	1	0

P/A (T0)	1	0
1	3	0
0	3	0

TPR=TP/(TP+FN)=3/(3+0)=1
FPR=FP/(FP+TN)=3/(3+0)=1

ROC

X	Y	Y(T0)	Y(T3)	Y(T5)	Y(T6.5)	Y(T9.5)
1	0	1	0	0	0	0
4	0	1	1	0	0	0
5	0	1	1	0	0	0
6	1	1	1	1	0	0
7	1	1	1	1	1	0
9	1	1	1	1	1	0

P/A (T3)	1	0
1	3	0
0	2	1

TPR=TP/(TP+FN)=3/(3+0)=1
FPR=FP/(FP+TN)=2/(2+1)=0.67

ROC

X	Y	Y(T0)	Y(T4.5)	Y(T5)	Y(T6.5)	Y(T9.5)
1	0	1	0	0	0	0
4	0	1	0	0	0	0
5	0	1	1	0	0	0
6	1	1	1	1	0	0
7	1	1	1	1	1	0
9	1	1	1	1	1	0

P/A (T4.5)	1	0
1	3	0
0	1	2

TPR=TP/(TP+FN)=3/(3+0)=1
FPR=FP/(FP+TN)=1/(2+1)=0.33

ROC

X	Y	Y(T0)	Y(T3)	Y(T5)	Y(T6.5)	Y(T9.5)
1	0	1	0	0	0	0
4	0	1	1	0	0	0
5	0	1	1	0	0	0
6	1	1	1	1	0	0
7	1	1	1	1	1	0
9	1	1	1	1	1	0

P/A (T5)	1	0
1	3	0
0	0	3

TPR=TP/(TP+FN)=3/(3+0)=1
FPR=FP/(FP+TN)=0/(0+3)=0

ROC

X	Y	Y(T0)	Y(T3)	Y(T5)	Y(T6.5)	Y(T9.5)
1	0	1	0	0	0	0
4	0	1	1	0	0	0
5	0	1	1	0	0	0
6	1	1	1	1	0	0
7	1	1	1	1	1	0
9	1	1	1	1	1	0

P/A (T6.5)	1	0
1	2	1
0	0	3

TPR=TP/(TP+FN)=2/(2+1)=0.67
FPR=FP/(FP+TN)=0/(0+3)=0

ROC

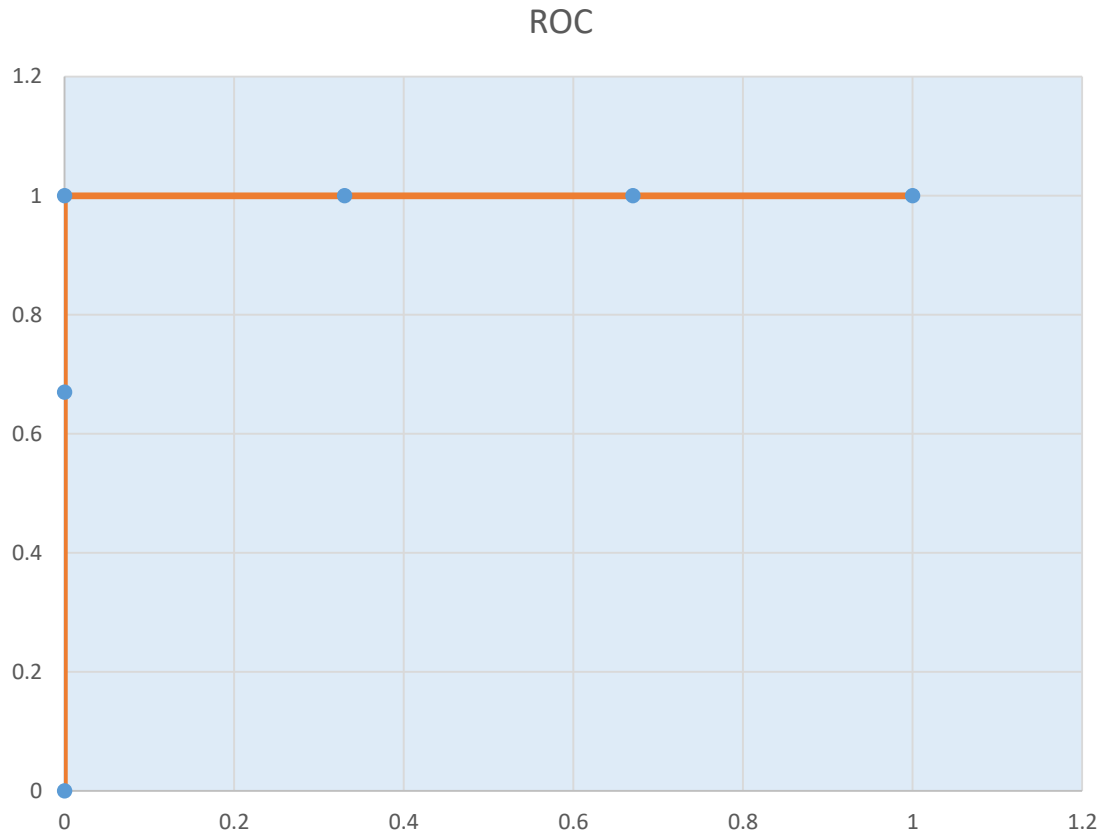
X	Y	Y(T0)	Y(T3)	Y(T5)	Y(T6.5)	Y(T9.5)
1	0	1	0	0	0	0
4	0	1	1	0	0	0
5	0	1	1	0	0	0
6	1	1	1	1	0	0
7	1	1	1	1	1	0
9	1	1	1	1	1	0

P/A (T9.5)	1	0
1	0	3
0	0	3

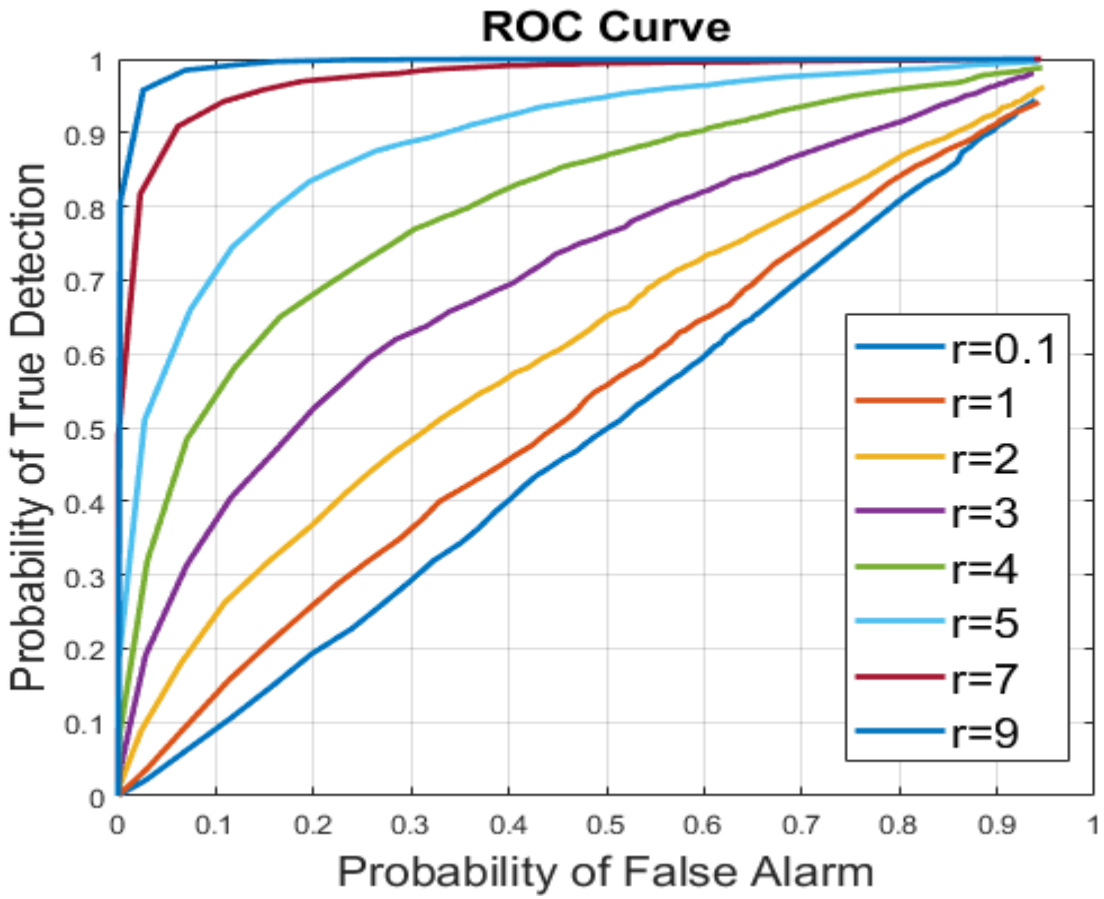
TPR=TP/(TP+FN)=0/(0+3)=0
FPR=FP/(FP+TN)=0/(0+3)=0

ROC

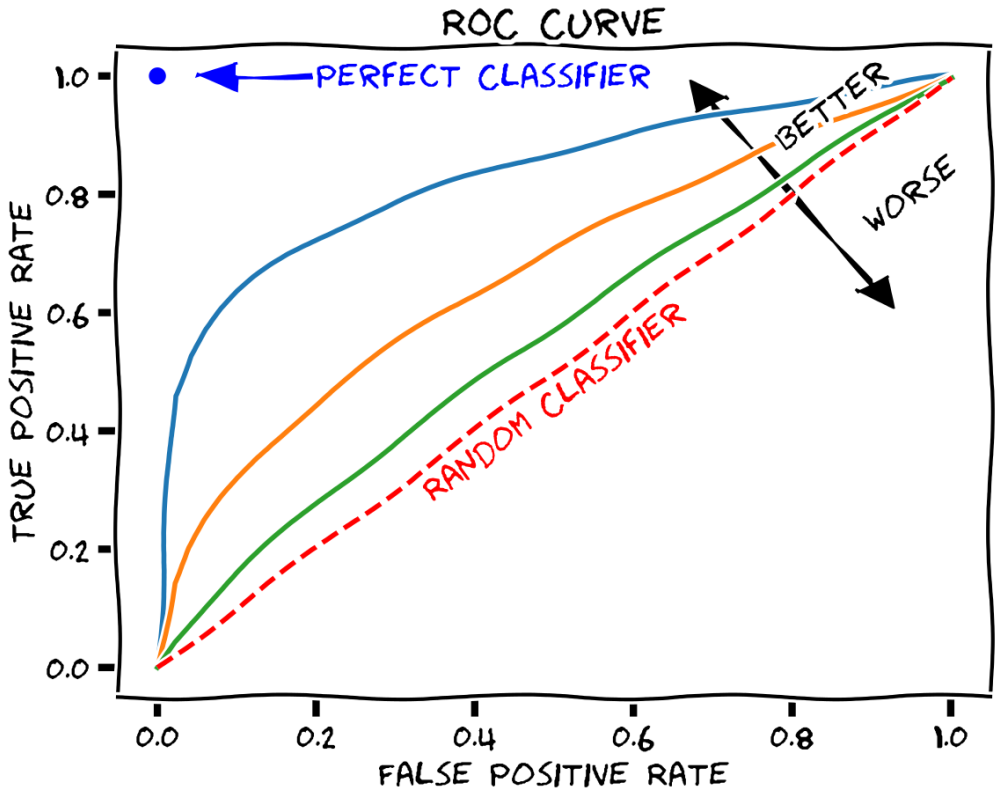
Threshold	FPR	TPR
0	1	1
3	0.67	1
4.5	0.33	1
5	0	1
6.5	0	0.67
9.5	0	0



Analysis of ROC



Analysis of ROC



AUC

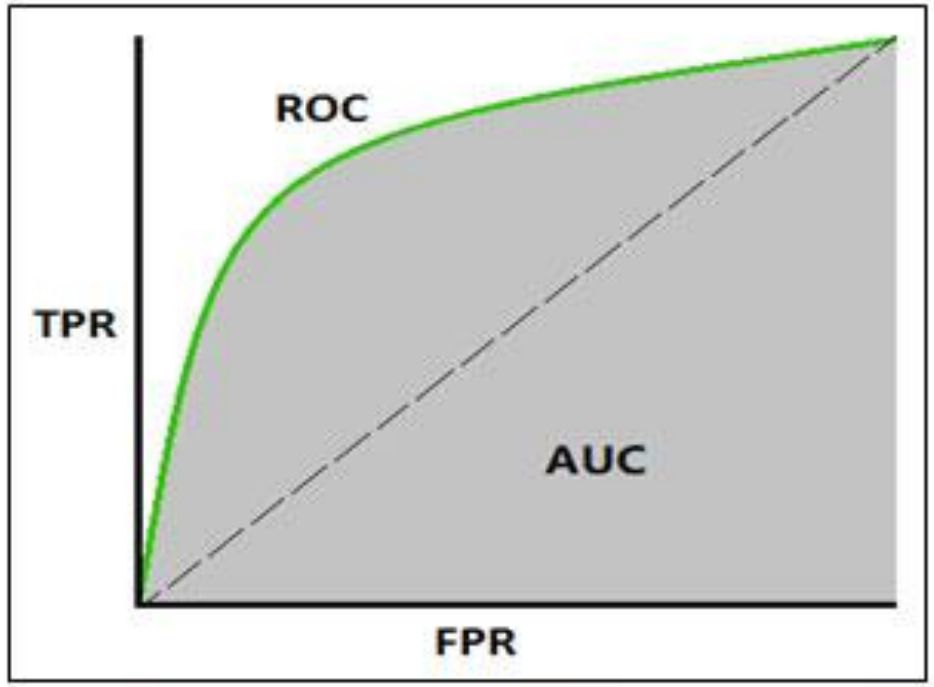


Figure 1: Indicating ROC Curve and AUC