

## ROC Data Input

Data Format: Frequency Table  
Number of Rating Categories: 6

18	0	0	6	2	2
0	2	11	25	56	81

## ROC Results

JROCFIT:

Maximum likelihood estimation of a binormal ROC curve from categorical rating data.

### DATA CHARACTERISTICS:

Data collected in 6 categories with category 6 representing strongest evidence of positivity (e.g., that abnormality is present).

Number of actually negative cases = 28

Number of actually positive cases = 175

### RESPONSE DATA:

Category	1	2	3	4	5	6
Actually negative cases	18	0	0	6	2	2
Actually positive cases	0	2	11	25	56	81

### OBSERVED OPERATING POINTS:

FPF:	0.0000	0.0714	0.1429	0.3571	0.3571	0.3571	1.0000
TPF:	0.0000	0.4629	0.7829	0.9257	0.9886	1.0000	1.0000

### INITIAL VALUES OF PARAMETERS:

A = 2.7086

B = 1.9125

Z(K): 0.1657 0.2657 0.3657 1.0676 1.4655

LOGL = -262.5308

### FINAL VALUES OF PARAMETERS:

Procedure converges after 9 iterations.

A = 3.3401

B = 2.6052

Z(K): 0.3258 0.4488 0.6926 0.9835 1.3198

LOGL = -249.4229

### VARIANCE-COVARIANCE MATRIX:

A	0.7417	0.5378	0.1707	0.1646	0.1329	0.0794	0.0123
B	0.5378	0.7882	0.0666	0.0485	-0.0081	-0.0907	-0.1904
Z(1)	0.1707	0.0666	0.0580	0.0542	0.0477	0.0403	0.0318
Z(2)	0.1646	0.0485	0.0542	0.0560	0.0505	0.0449	0.0386
Z(3)	0.1329	-0.0081	0.0477	0.0505	0.0543	0.0542	0.0550
Z(4)	0.0794	-0.0907	0.0403	0.0449	0.0542	0.0653	0.0763
Z(5)	0.0123	-0.1904	0.0318	0.0386	0.0550	0.0763	0.1013

### CORRELATION MATRIX:

A	1.0000	0.7034	0.8229	0.8075	0.6625	0.3607	0.0450
B	0.7034	1.0000	0.3114	0.2306	-0.0391	-0.3997	-0.6738
Z(1)	0.8229	0.3114	1.0000	0.9508	0.8502	0.6552	0.4149
Z(2)	0.8075	0.2306	0.9508	1.0000	0.9152	0.7419	0.5126
Z(3)	0.6625	-0.0391	0.8502	0.9152	1.0000	0.9110	0.7418
Z(4)	0.3607	-0.3997	0.6552	0.7419	0.9110	1.0000	0.9375
Z(5)	0.0450	-0.6738	0.4149	0.5126	0.7418	0.9375	1.0000

### SUMMARY OF ROC CURVE:

Area = 0.8843

Std. Dev. (Area) = 0.0506

ESTIMATED BINORMAL ROC CURVE WITH ASYMMETRIC 95% CONFIDENCE  
INTERVAL:

FPF	TPF	95% Conf. Interv.
0.005	0.0004	(0.0000, 0.5539)
0.010	0.0032	(0.0000, 0.6484)
0.020	0.0221	(0.0000, 0.7454)
0.030	0.0593	(0.0000, 0.8011)
0.040	0.1109	(0.0003, 0.8392)
0.050	0.1721	(0.0013, 0.8675)
0.060	0.2385	(0.0041, 0.8895)
0.070	0.3066	(0.0098, 0.9073)
0.080	0.3741	(0.0197, 0.9218)
0.090	0.4390	(0.0349, 0.9339)
0.100	0.5004	(0.0561, 0.9442)
0.110	0.5574	(0.0831, 0.9528)
0.120	0.6098	(0.1159, 0.9602)
0.130	0.6574	(0.1535, 0.9666)
0.140	0.7004	(0.1950, 0.9720)
0.150	0.7389	(0.2392, 0.9766)
0.200	0.8745	(0.4668, 0.9913)
0.250	0.9434	(0.6494, 0.9973)
0.300	0.9759	(0.7715, 0.9993)
0.400	0.9963	(0.8975, 1.0000)
0.500	0.9996	(0.9507, 1.0000)
0.600	1.0000	(0.9760, 1.0000)
0.700	1.0000	(0.9889, 1.0000)
0.800	1.0000	(0.9956, 1.0000)
0.900	1.0000	(0.9989, 1.0000)
0.950	1.0000	(0.9997, 1.0000)

ESTIMATES OF EXPECTED OPERATING POINTS ON FITTED ROC CURVE:

Expected Operating Point ( FPF , TPF )	95% C.I. of Lower Bound ( FPF , TPF )	95% C.I. of Upper Bound ( FPF , TPF )
(0.0935, 0.4609)	(0.0260, 0.0424)	(0.2432, 0.9366)
(0.1627, 0.7817)	(0.0689, 0.2991)	(0.3147, 0.9814)
(0.2443, 0.9377)	(0.1252, 0.6354)	(0.4068, 0.9968)
(0.3268, 0.9850)	(0.1807, 0.8320)	(0.5061, 0.9996)
(0.3723, 0.9936)	(0.2124, 0.8964)	(0.5582, 0.9999)

WARNINGS AND ERROR MESSAGES:

Chi-square goodness of fit not calculated because  
some expected cell frequencies are less than 5.

Chi-square goodness of fit not calculated because  
some expected cell frequencies are less than 5.

FPF	TPF	Lower	Upper
0.0000	0.0000	0.0000	0.0000
0.0050	0.0004	0.0000	0.5539
0.0100	0.0032	0.0000	0.6484
0.0200	0.0221	0.0000	0.7454
0.0300	0.0593	0.0000	0.8011
0.0400	0.1109	0.0003	0.8392
0.0500	0.1721	0.0013	0.8675
0.0600	0.2385	0.0041	0.8895
0.0700	0.3066	0.0098	0.9073
0.0800	0.3741	0.0197	0.9218
0.0900	0.4390	0.0349	0.9339
0.1000	0.5004	0.0561	0.9442
0.1100	0.5574	0.0831	0.9528
0.1200	0.6098	0.1159	0.9602
0.1300	0.6574	0.1535	0.9666
0.1400	0.7004	0.1950	0.9720
0.1500	0.7389	0.2392	0.9766
0.2000	0.8745	0.4668	0.9913
0.2500	0.9434	0.6494	0.9973

0.3000	0.9759	0.7715	0.9993
0.4000	0.9963	0.8975	1.0000
0.5000	0.9996	0.9507	1.0000
0.6000	1.0000	0.9760	1.0000
0.7000	1.0000	0.9889	1.0000
0.8000	1.0000	0.9956	1.0000
0.9000	1.0000	0.9989	1.0000
0.9500	1.0000	0.9997	1.0000
1.0000	1.0000	1.0000	1.0000

### LROC Data Input

OBSERVER:LB&TN  
CONDITION:MRvsCT  
REPLICATION:  
NDIST: 1  
NCAT: 6  
DISTRIBUTION: 0

1	0	10
2	0	3
3	0	0
4	0	6
5	0	4
6	0	2

DISTRIBUTION: 1

1	18	0
2	0	2
3	0	11
4	6	25
5	2	56
6	2	81

### LROC Results

OBSERVER:LB&TN  
CONDITION:MRvsCT  
REPLICATION:

NDIST: 1      Number of target distributions  
NCAT: 6      Number of rating categories  
NOLOC: 0      Number of categories without localization

Chance Correct Location (qset) values:

1  
0.000

DISTRIBUTION: 0      Non-target distribution

Rating	Frequency
1	10
2	3
3	0
4	6
5	4
6	2

DISTRIBUTION: 1      Target distribution

Rating	Non-hit	Hit
1	18	0
2	0	2
3	0	11
4	6	25
5	2	56
6	2	81

Procedure has estimates of model parameters

Number of iterations = 7  
Stopping index (tnet) = 0.00080599      lambda = 0.100000000000000E-06  
Number of distributions = 2

Mean of distributions

Fit	1.9874	0.0000
Initial	2.4366	0.0000

Sigma of distributions

Fit	1.6483	1.0000
Initial	2.0000	1.0000

Boundaries					
Fit	0.1822	0.3284	0.5970	1.2947	2.3549
Initial	0.0463	0.1864	0.2338	0.8957	1.4464

Distribution parameter values

Target dist #	1	
Mean	1.98744	0.00000
Std err	0.23245	0.00000
Sigma	1.64826	1.00000
Std err	0.24821	0.00000

Boundaries	0.18216	0.32844	0.59704	1.29473	2.35489
Std err	0.14203	0.13720	0.13131	0.13987	0.23873

Used numerical integration from parameter values

Target dist #	1
AreaROC	0.8901
std err	0.0146
AreaLROC	0.7801
Loc Accuracy	0.8487
std err	0.0237

Direct calculation from parameter values

Dloc	1.4579
std err	0.1427
Prob Local	0.8487
std err	0.0237

Moments from distribution parameters of LROC model

Target dist #	0	1
Mean	0.0000	2.1292
St. dev.	1.0060	1.4553
Skew	0.0000	0.2922
Kurtosis	0.1853	-6.5201
Implied d-a	0.0000	1.7054
Implied Az	0.5000	0.8861

Loglikelihood and chi-squared

logd1,logd2	-392.29388	-334.75824
logL1,logL2	64.79968	16.44430
chi1,chi2	61.33489	22.84165

Curves from fit distribution parameters

False Pos	Tar 1	
1.00000	1.0000	0.8487
0.99859	1.0000	0.8487
0.99733	1.0000	0.8487
0.99512	1.0000	0.8487
0.99140	1.0000	0.8487
0.98542	0.9999	0.8487
0.97614	0.9998	0.8486
0.96234	0.9996	0.8485
0.94262	0.9991	0.8483
0.91556	0.9983	0.8479
0.87990	0.9967	0.8471
0.83476	0.9940	0.8458
0.77989	0.9896	0.8436
0.71582	0.9829	0.8402
0.64398	0.9728	0.8349
0.56662	0.9586	0.8271
0.48662	0.9395	0.8163
0.40714	0.9147	0.8018
0.33133	0.8841	0.7830
0.26187	0.8476	0.7596
0.20076	0.8058	0.7314
0.14911	0.7594	0.6986

0.10719	0.7094	0.6614
0.07452	0.6570	0.6205
0.05006	0.6034	0.5766
0.03247	0.5494	0.5306
0.02033	0.4960	0.4833
0.01228	0.4440	0.4358
0.00715	0.3939	0.3888
0.00401	0.3463	0.3432
0.00217	0.3014	0.2997
0.00113	0.2597	0.2587
0.00057	0.2214	0.2209
0.00000	0.0000	0.0000

Standard Error -- Correlation matrix

Mean and sigma part of matrix

	m2	s2
m2	0.23245	0.62965
s2	0.62965	0.24821

Boundary part of matrix

	b1	b2	b3	b4	b5
b1	0.14203	0.90634	0.75935	0.42564	0.05911
b2	0.90634	0.13720	0.83954	0.49071	0.11443
b3	0.75935	0.83954	0.13131	0.62594	0.23905
b4	0.42564	0.49071	0.62594	0.13987	0.64027
b5	0.05911	0.11443	0.23905	0.64027	0.23873

Mean and sigma by boundary

	m2	s2
b1	0.13288	-.30032
b2	0.18338	-.26014
b3	0.29275	-.15701
b4	0.61223	0.25065
b5	0.81157	0.71692