

A comparative study of survival models for breast cancer prognostication based on microarray data

B. Haibe-Kains^{1,2}

¹Functional Genomics Unit, Institut Jules Bordet

²Machine Learning Group, Université Libre de Bruxelles

April 21, 2008

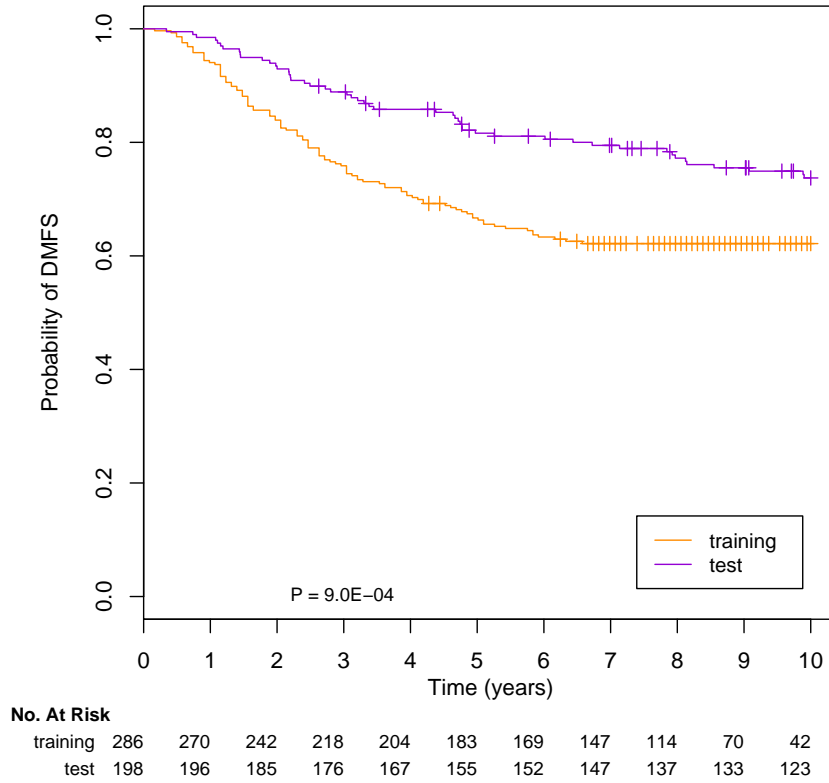
Contents

1	From TRAINING to TEST	3
1.1	Survival Curves for TRAINING and TEST Sets	3
1.2	AURKA Alone	3
1.3	BD.COMBUNIV.WILCOXON.HG	6
1.4	BD.COMBUNIV.COX.SURV	9
1.5	BD.MULTIV.LM.TOE	12
1.6	BD.MULTIV.COX.SURV	15
1.7	GW.RANK.COMBUNIV.WILCOXON.HG	18
1.8	GW.RANKCV.COMBUNIV.WILCOXON.HG	22
1.9	GW.RANK.COMBUNIV.COX.SURV	26
1.10	GW.RANKCV.COMBUNIV.COX.SURV	30
1.11	GW.RANK.MULTIV.RCOX.SURV	34
1.12	GW.RANKCV.MULTIV.RCOX.SURV	38
1.13	GW.PCA.COMBUNIV.WILCOXON.HG	42
1.14	GW.PCACV.COMBUNIV.WILCOXON.HG	45
1.15	GW.PCA.COMBUNIV.COX.SURV	49
1.16	GW.PCACV.COMBUNIV.COX.SURV	52
1.17	GW.PCA.MULTIV.RCOX.SURV	56
1.18	GW.PCACV.MULTIV.RCOX.SURV	59
1.19	GENE76	63
1.20	GGI	66
1.21	AOL	69
1.22	NPI	72
1.23	Model Comparison	75
1.23.1	Training Set	75
1.23.2	Test Set	96

TRAINING set = VDX and TEST set = TBG.

1 From TRAINING to TEST

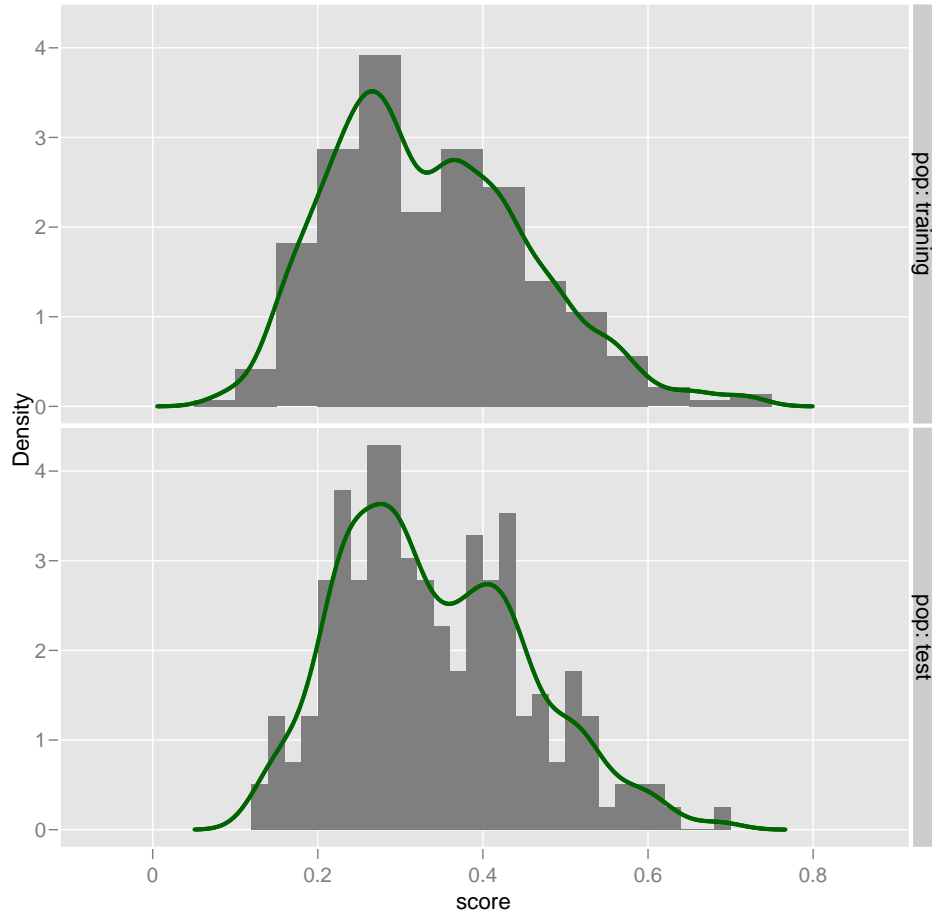
1.1 Survival Curves for TRAINING and TEST Sets



As we can see, there is a significant difference between the two datasets. So we expect a bias in the prediction of survival probabilities from the TRAINING and the TEST sets. This bias will results in large prediction errors as defined by the Brier score. However, this should not have a large impact on the concordance index, the time-dependent ROC curve and the hazard ratio estimates.

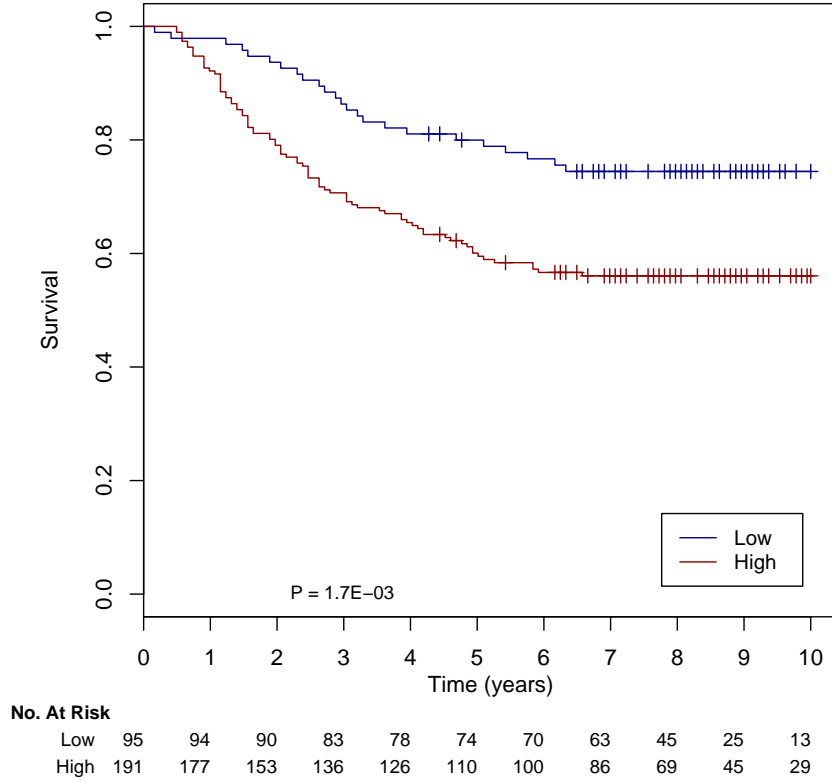
1.2 AURKA Alone

The following figure shows the distribution of the ggi :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of 1.05E-05, a concordance index of 0.636 95CI[0.583,0.69] (p-value of 3.03E-07) and an integrated Brier score of 0.178.

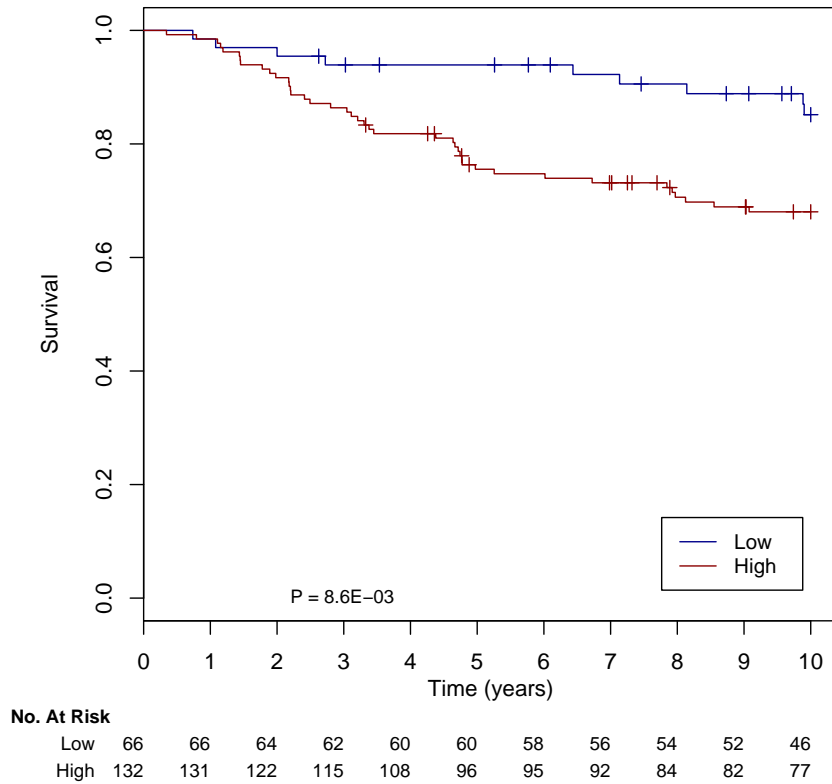
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of 1.10E-03, a concordance index of 0.685 95CI[0.587,0.783] (p-value of 1.13E-04) and an integrated Brier score of 0.182. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.85	[0.78,0.93]	0.79	[0.71,0.88]	0.74	[0.66,0.84]
High	0.69	[0.63,0.76]	0.60	[0.53,0.67]	0.56	[0.49,0.64]

Risk Score On TEST, the risk score exhibits a Cox p-value of 1.37E-02, a concordance index of 0.609 95CI[0.534,0.683] (p-value of 2.10E-03) and an integrated Brier score of 0.144.

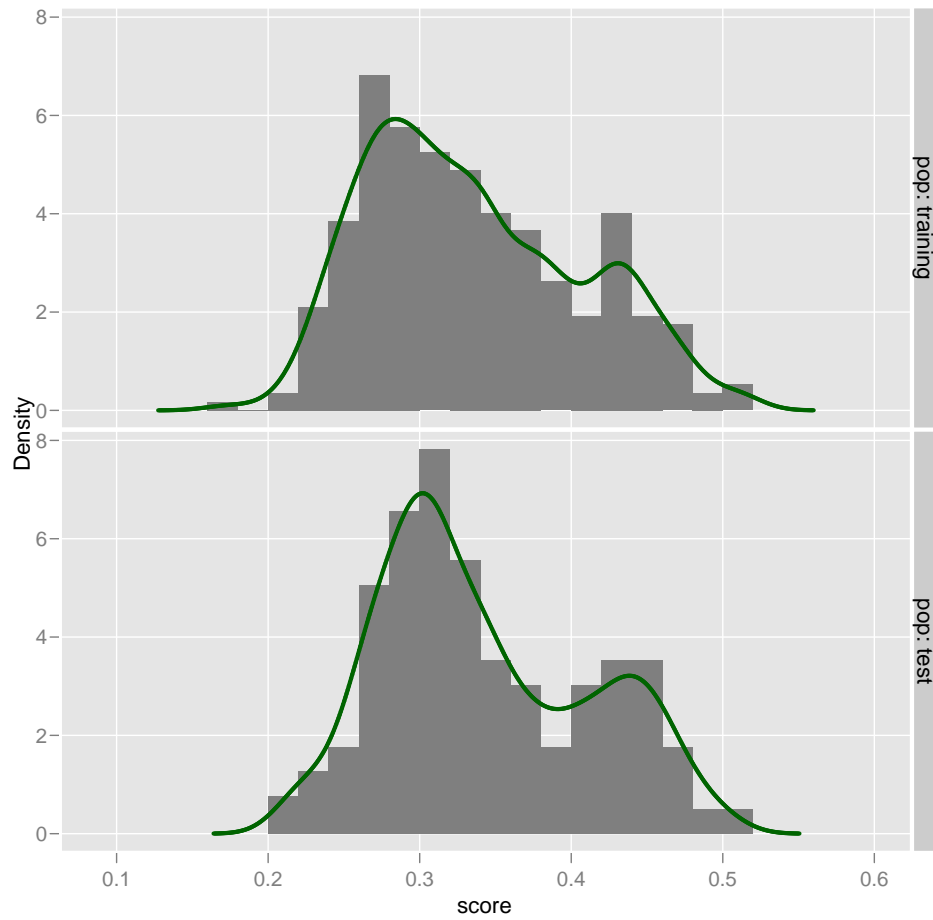
Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 9.29E-03, a concordance index of 0.729 95CI[0.585,0.873] (p-value of 9.05E-04) and an integrated Brier score of 0.14. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.94	[0.88,1.00]	0.94	[0.88,1.00]	0.85	[0.77,0.95]
High	0.86	[0.80,0.92]	0.75	[0.68,0.83]	0.68	[0.60,0.77]

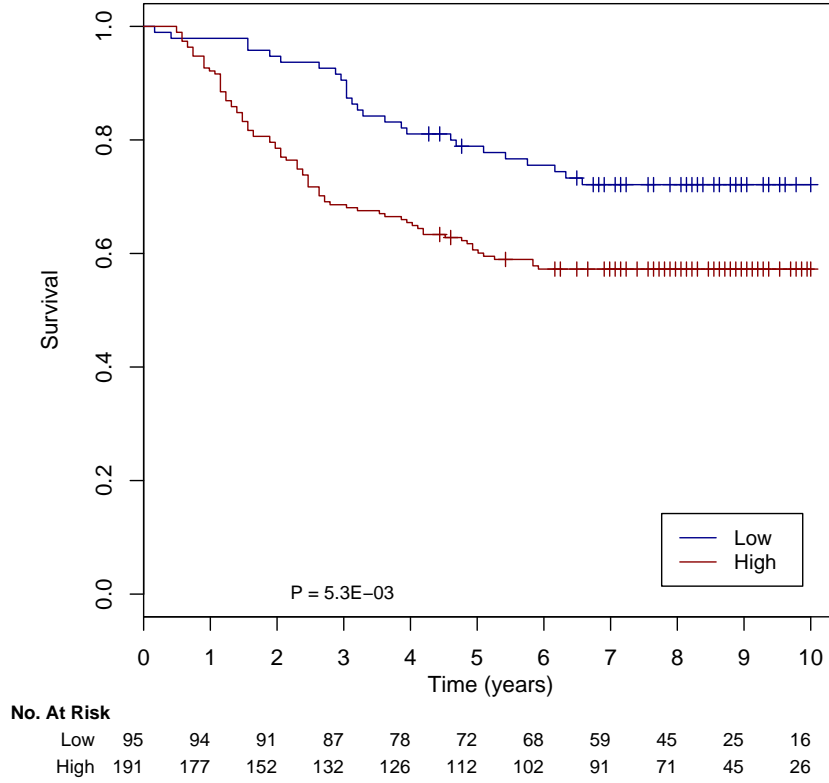
1.3 BD.COMBUNIV.WILCOXON.HG

The following figure shows the distribution of the ggi :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of 1.16E-02, a concordance index of 0.606 95CI[0.552,0.659] (p-value of 5.55E-05) and an integrated Brier score of 0.185.

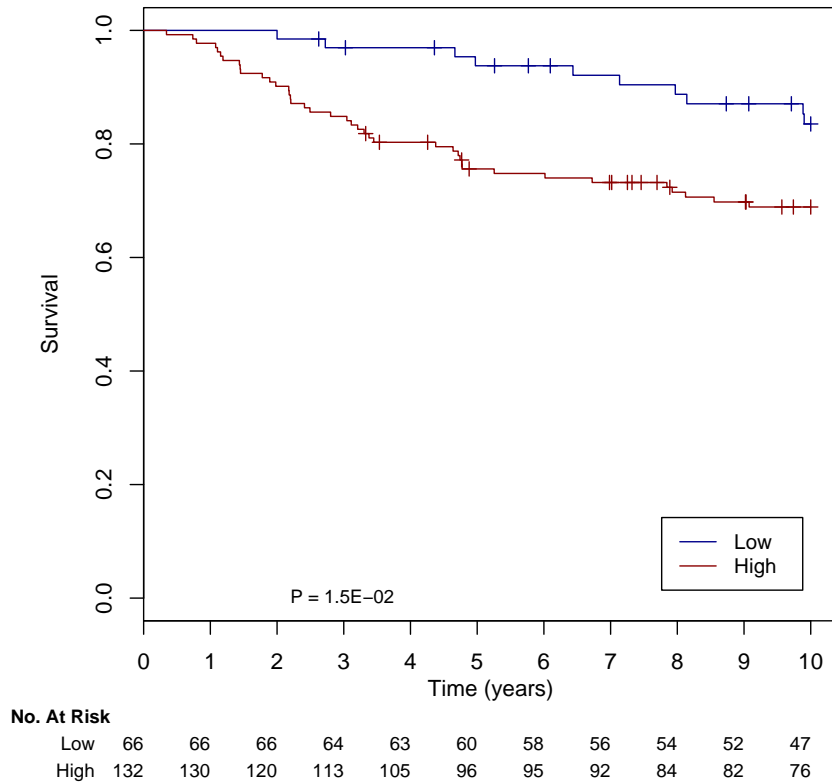
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of 3.99E-03, a concordance index of 0.675 95CI[0.579,0.772] (p-value of 1.86E-04) and an integrated Brier score of 0.184. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.87	[0.81,0.94]	0.78	[0.70,0.87]	0.72	[0.64,0.82]
High	0.68	[0.62,0.75]	0.60	[0.53,0.67]	0.57	[0.51,0.65]

Risk Score On TEST, the risk score exhibits a Cox p-value of 2.42E-02, a concordance index of 0.618 95CI[0.549,0.688] (p-value of 4.41E-04) and an integrated Brier score of 0.143.

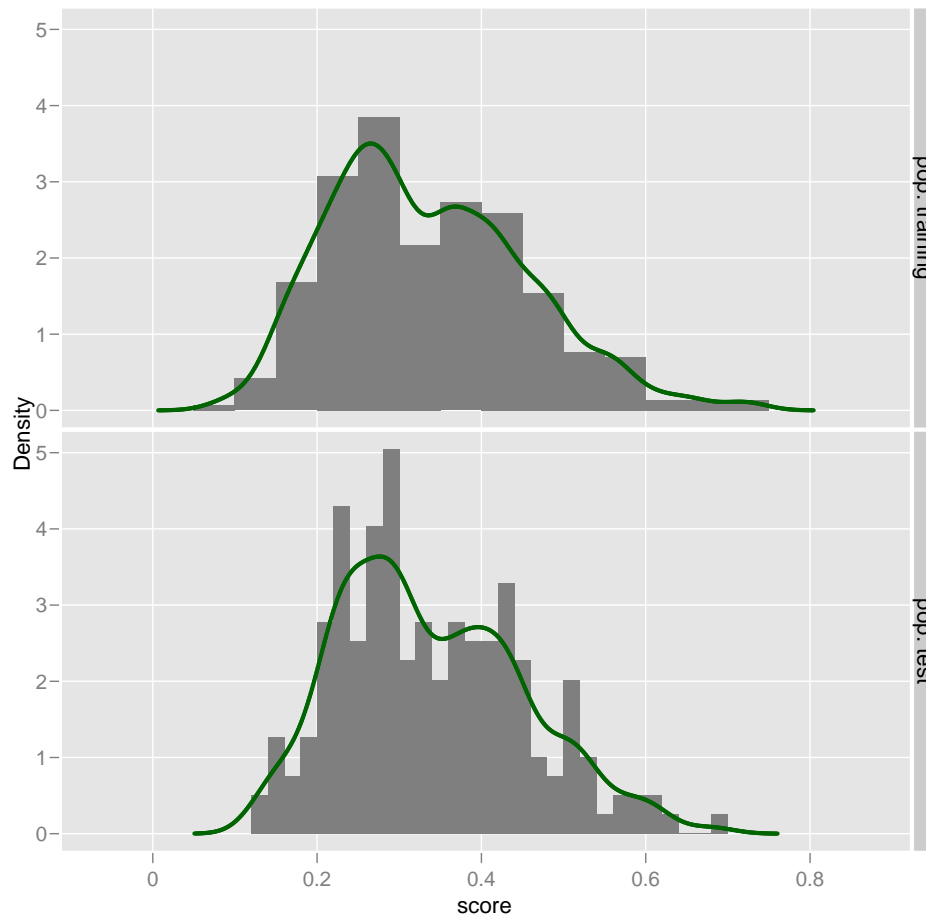
Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 9.04E-03, a concordance index of 0.728 95CI[0.592,0.863] (p-value of 5.00E-04) and an integrated Brier score of 0.14. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.97	[0.93,1.00]	0.94	[0.88,1.00]	0.84	[0.75,0.93]
High	0.84	[0.78,0.91]	0.75	[0.68,0.83]	0.69	[0.61,0.77]

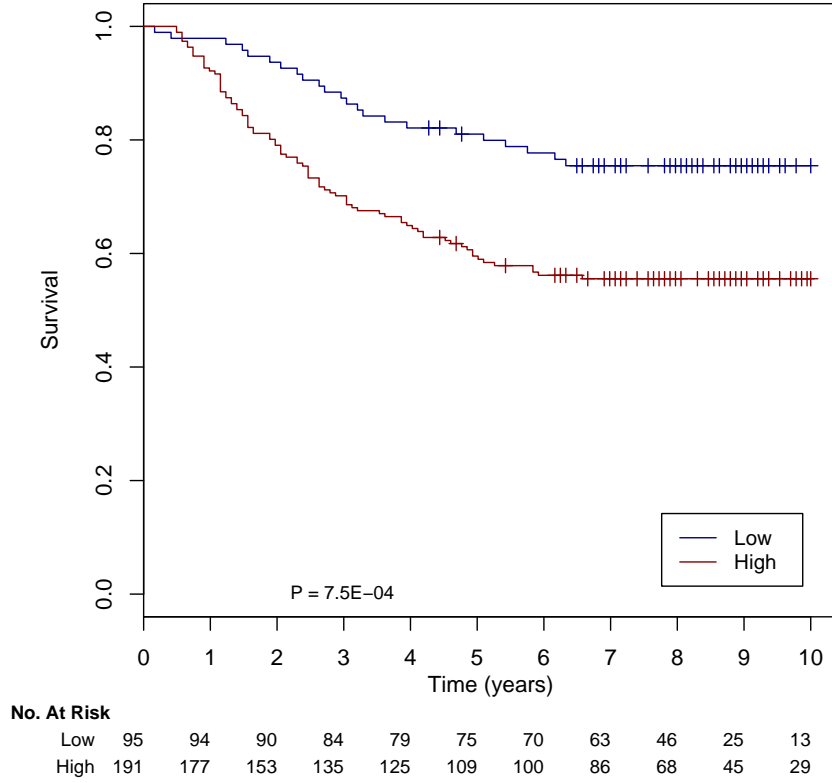
1.4 BD.COMBUNIV.COX.SURV

The following figure shows the distribution of the ggi :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of 1.01E-05, a concordance index of 0.638 95CI[0.584,0.691] (p-value of 2.30E-07) and an integrated Brier score of 0.178.

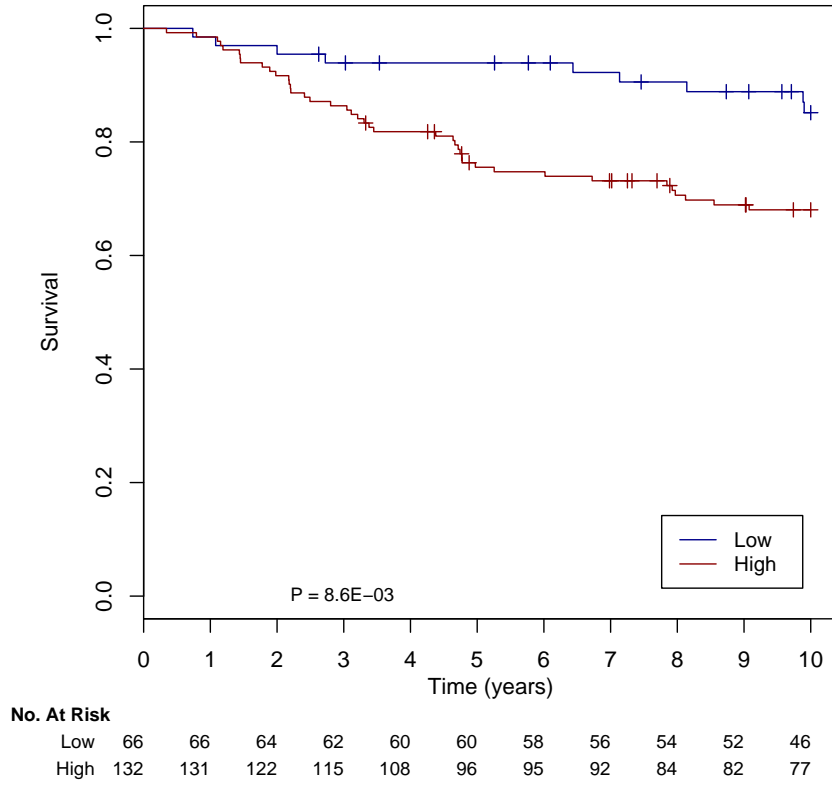
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of 4.40E-04, a concordance index of 0.698 95CI[0.6,0.795] (p-value of 3.65E-05) and an integrated Brier score of 0.181. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.86	[0.80,0.94]	0.80	[0.72,0.88]	0.75	[0.67,0.85]
High	0.69	[0.62,0.75]	0.59	[0.52,0.66]	0.56	[0.49,0.63]

Risk Score On TEST, the risk score exhibits a Cox p-value of 1.19E-02, a concordance index of 0.613 95CI[0.539,0.687] (p-value of 1.34E-03) and an integrated Brier score of 0.143.

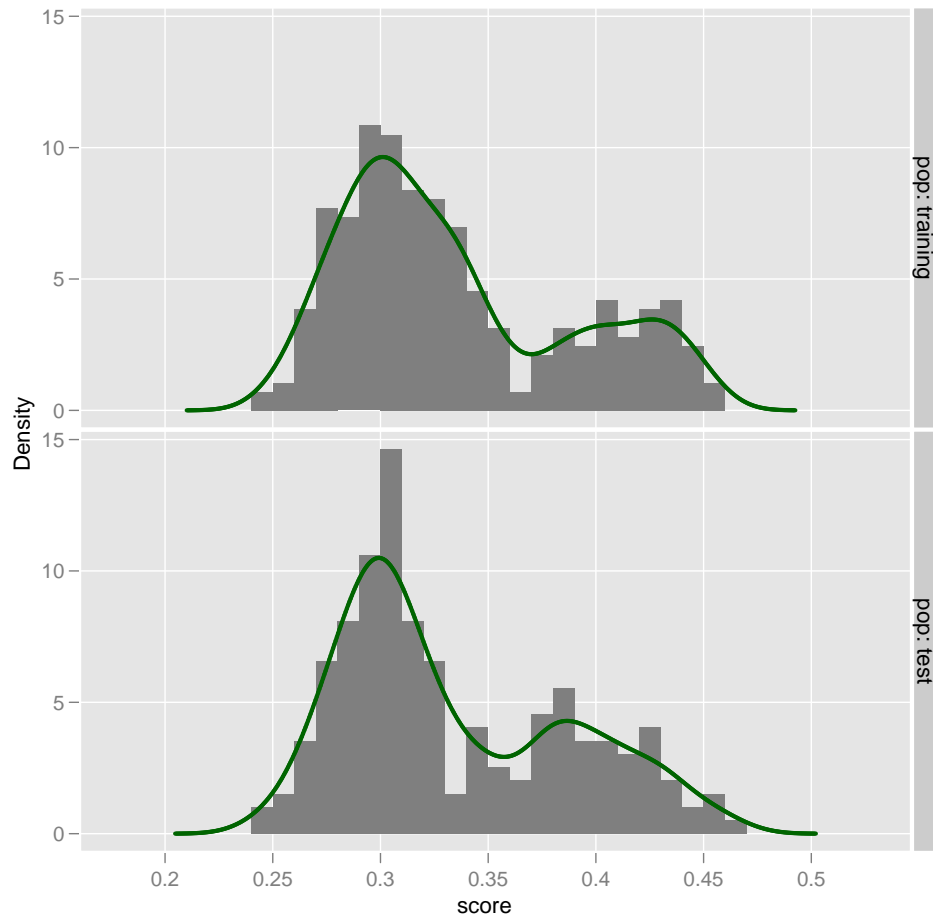
Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 9.29E-03, a concordance index of 0.729 95CI[0.585,0.873] (p-value of 9.05E-04) and an integrated Brier score of 0.141. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.94	[0.88,1.00]	0.94	[0.88,1.00]	0.85	[0.77,0.95]
High	0.86	[0.80,0.92]	0.75	[0.68,0.83]	0.68	[0.60,0.77]

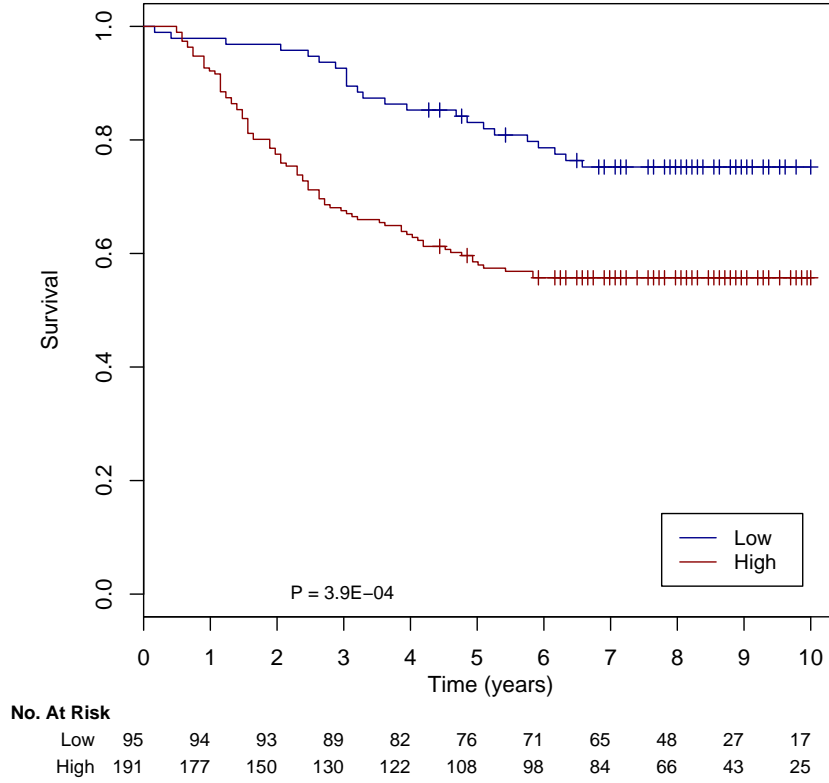
1.5 BD.MULTIV.LM.TOE

The following figure shows the distribution of the ggi in the two populations :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of 5.80E-02, a concordance index of 0.601 95CI[0.55,0.653] (p-value of 5.95E-05) and an integrated Brier score of 0.186.

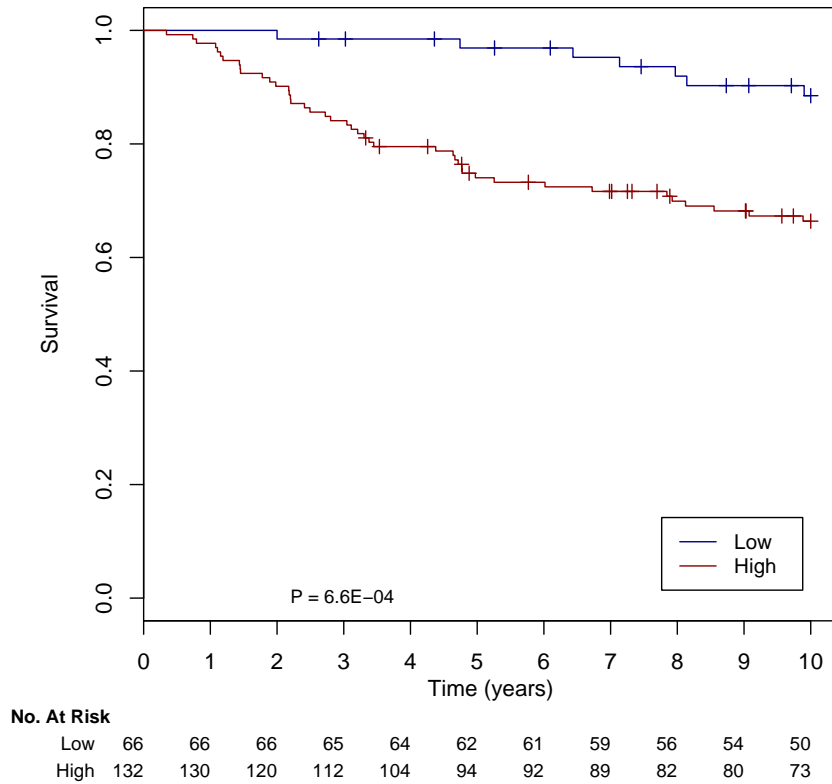
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of 2.15E-04, a concordance index of 0.721 95CI[0.628,0.814] (p-value of 1.68E-06) and an integrated Brier score of 0.18. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.89	[0.84,0.96]	0.82	[0.75,0.90]	0.75	[0.67,0.85]
High	0.67	[0.61,0.74]	0.58	[0.51,0.65]	0.56	[0.49,0.63]

Risk Score On TEST, the risk score exhibits a Cox p-value of 1.18E-02, a concordance index of 0.645 95CI[0.58,0.711] (p-value of 6.59E-06) and an integrated Brier score of 0.141.

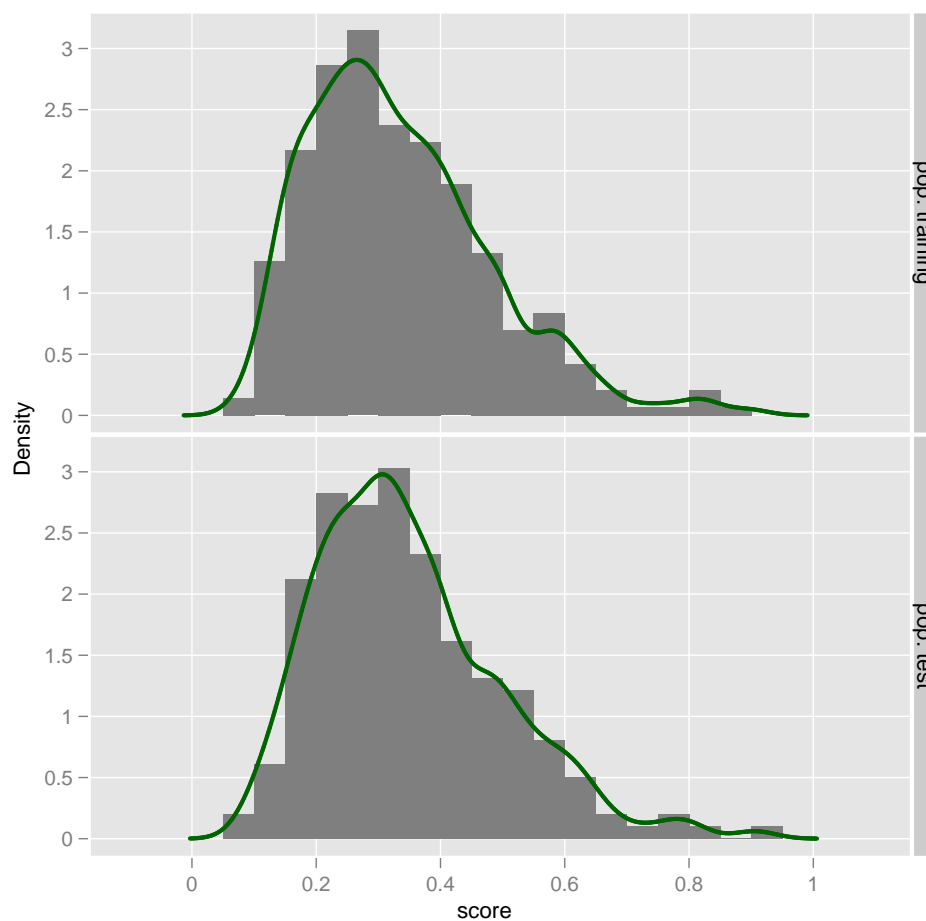
Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 2.62E-04, a concordance index of 0.811 95CI[0.689,0.932] (p-value of 2.86E-07) and an integrated Brier score of 0.137. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.98	[0.96,1.00]	0.97	[0.93,1.00]	0.88	[0.81,0.97]
High	0.83	[0.77,0.90]	0.73	[0.66,0.81]	0.66	[0.59,0.75]

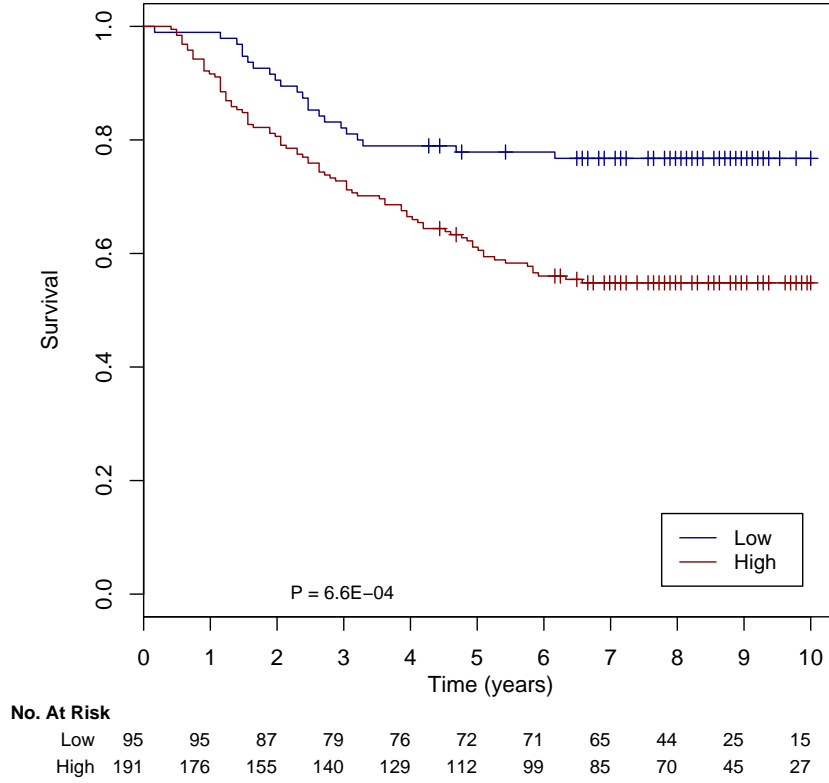
1.6 BD.MULTIV.COX.SURV

The following figure shows the distribution of the ggi in the two populations :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of 3.30E-08, a concordance index of 0.649 95CI[0.594,0.704] (p-value of 5.59E-08) and an integrated Brier score of 0.172.

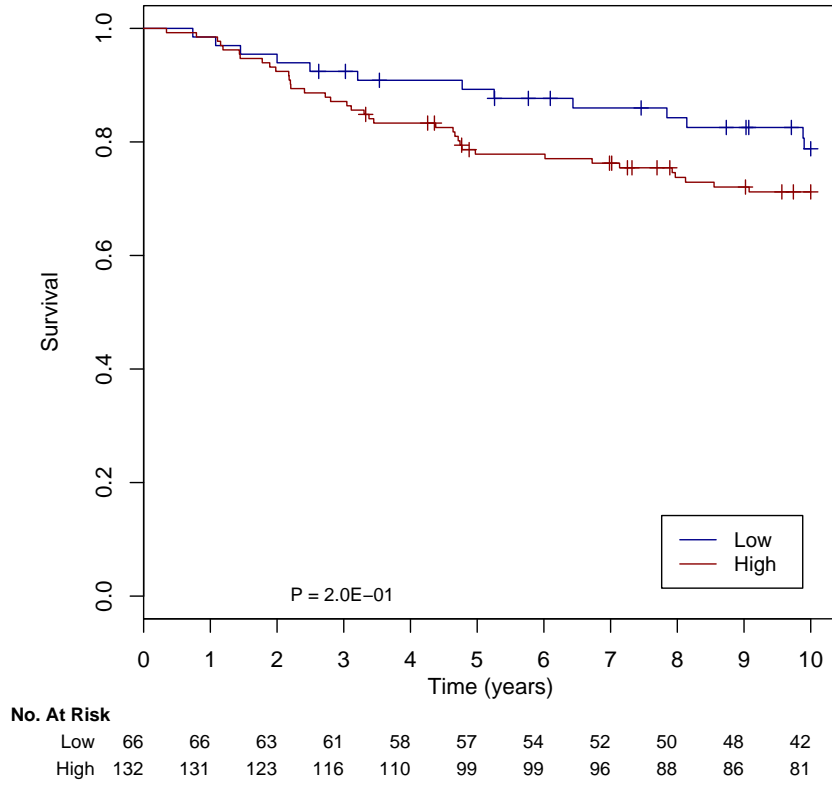
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of 3.72E-04, a concordance index of 0.685 95CI[0.583,0.787] (p-value of 1.82E-04) and an integrated Brier score of 0.182. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.81	[0.74,0.89]	0.78	[0.70,0.87]	0.77	[0.69,0.86]
High	0.71	[0.65,0.78]	0.61	[0.54,0.68]	0.55	[0.48,0.62]

Risk Score On TEST, the risk score exhibits a Cox p-value of 5.01E-03, a concordance index of 0.603 95CI[0.521,0.686] (p-value of 7.18E-03) and an integrated Brier score of 0.15.

Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 1.41E-01, a concordance index of 0.611 95CI[0.461,0.761] (p-value of 7.32E-02) and an integrated Brier score of 0.146. The following figure shows the Kaplan-Meier survival curves for the two groups :



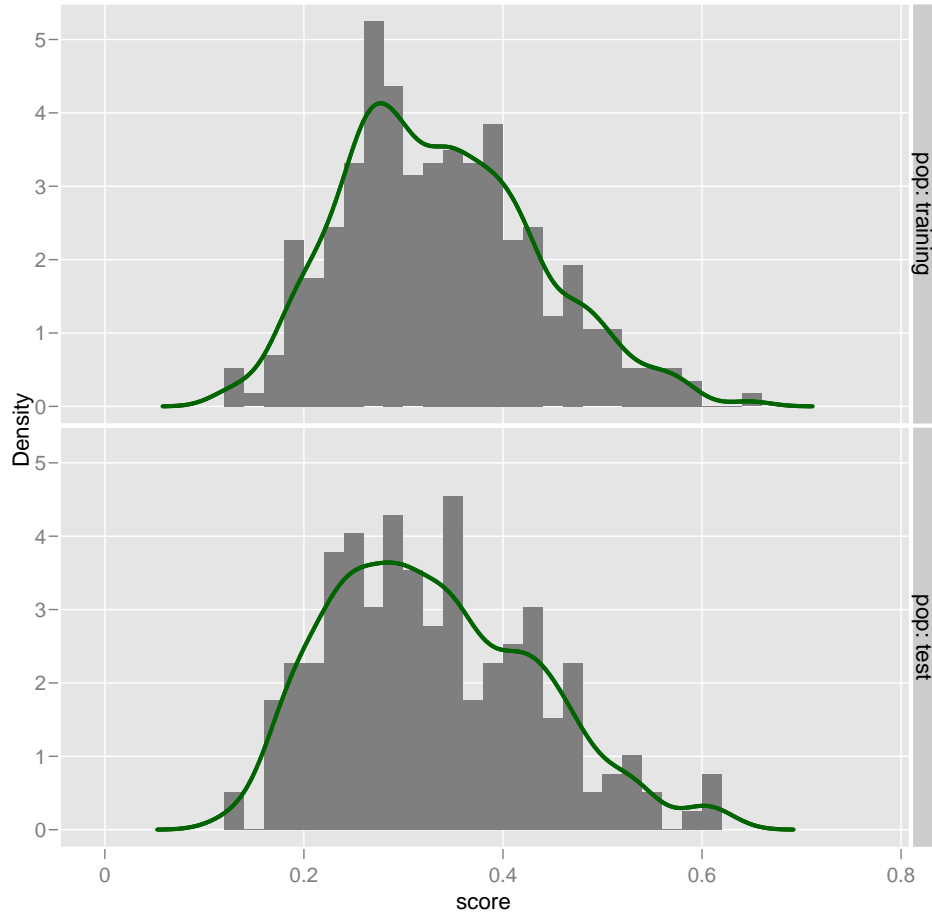
	3.years		5.years		10.years	
Low	0.92	[0.86,0.99]	0.88	[0.80,0.96]	0.79	[0.69,0.90]
High	0.86	[0.81,0.92]	0.77	[0.70,0.85]	0.71	[0.64,0.80]

1.7 GW.RANK.COMBUNIV.WILCOXON.HG

The following table shows the selected features :

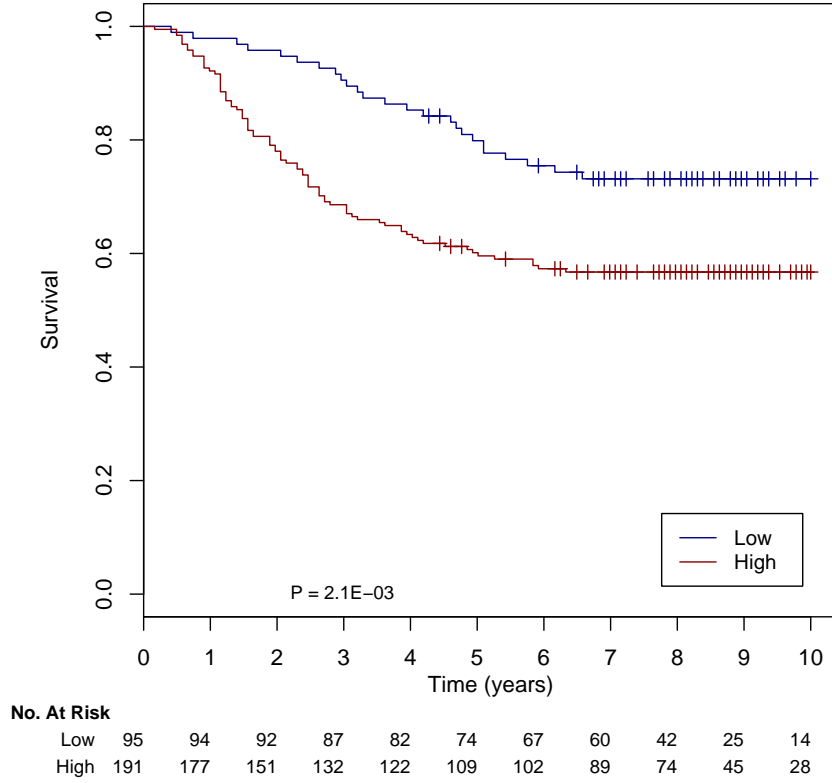
	diff	p.value	c.index	p.value	NCBI.gene.symbol	EntrezGene.ID
206887.at	-1.000	7.2E-05	0.473	1.6E-01	CCBP2	1238
222077.s.at	1.000	8.7E-05	0.643	8.1E-09	RACGAP1	29127
218728.s.at	1.000	9.3E-05	0.564	1.1E-02	CNIH4	29097
212250.at	1.000	1.0E-04	0.575	3.7E-03	MTDH	92140
201897.s.at	1.000	1.0E-04	0.563	1.5E-02	CKS1B	1163
215850.s.at	-1.000	1.1E-04	0.501	4.9E-01		
219494.at	1.000	1.2E-04	0.595	2.8E-04	RAD54B	25788
206791.s.at	-1.000	1.2E-04	0.449	3.7E-02	PDE4C	5143
208079.s.at	1.000	1.2E-04	0.636	3.0E-07	AURKA	6790
215021.s.at	-1.000	1.3E-04	0.411	7.7E-04	NRXN3	9369
203213.at	1.000	1.4E-04	0.593	2.7E-04		
202188.at	1.000	1.4E-04	0.563	1.1E-02	NUP93	9688
221676.s.at	1.000	1.4E-04	0.573	3.6E-03	CORO1C	23603
204886.at	1.000	1.4E-04	0.594	1.9E-04	PLK4	10733
220245.at	-1.000	1.7E-04	0.461	7.2E-02	SLC45A2	51151
219010.at	1.000	1.9E-04	0.543	6.5E-02	C1orf106	55765
215999.at	-1.000	2.2E-04	0.477	2.0E-01		
203764.at	1.000	2.2E-04	0.614	1.5E-05	DLG7	9787
204641.at	1.000	2.2E-04	0.646	4.4E-09	NEK2	4751
210691.s.at	1.000	2.5E-04	0.566	1.1E-02	CACYBP	27101
201834.at	-1.000	2.6E-04	0.472	1.6E-01	PRKAB1	5564
206515.at	-1.000	2.6E-04	0.495	4.3E-01		
202107.s.at	1.000	2.7E-04	0.567	9.9E-03	MCM2	4171
218732.at	1.000	2.9E-04	0.547	4.8E-02	PTRH2	51651
216841.s.at	1.000	3.0E-04	0.533	1.2E-01	SOD2	6648
48580.at	-1.000	3.1E-04	0.425	4.2E-03	CXXC1	30827
218009.s.at	1.000	3.3E-04	0.605	7.0E-05	PRC1	9055
200940.s.at	-1.000	3.3E-04	0.433	8.1E-03	RERE	473
201557.at	-1.000	3.4E-04	0.455	5.4E-02	VAMP2	6844
219037.at	1.000	3.4E-04	0.605	4.3E-05	CGI-115	51018

The following figure shows the distribution of the ggi :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of 3.72E-04, a concordance index of 0.619 95CI[0.568,0.67] (p-value of 2.16E-06) and an integrated Brier score of 0.182.

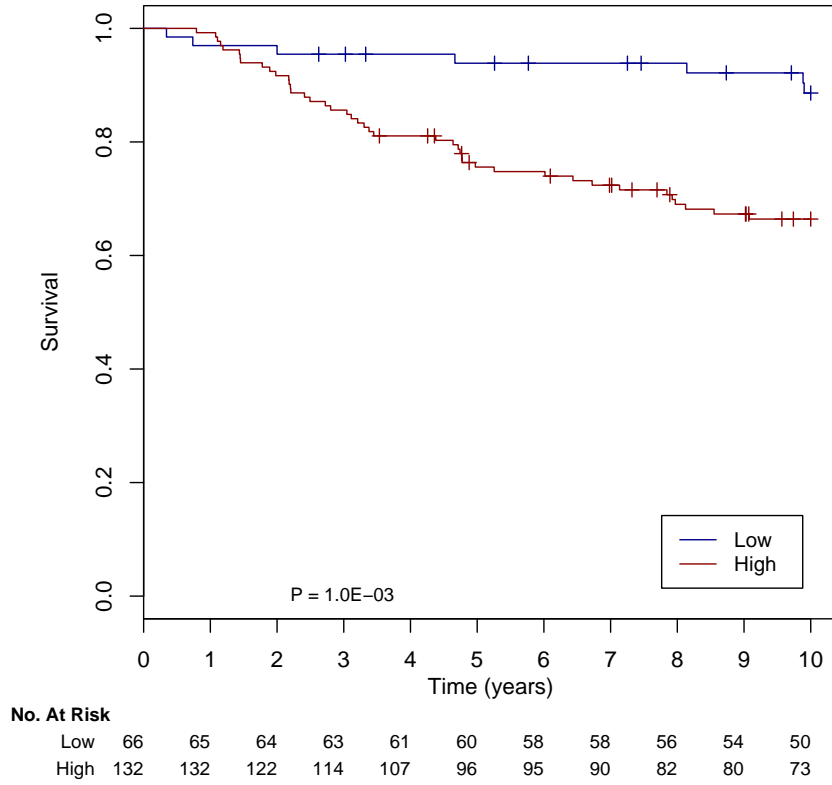
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of 1.46E-03, a concordance index of 0.694 95CI[0.599,0.789] (p-value of 3.03E-05) and an integrated Brier score of 0.182. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years	5.years	10.years
Low	0.89 [0.84,0.96]	0.78 [0.70,0.87]	0.73 [0.65,0.83]
High	0.67 [0.61,0.74]	0.60 [0.53,0.67]	0.57 [0.50,0.64]

Risk Score On TEST, the risk score exhibits a Cox p-value of 1.26E-02, a concordance index of 0.624 95CI[0.553,0.694] (p-value of 2.85E-04) and an integrated Brier score of 0.141.

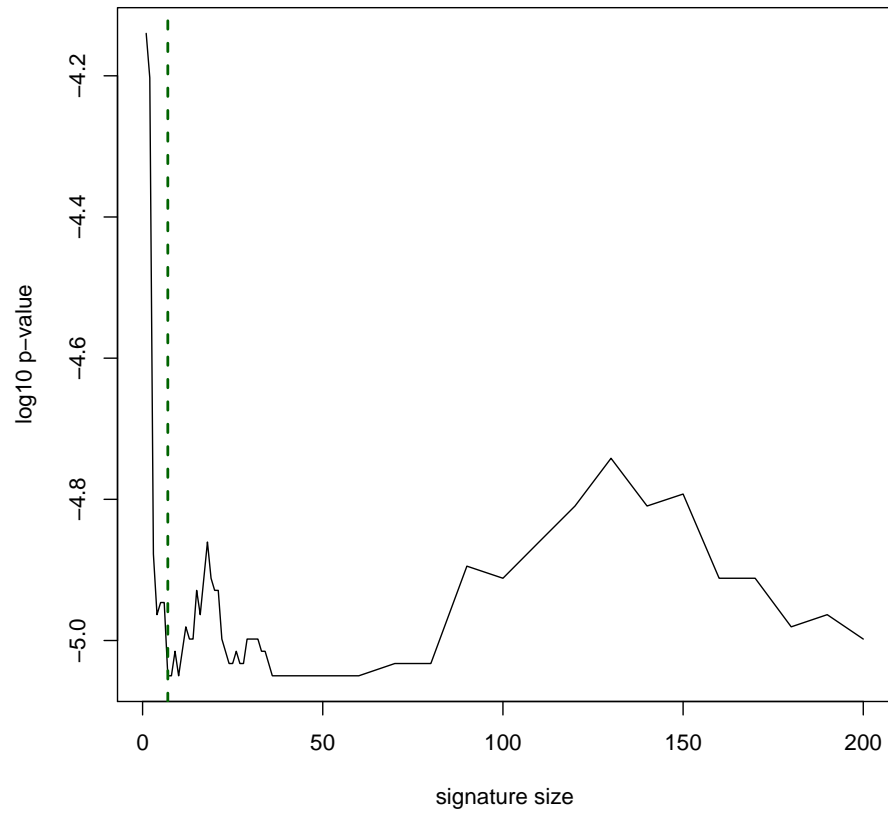
Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 3.29E-04, a concordance index of 0.785 95CI[0.647,0.922] (p-value of 2.55E-05) and an integrated Brier score of 0.139. The following figure shows the Kaplan-Meier survival curves for the two groups :



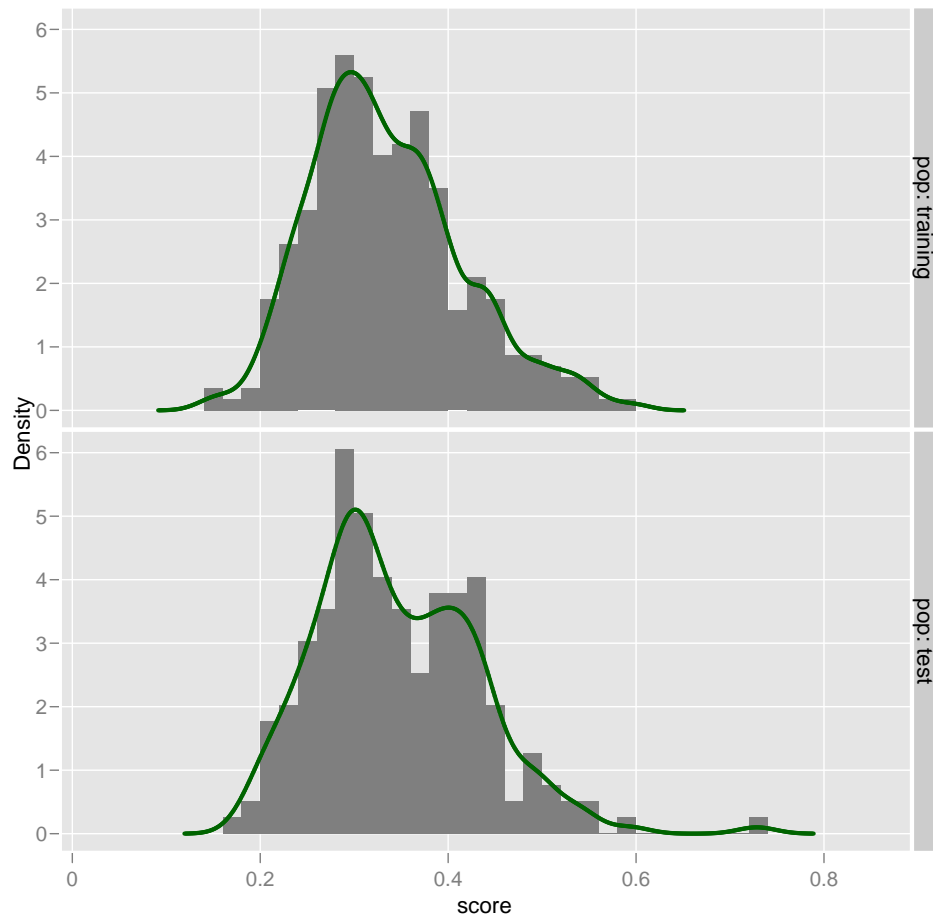
	3.years		5.years		10.years	
Low	0.95	[0.91,1.00]	0.94	[0.88,1.00]	0.89	[0.81,0.97]
High	0.85	[0.79,0.91]	0.75	[0.68,0.83]	0.66	[0.59,0.75]

1.8 GW.RANKCV.COMBUNIV.WILCOXON.HG

The following figure shows the evolution of the performance w.r.t. the signature size (best signature size is 7):

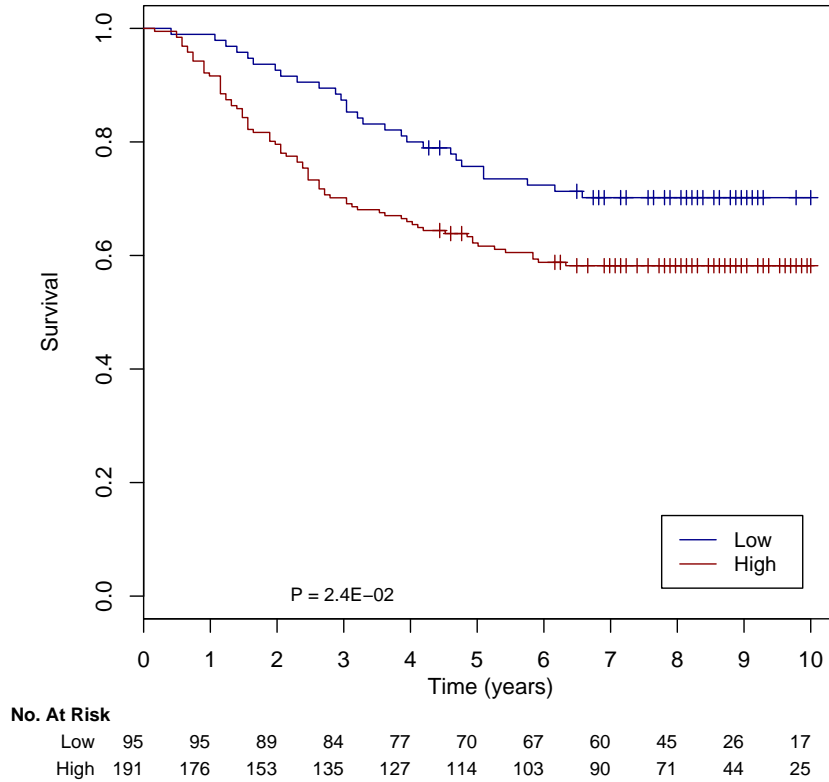


The following figure shows the distribution of the ggi :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of 2.71E-03, a concordance index of 0.595 95CI[0.543,0.647] (p-value of 1.72E-04) and an integrated Brier score of 0.184.

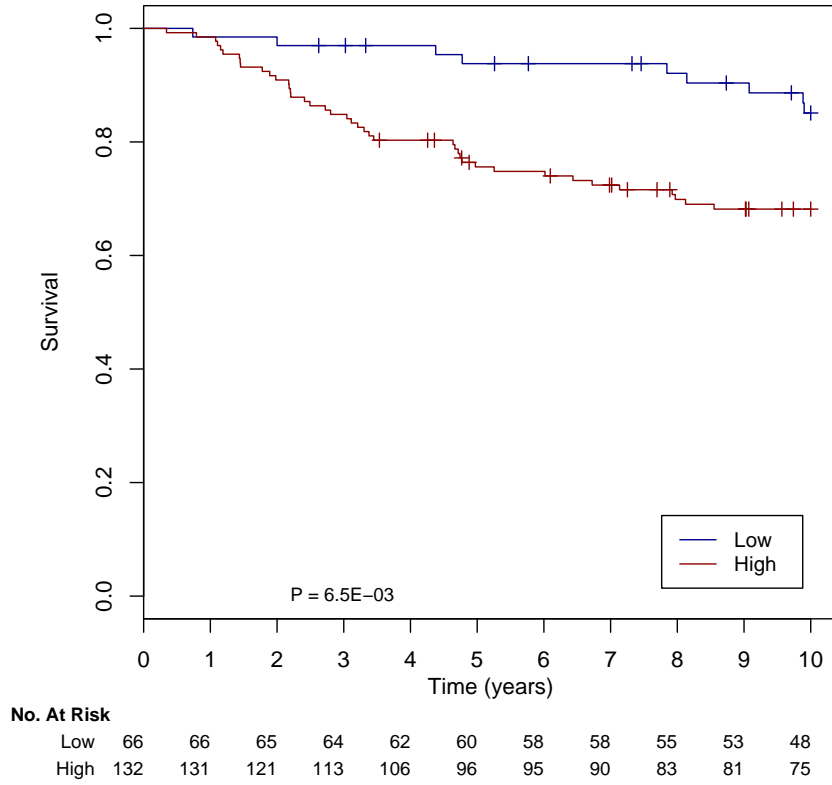
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of 1.99E-02, a concordance index of 0.642 95CI[0.544,0.741] (p-value of 2.28E-03) and an integrated Brier score of 0.185. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.85	[0.78,0.93]	0.73	[0.65,0.83]	0.70	[0.62,0.80]
High	0.69	[0.63,0.76]	0.62	[0.55,0.69]	0.58	[0.52,0.66]

Risk Score On TEST, the risk score exhibits a Cox p-value of 1.25E-02, a concordance index of 0.602 95CI[0.532,0.671] (p-value of 2.08E-03) and an integrated Brier score of 0.144.

Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 2.47E-03, a concordance index of 0.749 95CI[0.613,0.885] (p-value of 1.60E-04) and an integrated Brier score of 0.14. The following figure shows the Kaplan-Meier survival curves for the two groups :



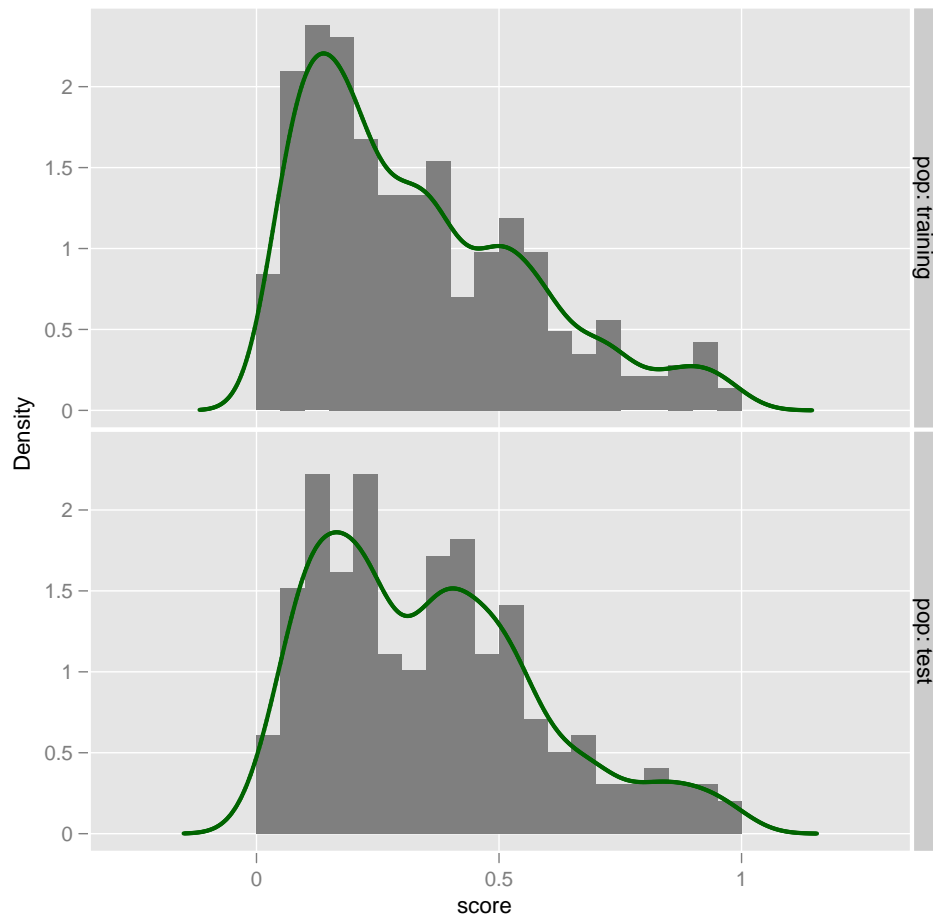
	3.years		5.years		10.years	
Low	0.97	[0.93,1.00]	0.94	[0.88,1.00]	0.85	[0.77,0.95]
High	0.84	[0.78,0.91]	0.75	[0.68,0.83]	0.68	[0.61,0.77]

1.9 GW.RANK.COMBUNIV.COX.SURV

The following table shows the selected features :

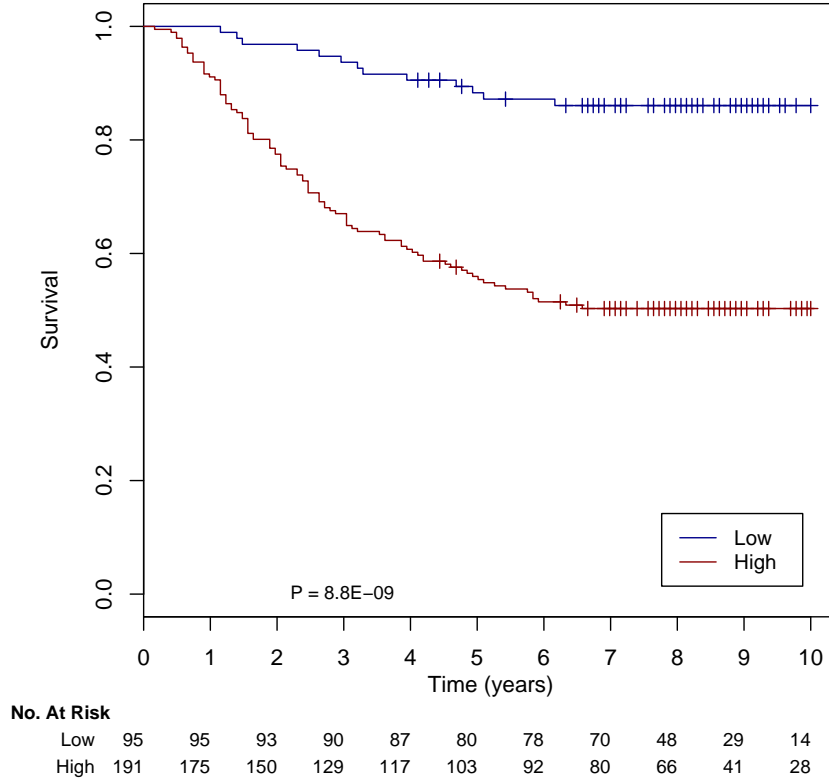
	hr	p.value	c.index	p.value	NCBI.gene.symbol	EntrezGene.ID
204641.at	1.565	6.5E-07	0.646	4.4E-09	NEK2	4751
222077.s.at	1.919	7.8E-07	0.643	8.1E-09	RACGAP1	29127
219478.at	1.551	8.5E-07	0.641	1.7E-07	WFDC1	58189
201769.at	2.529	3.3E-06	0.643	3.5E-08	CLINT1	9685
202324.s.at	2.416	3.3E-06	0.625	1.7E-06	ACBD3	64746
218252.at	2.343	4.2E-06	0.627	1.7E-06	CKAP2	26586
212898.at	1.887	4.7E-06	0.628	9.2E-07	KIAA0406	9675
208079.s.at	1.540	5.2E-06	0.636	3.0E-07	AURKA	6790
202824.s.at	2.042	6.6E-06	0.625	3.8E-06	TCEB1	6921
209380.s.at	1.777	6.7E-06	0.606	1.3E-04	ABCC5	10057
213226.at	1.657	7.7E-06	0.637	7.7E-08		
201076.at	0.349	8.3E-06	0.375	1.5E-06	NHP2L1	4809
201664.at	2.082	9.4E-06	0.621	3.2E-06	SMC4	10051
202969.at	1.894	1.0E-05	0.628	1.4E-06		
212900.at	2.439	1.0E-05	0.625	2.5E-06		
218701.at	1.783	1.2E-05	0.623	2.3E-06	LACTB2	51110
218478.s.at	2.707	1.3E-05	0.621	7.3E-06	ZCCHC8	55596
217235.x.at	0.753	1.3E-05	0.394	6.1E-05		
214853.s.at	2.447	1.4E-05	0.618	4.9E-06	SHC1	6464
212149.at	1.990	1.4E-05	0.623	2.5E-06	KIAA0143	23167
210396.s.at	1.922	1.6E-05	0.625	5.6E-07	BOLA2	552900
202620.s.at	1.534	1.6E-05	0.632	2.6E-07	PLOD2	5352
207165.at	1.613	1.6E-05	0.613	2.0E-05	HMMR	3161
212687.at	2.135	1.7E-05	0.626	1.1E-06		
209835.x.at	0.604	1.8E-05	0.404	2.2E-04	CD44	960
215205.x.at	0.629	2.0E-05	0.368	1.8E-07	NCOR2	9612
209276.s.at	0.575	2.2E-05	0.373	5.5E-07	GLRX	2745
201369.s.at	0.631	2.2E-05	0.378	1.2E-06	ZFP36L2	678
217157.x.at	0.776	2.3E-05	0.395	5.6E-05		
212014.x.at	0.640	2.4E-05	0.403	1.6E-04	CD44	960

The following figure shows the distribution of the ggi :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of 3.39E-19, a concordance index of 0.742 95CI[0.699,0.785] (p-value of 2.86E-28) and an integrated Brier score of 0.148.

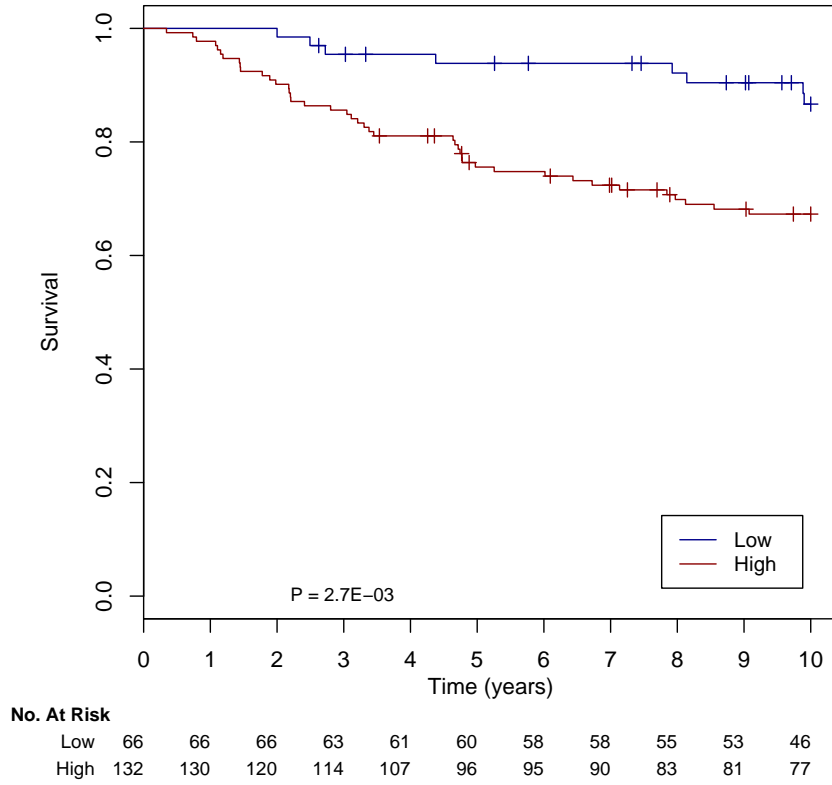
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of 4.31E-10, a concordance index of 0.836 95CI[0.756,0.916] (p-value of 8.15E-17) and an integrated Brier score of 0.168. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.93	[0.88,0.98]	0.87	[0.81,0.94]	0.86	[0.79,0.93]
High	0.65	[0.58,0.72]	0.55	[0.49,0.63]	0.50	[0.44,0.58]

Risk Score On TEST, the risk score exhibits a Cox p-value of 1.47E-04, a concordance index of 0.665 95CI[0.597,0.734] (p-value of 1.06E-06) and an integrated Brier score of 0.153.

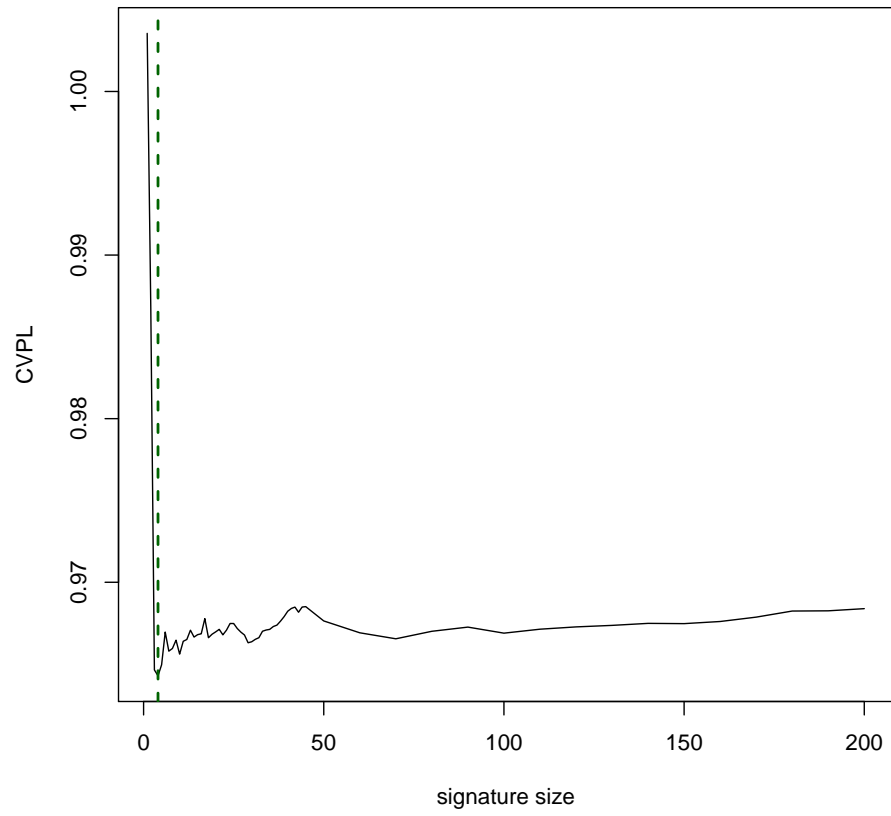
Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 1.78E-03, a concordance index of 0.77 95CI[0.636,0.904] (p-value of 3.73E-05) and an integrated Brier score of 0.143. The following figure shows the Kaplan-Meier survival curves for the two groups :



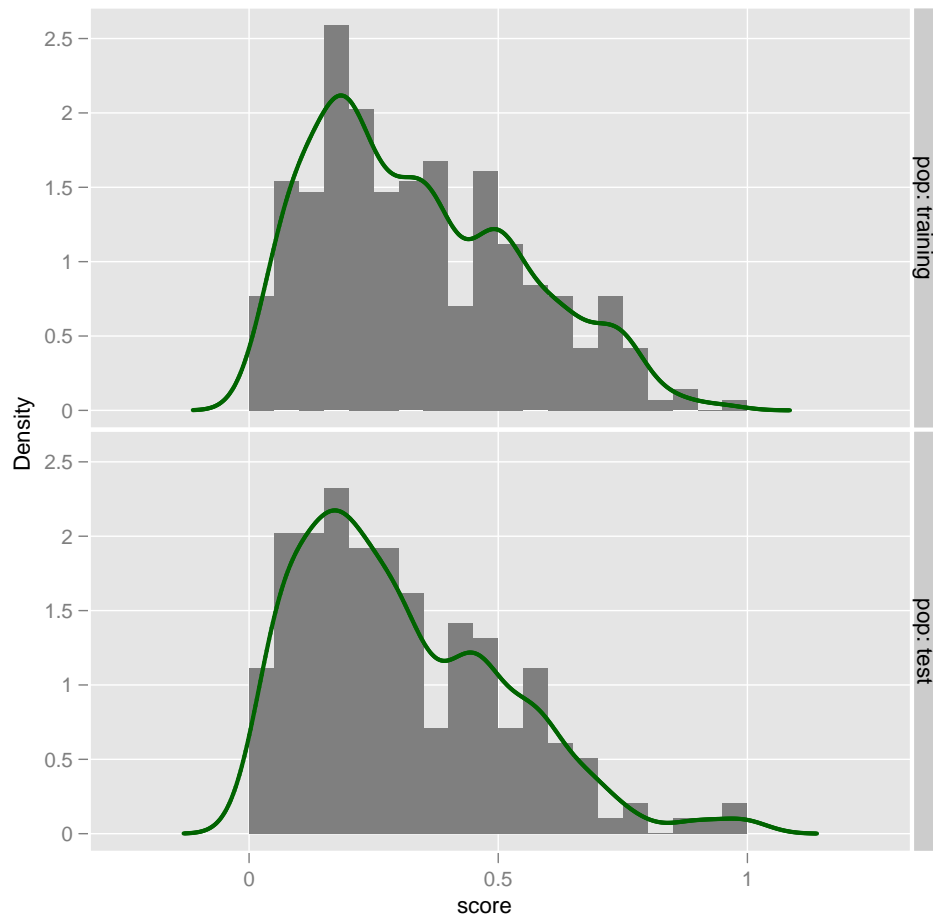
	3.years		5.years		10.years	
Low	0.95	[0.91,1.00]	0.94	[0.88,1.00]	0.87	[0.78,0.96]
High	0.85	[0.79,0.91]	0.75	[0.68,0.83]	0.67	[0.60,0.76]

1.10 GW.RANKCV.COMBUNIV.COX.SURV

The following figure shows the evolution of the performance w.r.t. the signature size (best signature size is 4):

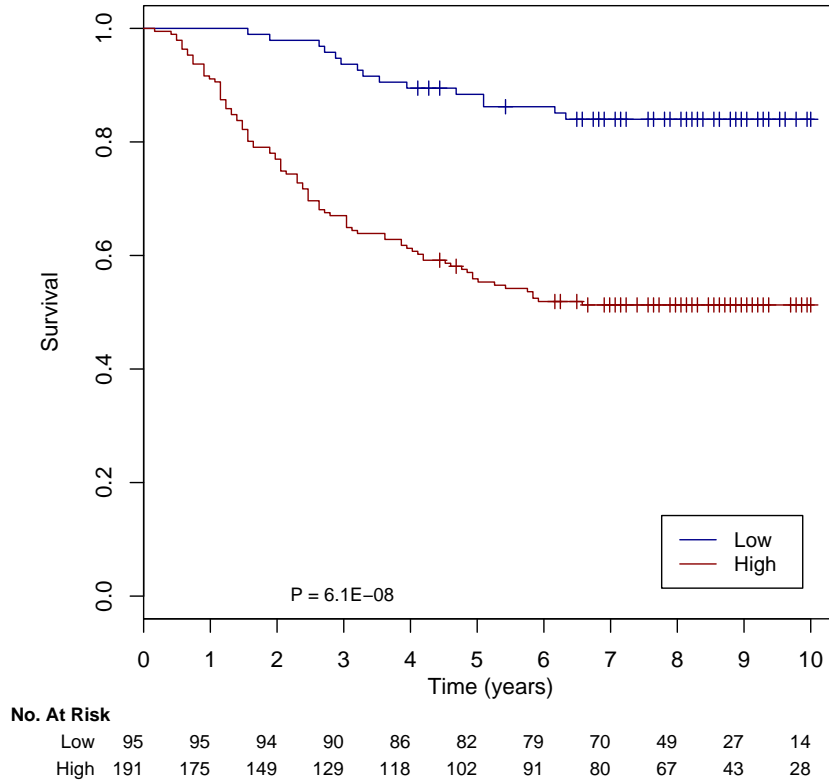


The following figure shows the distribution of the ggi :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of 3.95E-15, a concordance index of 0.717 95CI[0.671,0.762] (p-value of 7.07E-21) and an integrated Brier score of 0.156.

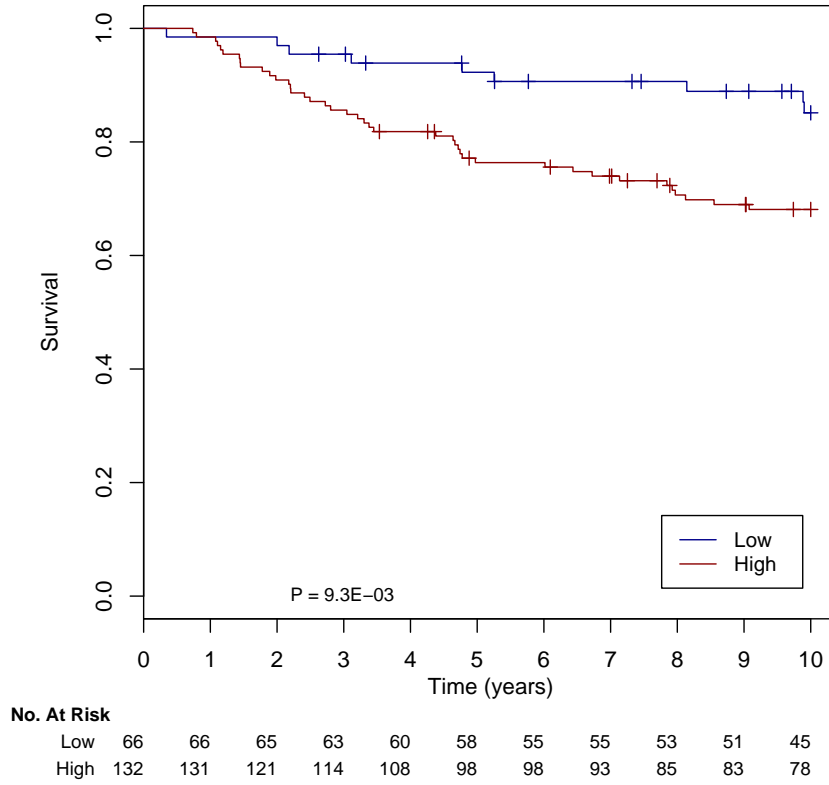
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of 5.82E-09, a concordance index of 0.824 95CI[0.745,0.903] (p-value of 3.60E-16) and an integrated Brier score of 0.17. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.93	[0.88,0.98]	0.86	[0.80,0.93]	0.84	[0.77,0.92]
High	0.65	[0.58,0.72]	0.55	[0.49,0.63]	0.51	[0.45,0.59]

Risk Score On TEST, the risk score exhibits a Cox p-value of 2.18E-03, a concordance index of 0.646 95CI[0.575,0.717] (p-value of 2.77E-05) and an integrated Brier score of 0.142.

Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 5.40E-03, a concordance index of 0.727 95CI[0.584,0.871] (p-value of 9.43E-04) and an integrated Brier score of 0.146. The following figure shows the Kaplan-Meier survival curves for the two groups :



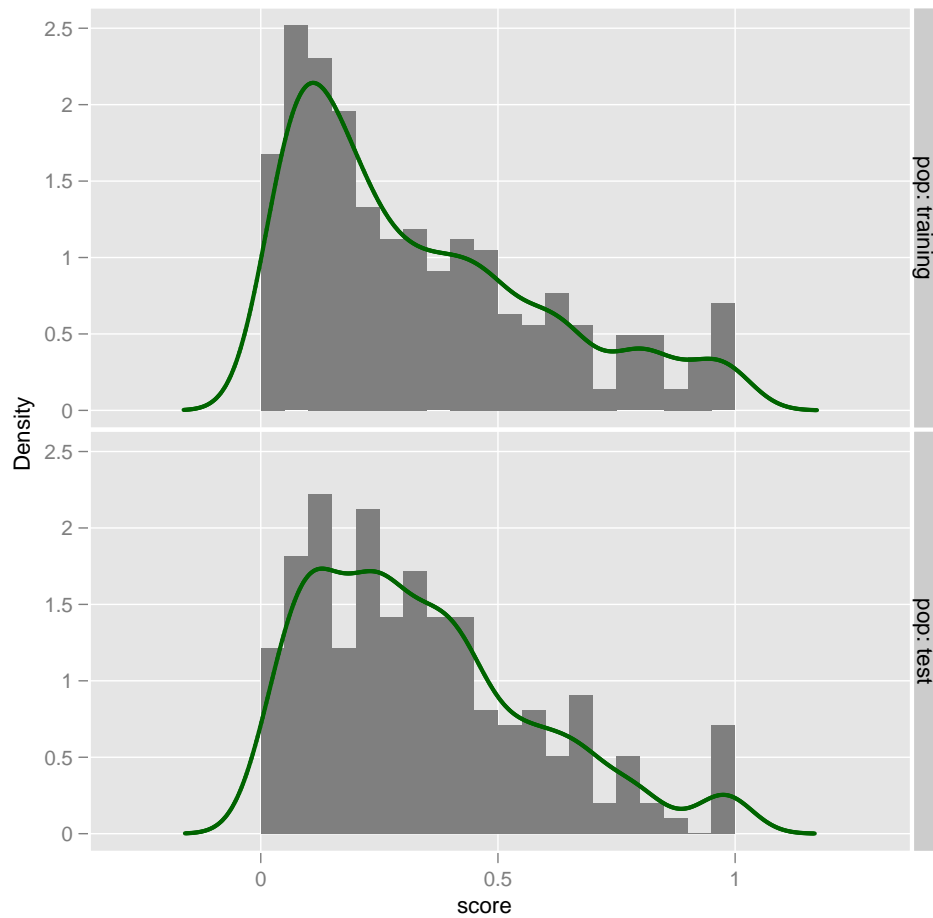
	3.years		5.years		10.years	
Low	0.95	[0.91,1.00]	0.91	[0.84,0.98]	0.85	[0.77,0.95]
High	0.85	[0.79,0.91]	0.76	[0.69,0.83]	0.68	[0.60,0.77]

1.11 GW.RANK.MULTIV.RCOX.SURV

The following table shows the selected features :

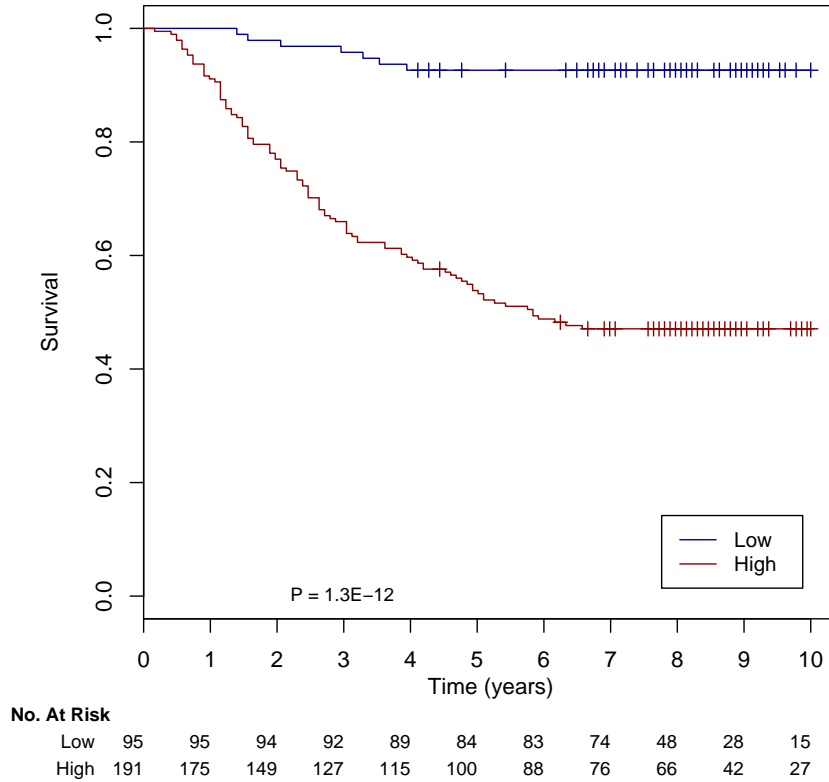
	hr	p.value	c.index	p.value	cox.coef	NCBI.gene.symbol	EntrezGene.ID
201076.at	0.349	8.3E−06	0.375	1.5E−06	−0.415	NHP2L1	4809
219478.at	1.551	8.5E−07	0.641	1.7E−07	0.330	WFDC1	58189
204641.at	1.565	6.5E−07	0.646	4.4E−09	0.219	NEK2	4751
201769.at	2.529	3.3E−06	0.643	3.5E−08	0.216	CLINT1	9685
218252.at	2.343	4.2E−06	0.627	1.7E−06	0.167	CKAP2	26586
209380.s.at	1.777	6.7E−06	0.606	1.3E−04	0.162	ABCC5	10057
215205.x.at	0.629	2.0E−05	0.368	1.8E−07	−0.153	NCOR2	9612
202969.at	1.894	1.0E−05	0.628	1.4E−06	0.133		
217235.x.at	0.753	1.3E−05	0.394	6.1E−05	−0.130		
212898.at	1.887	4.7E−06	0.628	9.2E−07	0.119	KIAA0406	9675
209835.x.at	0.604	1.8E−05	0.404	2.2E−04	−0.102	CD44	960
202620.s.at	1.534	1.6E−05	0.632	2.6E−07	0.094	PLOD2	5352
201369.s.at	0.631	2.2E−05	0.378	1.2E−06	−0.030	ZFP36L2	678
218701.at	1.783	1.2E−05	0.623	2.3E−06	0.022	LACTB2	51110
217157.x.at	0.776	2.3E−05	0.395	5.6E−05	−0.021		
212900.at	2.439	1.0E−05	0.625	2.5E−06	0.021		
209276.s.at	0.575	2.2E−05	0.373	5.5E−07	−0.013	GLRX	2745
201664.at	2.082	9.4E−06	0.621	3.2E−06	0.000	SMC4	10051

The following figure shows the distribution of the ggi :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of $1.41\text{E-}25$, a concordance index of 0.774 95CI[0.733,0.815] (p-value of $4.21\text{E-}39$) and an integrated Brier score of 0.136.

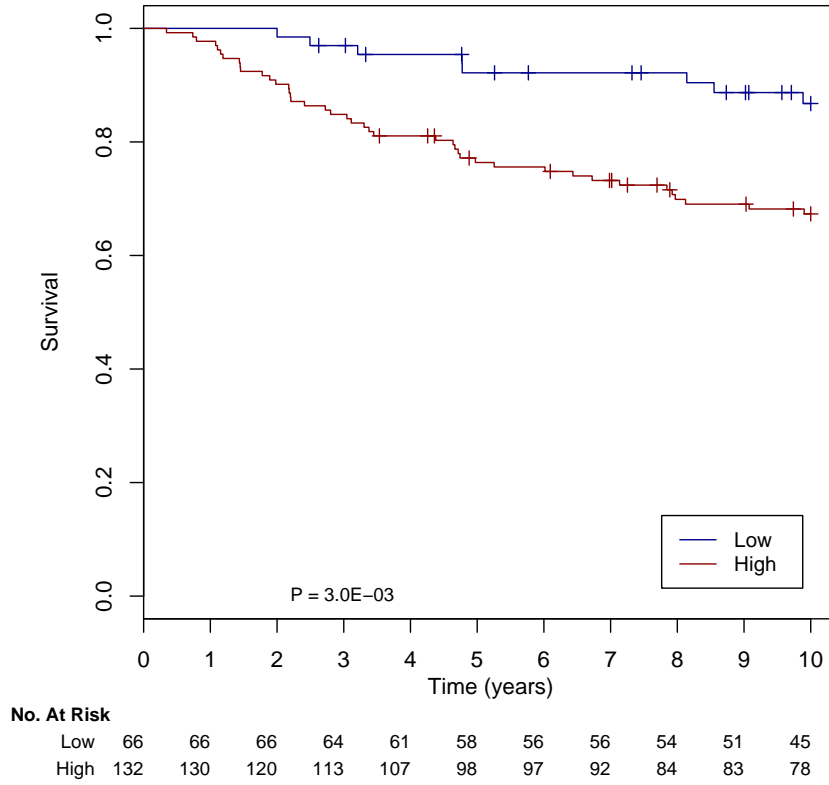
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of $1.51\text{E-}15$, a concordance index of 0.906 95CI[0.841,0.972] (p-value of $9.74\text{E-}35$) and an integrated Brier score of 0.159. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.95	[0.90,0.99]	0.93	[0.88,0.98]	0.93	[0.88,0.98]
High	0.64	[0.57,0.71]	0.53	[0.47,0.61]	0.47	[0.40,0.55]

Risk Score On TEST, the risk score exhibits a Cox p-value of 4.47E-04, a concordance index of 0.663 95CI[0.591,0.735] (p-value of 4.19E-06) and an integrated Brier score of 0.151.

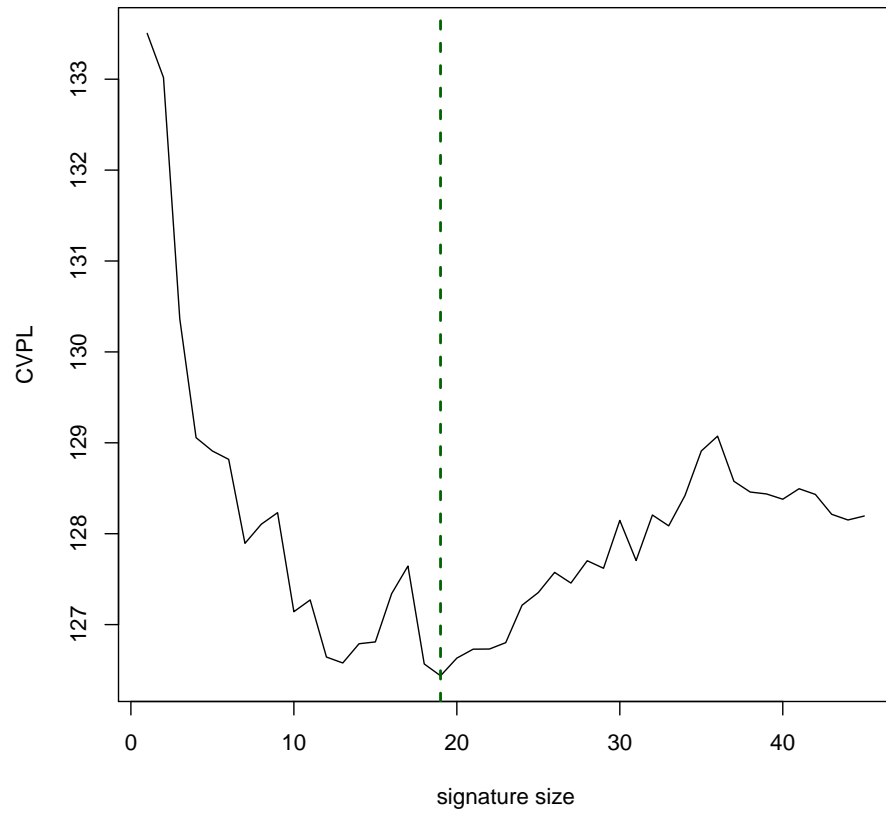
Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 5.91E-04, a concordance index of 0.765 95CI[0.63,0.9] (p-value of 5.93E-05) and an integrated Brier score of 0.15. The following figure shows the Kaplan-Meier survival curves for the two groups :



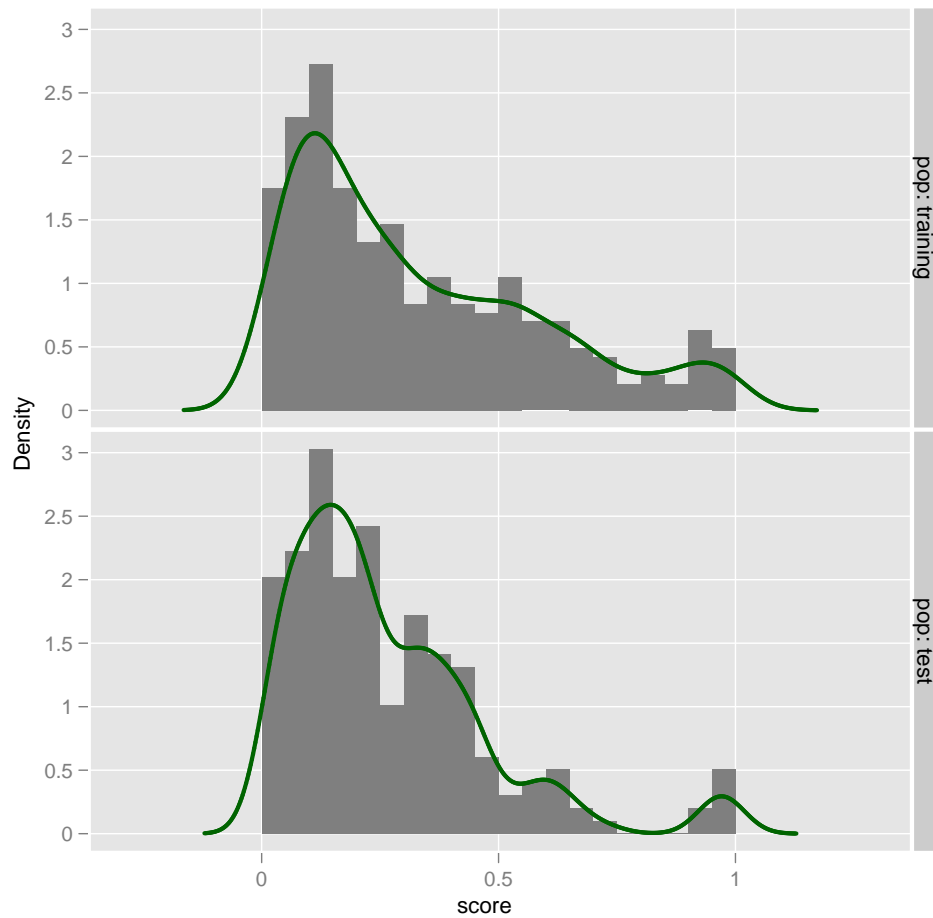
	3.years		5.years		10.years	
Low	0.97	[0.93,1.00]	0.92	[0.86,0.99]	0.87	[0.79,0.96]
High	0.84	[0.78,0.91]	0.76	[0.69,0.83]	0.67	[0.60,0.76]

1.12 GW.RANKCV.MULTIV.RCOX.SURV

The following figure shows the evolution of the performance w.r.t. the signature size (best signature size is 19):

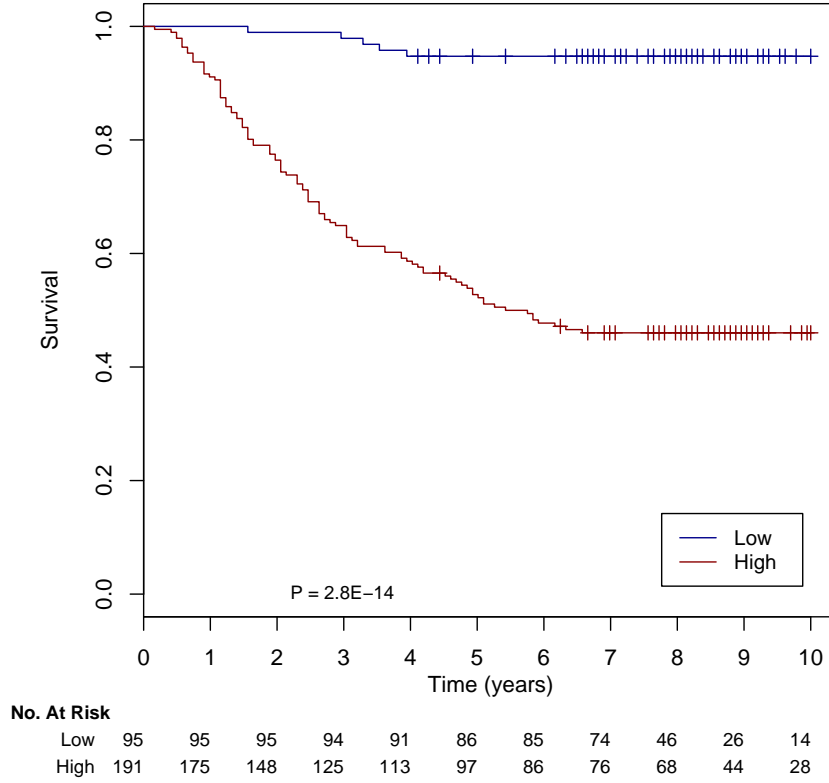


The following figure shows the distribution of the ggi :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of 5.60E-25, a concordance index of 0.777 95CI[0.737,0.817] (p-value of 9.72E-42) and an integrated Brier score of 0.138.

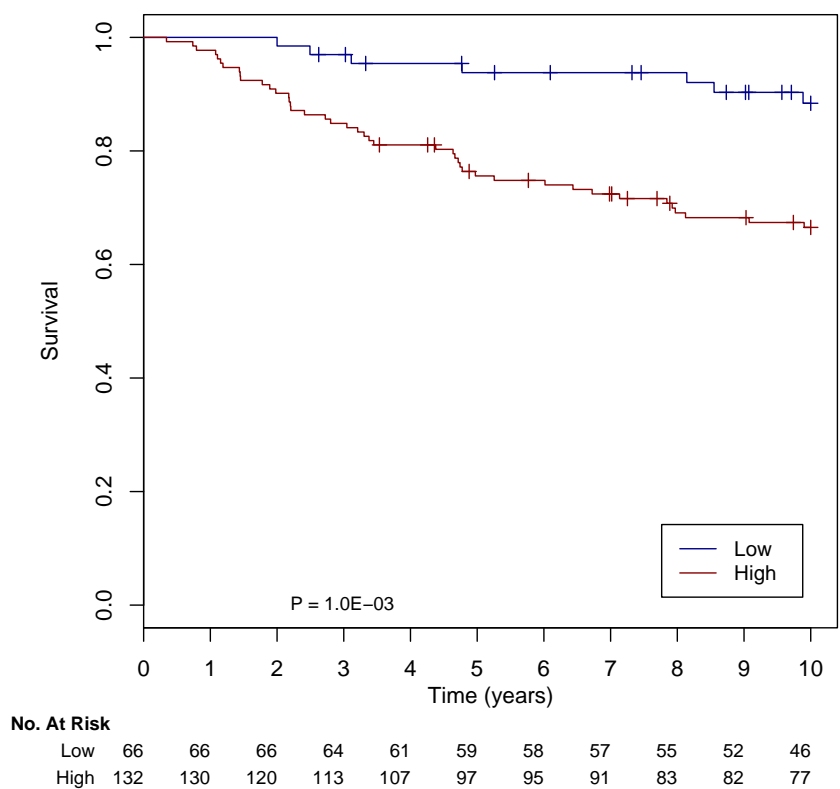
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of 3.86E-18, a concordance index of 0.938 95CI[0.885,0.99] (p-value of 9.53E-61) and an integrated Brier score of 0.155. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.97	[0.93,1.00]	0.95	[0.90,0.99]	0.95	[0.90,0.99]
High	0.63	[0.56,0.70]	0.52	[0.46,0.60]	0.46	[0.39,0.54]

Risk Score On TEST, the risk score exhibits a Cox p-value of 7.31E-04, a concordance index of 0.682 95CI[0.615,0.748] (p-value of 4.73E-08) and an integrated Brier score of 0.13.

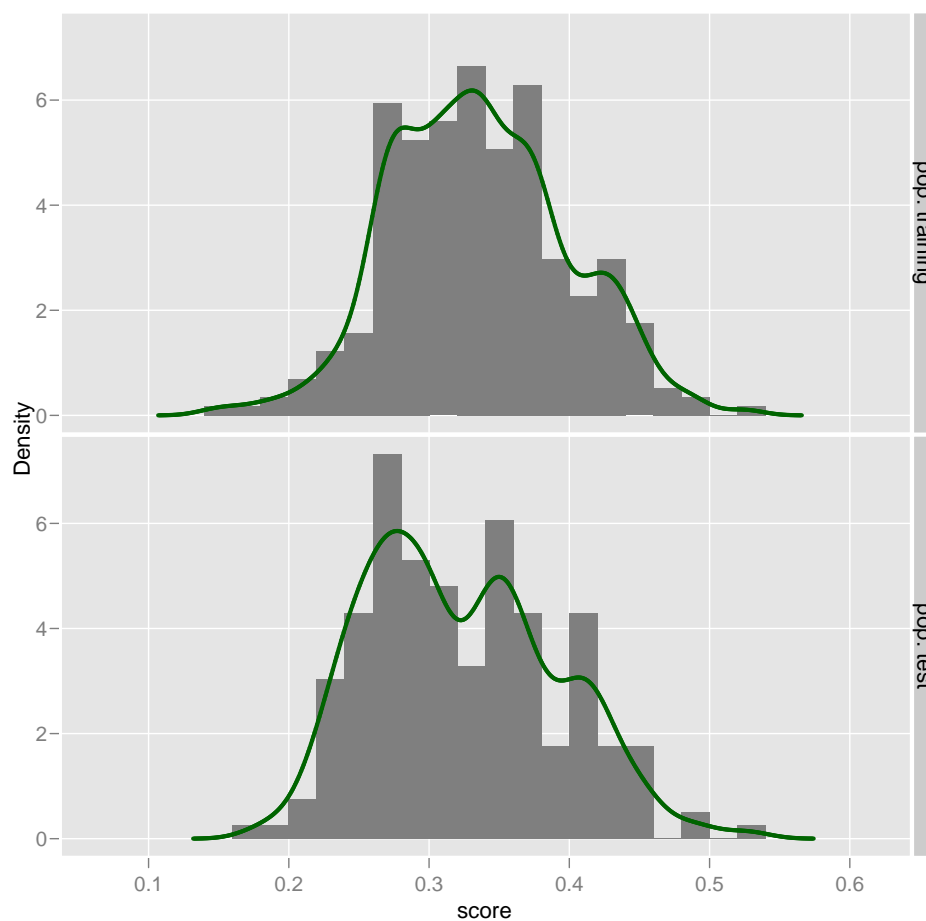
Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 3.15E-04, a concordance index of 0.793 95CI[0.663,0.924] (p-value of 5.35E-06) and an integrated Brier score of 0.151. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.97	[0.93,1.00]	0.94	[0.88,1.00]	0.88	[0.81,0.97]
High	0.84	[0.78,0.91]	0.75	[0.68,0.83]	0.67	[0.59,0.75]

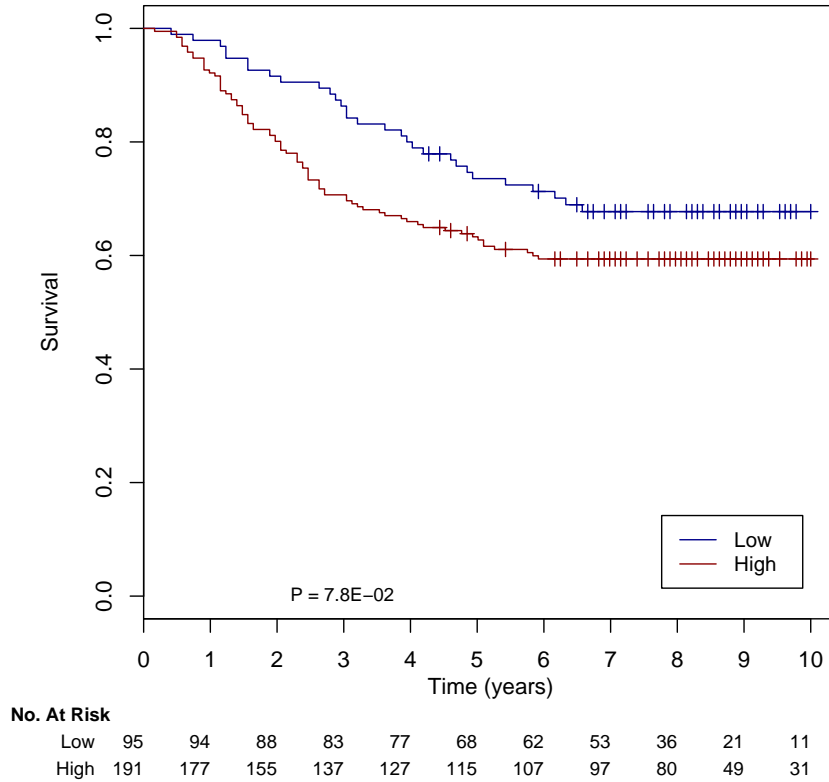
1.13 GW.PCA.COMBUNIV.WILCOXON.HG

The following figure shows the distribution of the ggi in the two populations :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of 1.94E-02, a concordance index of 0.586 95CI[0.533,0.64] (p-value of 7.81E-04) and an integrated Brier score of 0.186.

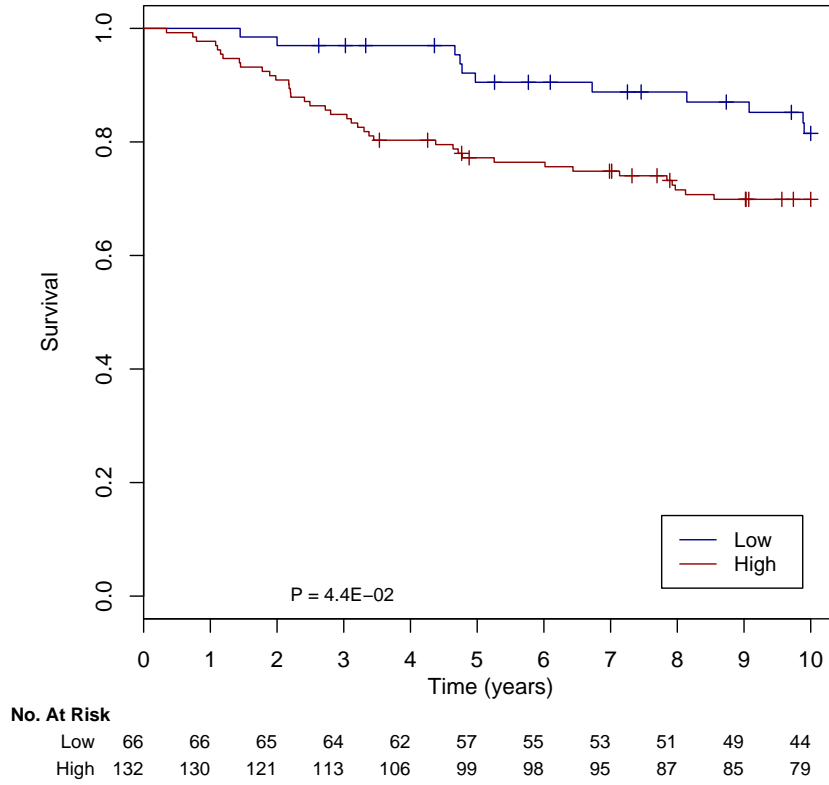
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of 7.19E-02, a concordance index of 0.616 95CI[0.517,0.715] (p-value of 1.08E-02) and an integrated Brier score of 0.187. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.84	[0.77,0.92]	0.72	[0.64,0.82]	0.68	[0.59,0.78]
High	0.70	[0.63,0.76]	0.63	[0.56,0.70]	0.59	[0.53,0.67]

Risk Score On TEST, the risk score exhibits a Cox p-value of 6.75E-02, a concordance index of 0.591 95CI[0.516,0.666] (p-value of 8.81E-03) and an integrated Brier score of 0.14.

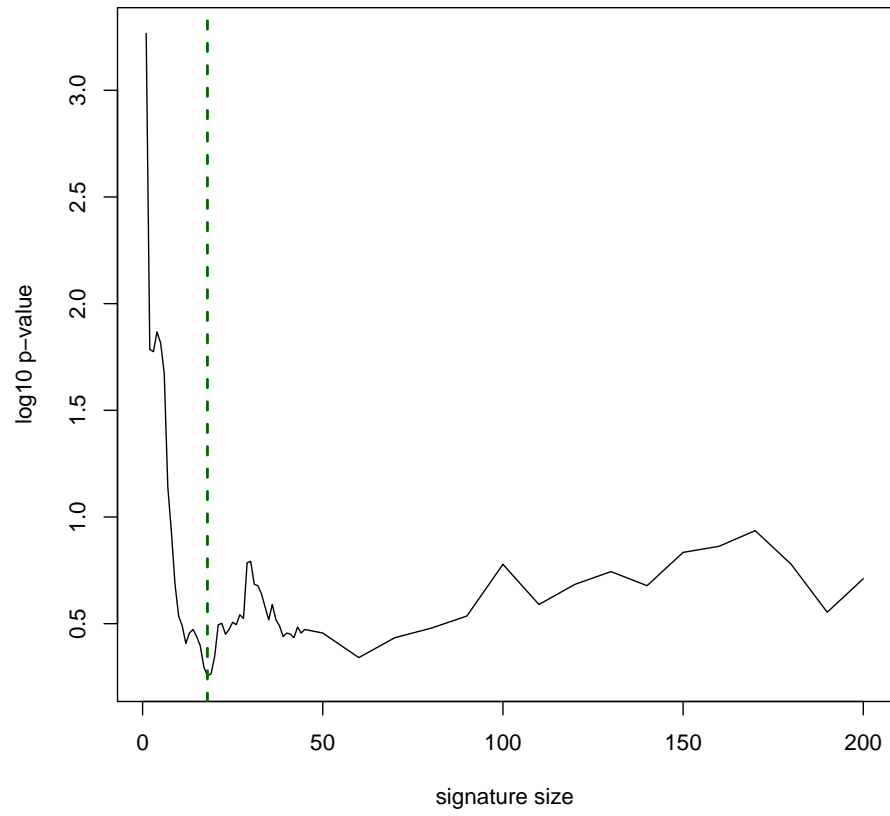
Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 4.11E-02, a concordance index of 0.69 95CI[0.549,0.831] (p-value of 4.20E-03) and an integrated Brier score of 0.142. The following figure shows the Kaplan-Meier survival curves for the two groups :



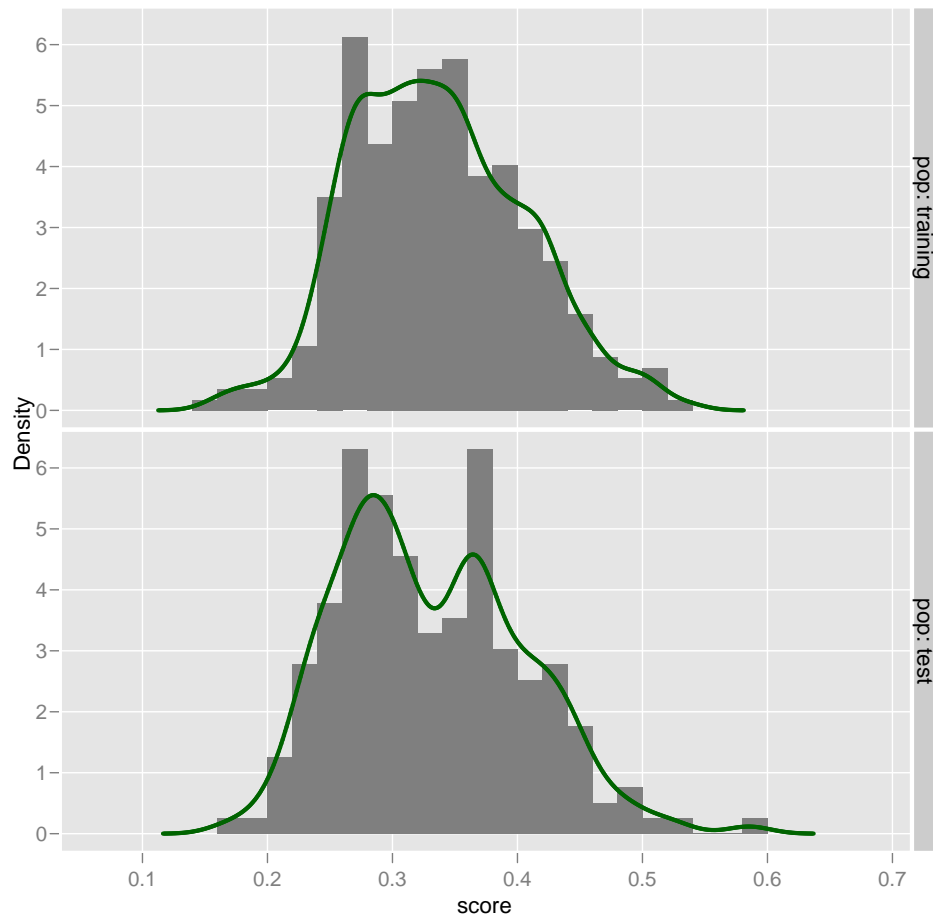
	3.years		5.years		10.years	
Low	0.97	[0.93,1.00]	0.91	[0.84,0.98]	0.82	[0.72,0.92]
High	0.84	[0.78,0.91]	0.76	[0.69,0.84]	0.70	[0.62,0.78]

1.14 GW.PCACV.COMBUNIV.WILCOXON.HG

The following figure shows the evolution of the performance w.r.t. the signature size (best signature size is 18):

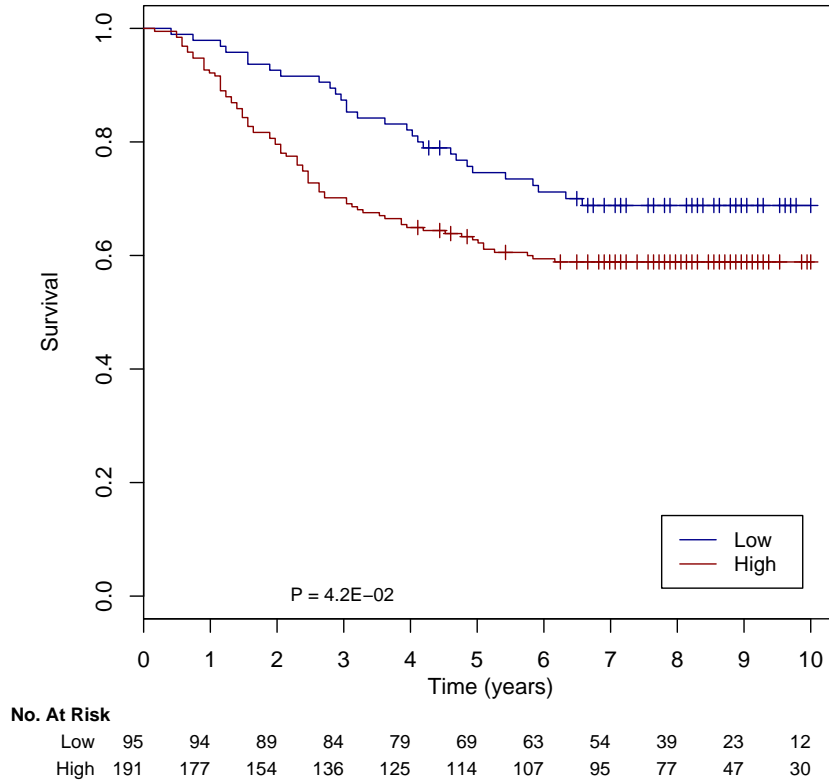


The following figure shows the distribution of the ggi in the two populations :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of 9.90E-03, a concordance index of 0.596 95CI[0.543,0.649] (p-value of 2.15E-04) and an integrated Brier score of 0.185.

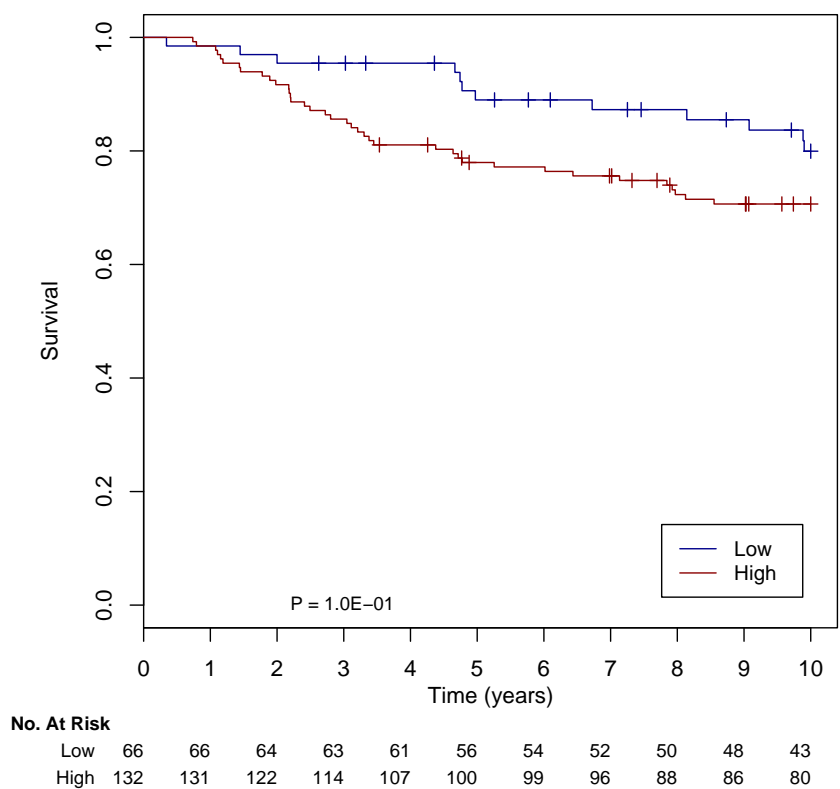
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of 3.68E-02, a concordance index of 0.633 95CI[0.535,0.731] (p-value of 3.97E-03) and an integrated Brier score of 0.186. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.85	[0.78,0.93]	0.73	[0.65,0.83]	0.69	[0.60,0.79]
High	0.69	[0.63,0.76]	0.62	[0.56,0.69]	0.59	[0.52,0.66]

Risk Score On TEST, the risk score exhibits a Cox p-value of 7.96E-02, a concordance index of 0.583 95CI[0.506,0.659] (p-value of 1.70E-02) and an integrated Brier score of 0.142.

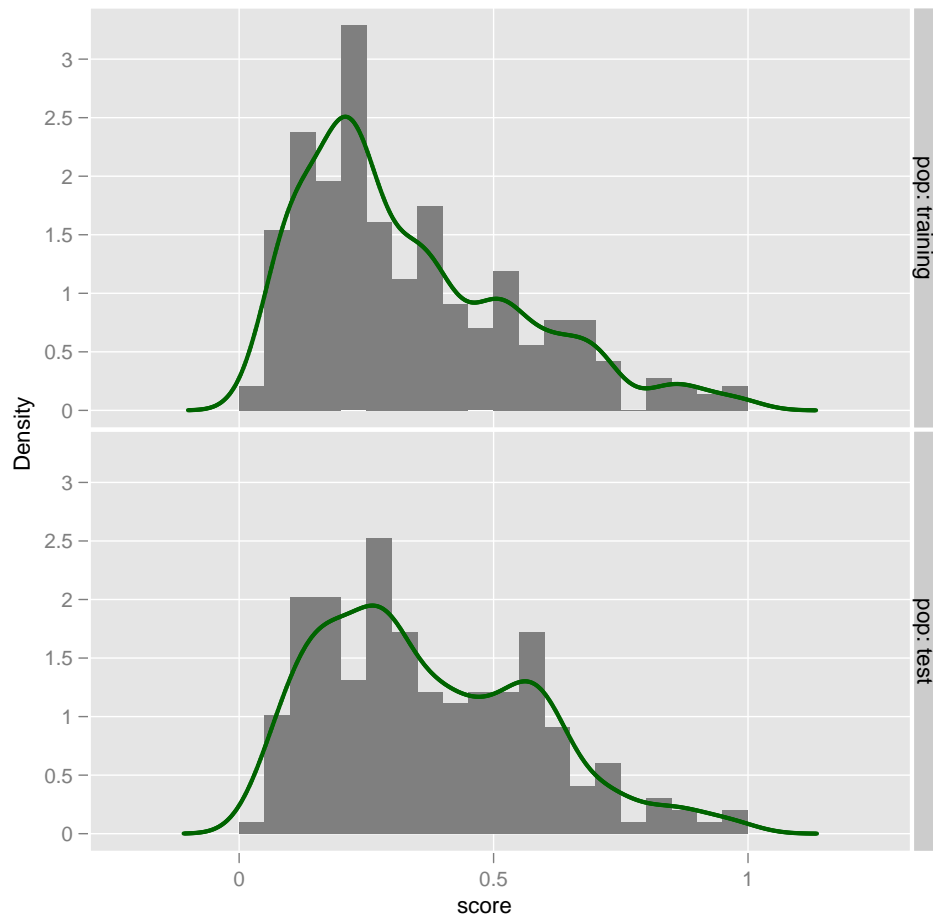
Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 1.09E-01, a concordance index of 0.652 95CI[0.506,0.798] (p-value of 2.06E-02) and an integrated Brier score of 0.143. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.95	[0.91,1.00]	0.89	[0.82,0.97]	0.80	[0.70,0.91]
High	0.85	[0.79,0.91]	0.77	[0.70,0.85]	0.71	[0.63,0.79]

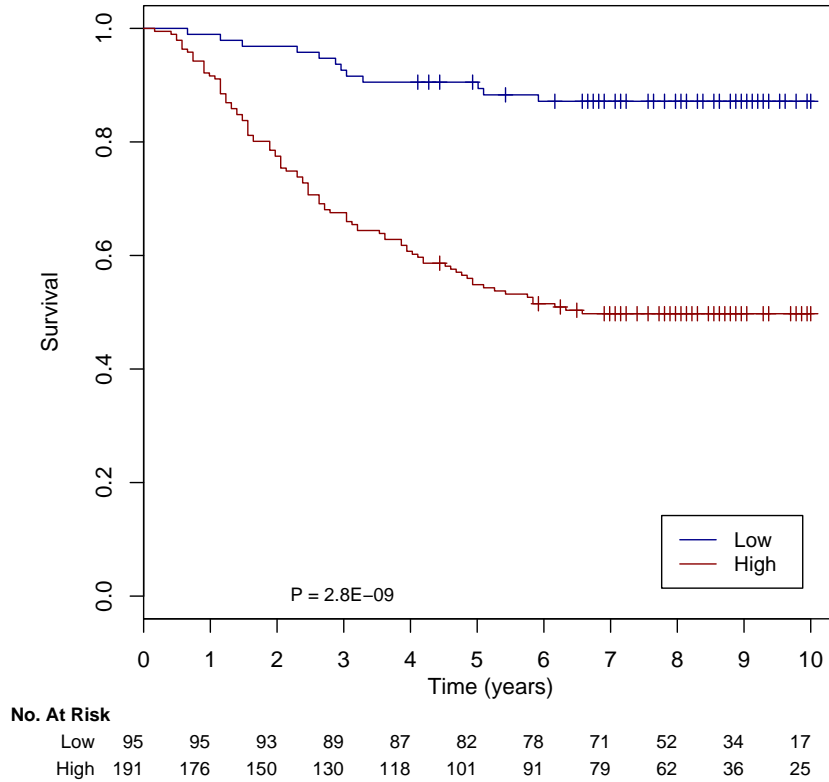
1.15 GW.PCA.COMBUNIV.COX.SURV

The following figure shows the distribution of the ggi in the two populations :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of 2.37E-16, a concordance index of 0.726 95CI[0.679,0.773] (p-value of 3.41E-21) and an integrated Brier score of 0.154.

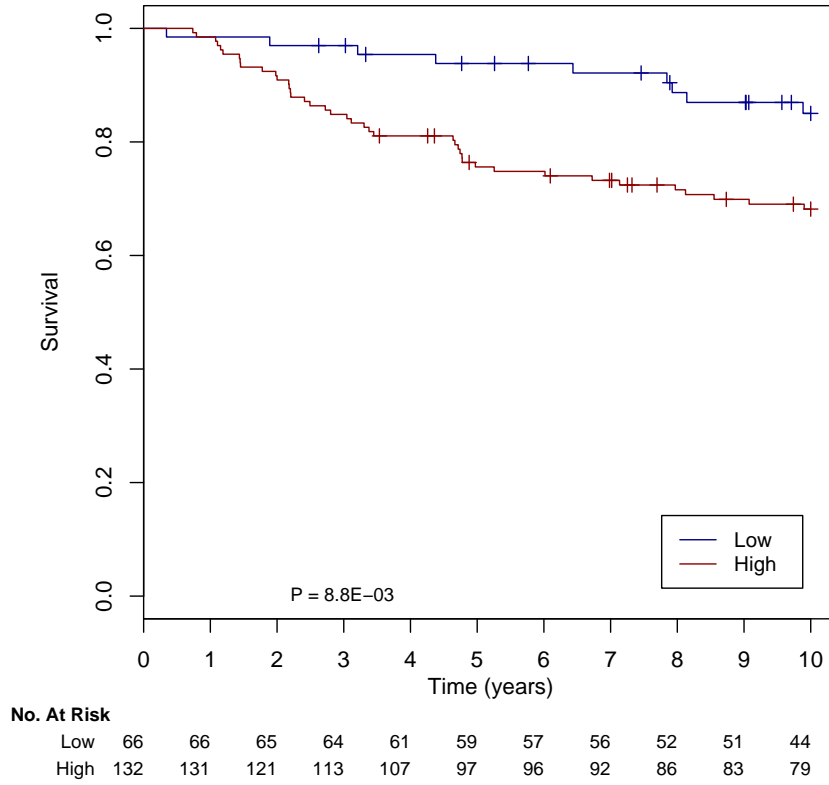
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of 8.96E-11, a concordance index of 0.843 95CI[0.762,0.923] (p-value of 3.46E-17) and an integrated Brier score of 0.167. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.92	[0.86,0.97]	0.89	[0.83,0.96]	0.87	[0.81,0.94]
High	0.66	[0.60,0.73]	0.54	[0.48,0.62]	0.50	[0.43,0.57]

Risk Score On TEST, the risk score exhibits a Cox p-value of 1.29E-05, a concordance index of 0.676 95CI[0.608,0.745] (p-value of 2.37E-07) and an integrated Brier score of 0.147.

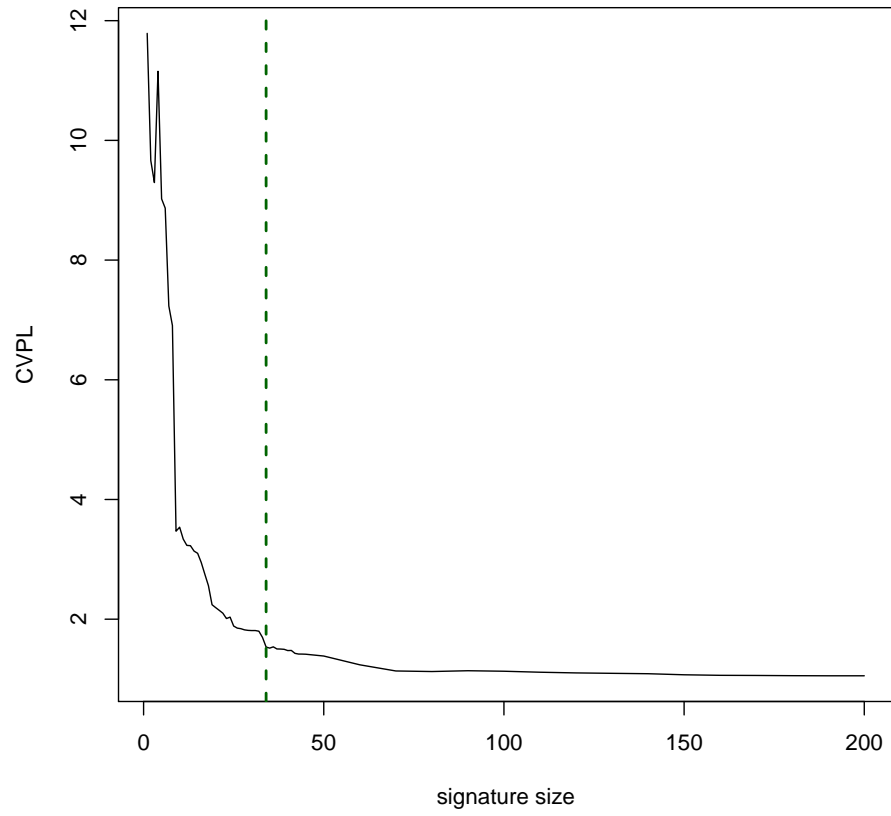
Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 5.66E-03, a concordance index of 0.734 95CI[0.593,0.874] (p-value of 5.77E-04) and an integrated Brier score of 0.147. The following figure shows the Kaplan-Meier survival curves for the two groups :



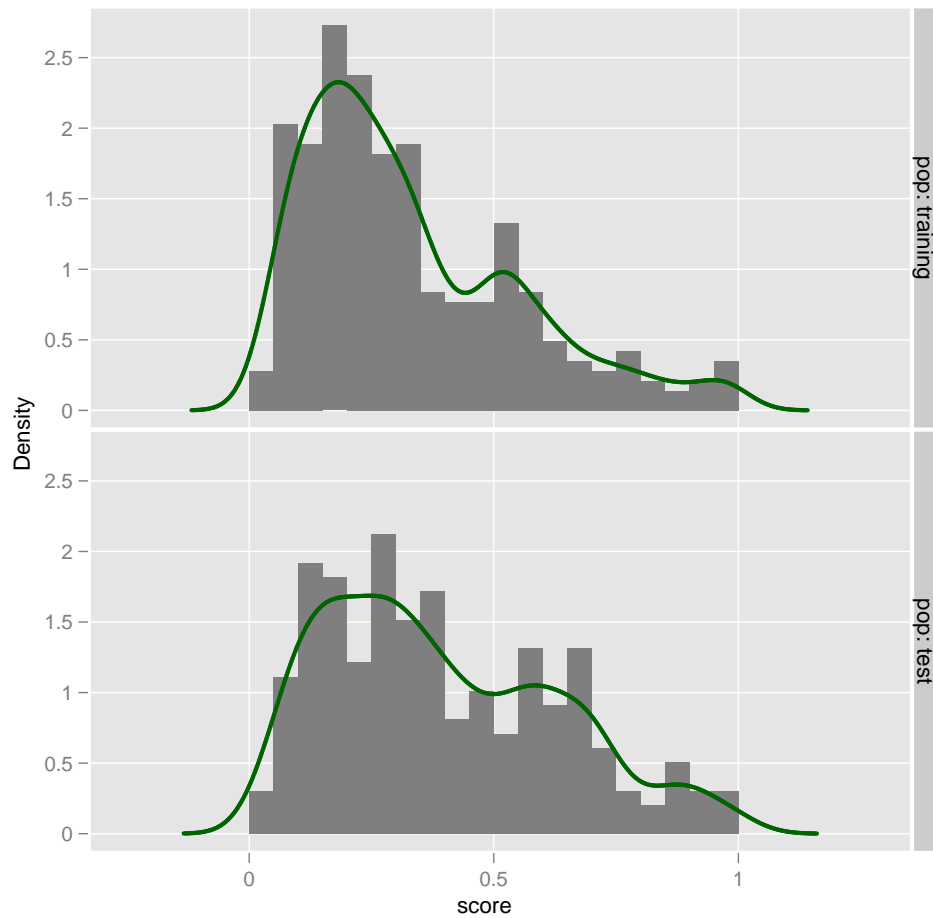
	3.years		5.years		10.years	
Low	0.97	[0.93,1.00]	0.94	[0.88,1.00]	0.85	[0.76,0.95]
High	0.84	[0.78,0.91]	0.75	[0.68,0.83]	0.68	[0.61,0.77]

1.16 GW.PCACV.COMBUNIV.COX.SURV

The following figure shows the evolution of the performance w.r.t. the signature size (best signature size is 34):

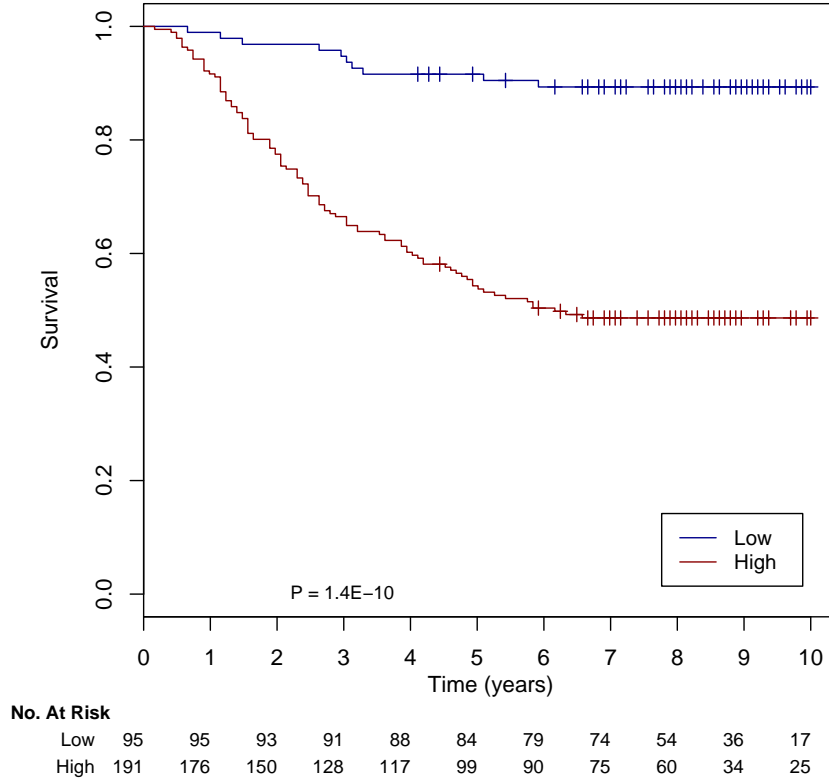


The following figure shows the distribution of the ggi in the two populations :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of 1.23E-18, a concordance index of 0.747 95CI[0.702,0.793] (p-value of 1.16E-26) and an integrated Brier score of 0.149.

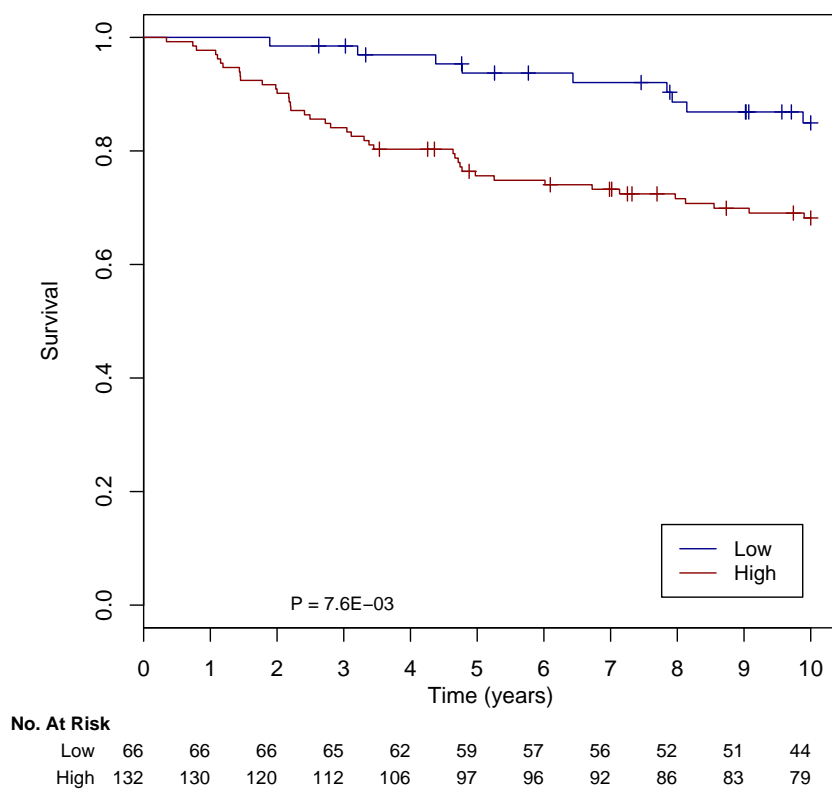
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of 1.54E-12, a concordance index of 0.868 95CI[0.792,0.944] (p-value of 8.17E-22) and an integrated Brier score of 0.164. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.94	[0.89,0.99]	0.90	[0.85,0.97]	0.89	[0.83,0.96]
High	0.65	[0.58,0.72]	0.54	[0.47,0.61]	0.49	[0.42,0.56]

Risk Score On TEST, the risk score exhibits a Cox p-value of 4.15E-06, a concordance index of 0.678 95CI[0.61,0.747] (p-value of 1.39E-07) and an integrated Brier score of 0.159.

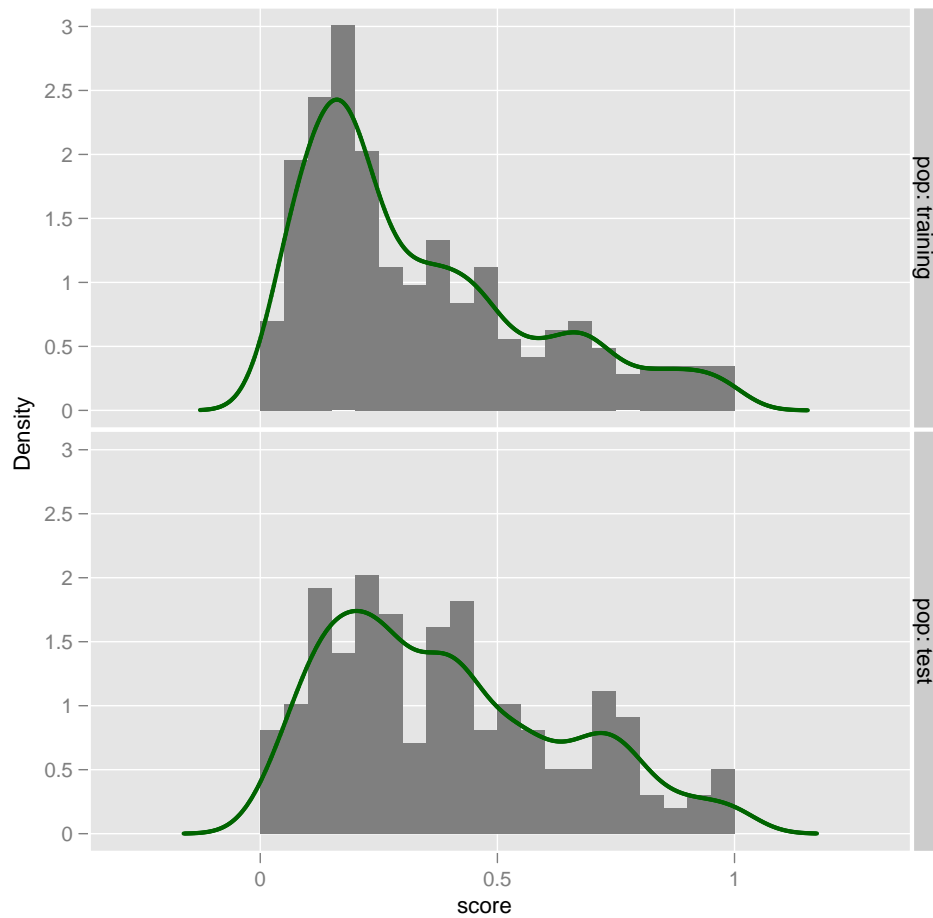
Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 4.42E-03, a concordance index of 0.745 95CI[0.609,0.88] (p-value of 2.01E-04) and an integrated Brier score of 0.148. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.98	[0.96,1.00]	0.94	[0.88,1.00]	0.85	[0.76,0.95]
High	0.83	[0.77,0.90]	0.75	[0.68,0.83]	0.68	[0.61,0.77]

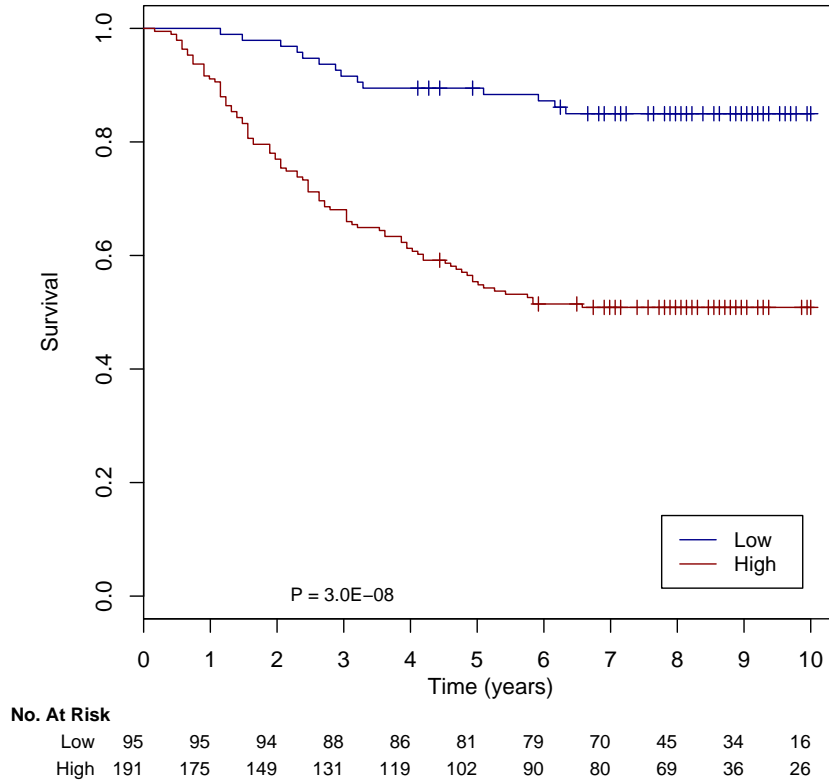
1.17 GW.PCA.MULTIV.RCOX.SURV

The following figure shows the distribution of the ggi :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of 3.91E-21, a concordance index of 0.75 95CI[0.705,0.794] (p-value of 8.86E-29) and an integrated Brier score of 0.143.

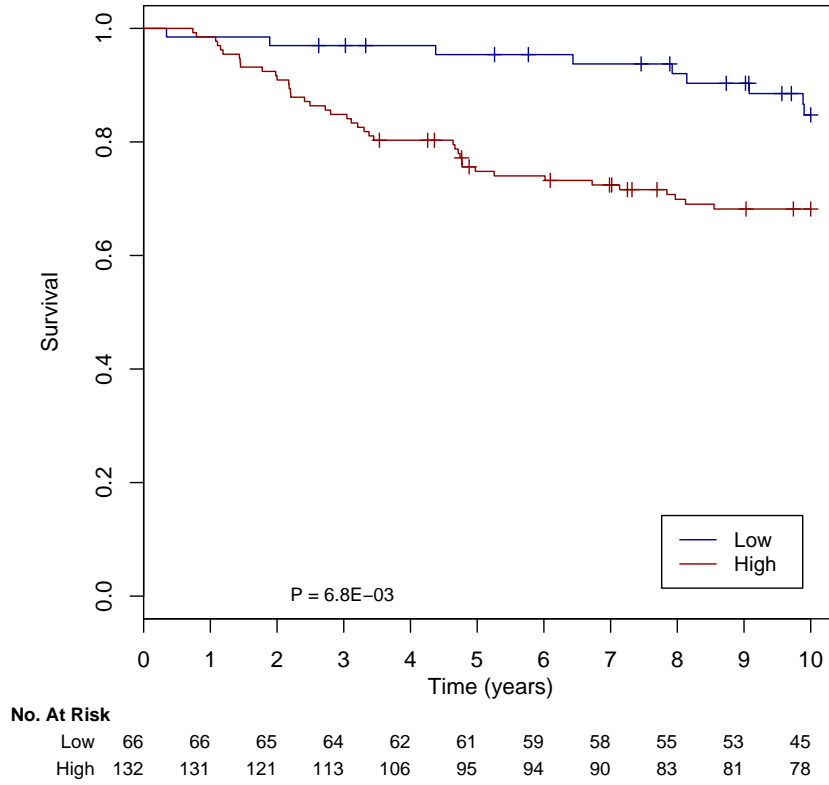
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of 2.19E-09, a concordance index of 0.826 95CI[0.744,0.907] (p-value of 2.30E-15) and an integrated Brier score of 0.169. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.91	[0.85,0.97]	0.88	[0.82,0.95]	0.85	[0.78,0.93]
High	0.66	[0.60,0.73]	0.55	[0.48,0.62]	0.51	[0.44,0.59]

Risk Score On TEST, the risk score exhibits a Cox p-value of 8.23E-06, a concordance index of 0.694 95CI[0.625,0.763] (p-value of 1.73E-08) and an integrated Brier score of 0.155.

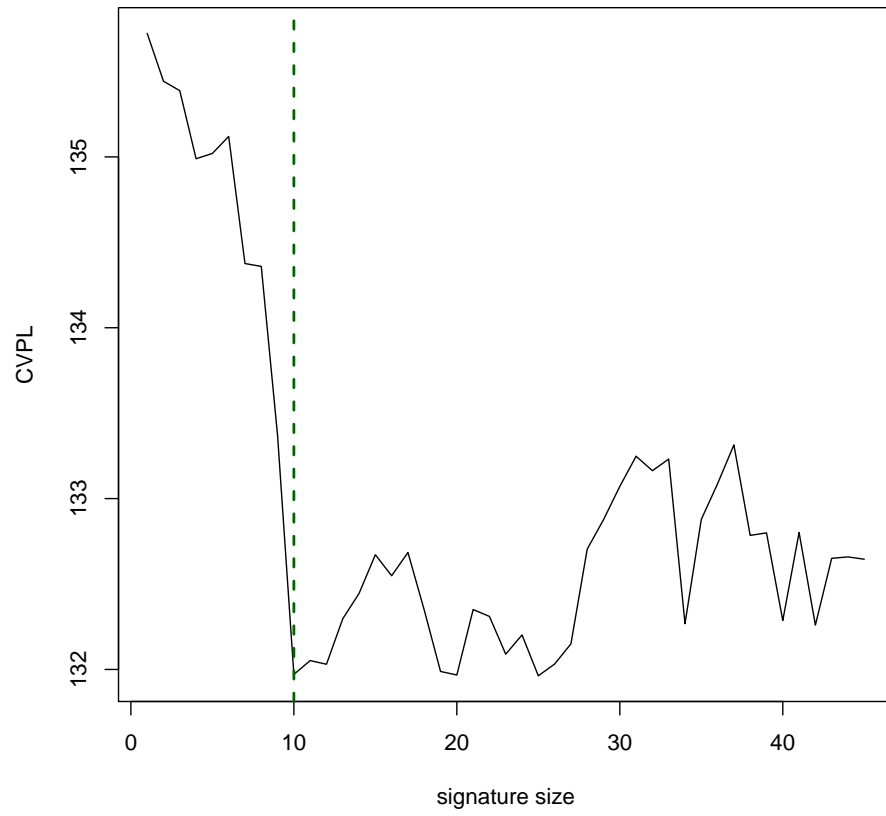
Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 4.83E-03, a concordance index of 0.749 95CI[0.613,0.885] (p-value of 1.65E-04) and an integrated Brier score of 0.142. The following figure shows the Kaplan-Meier survival curves for the two groups :



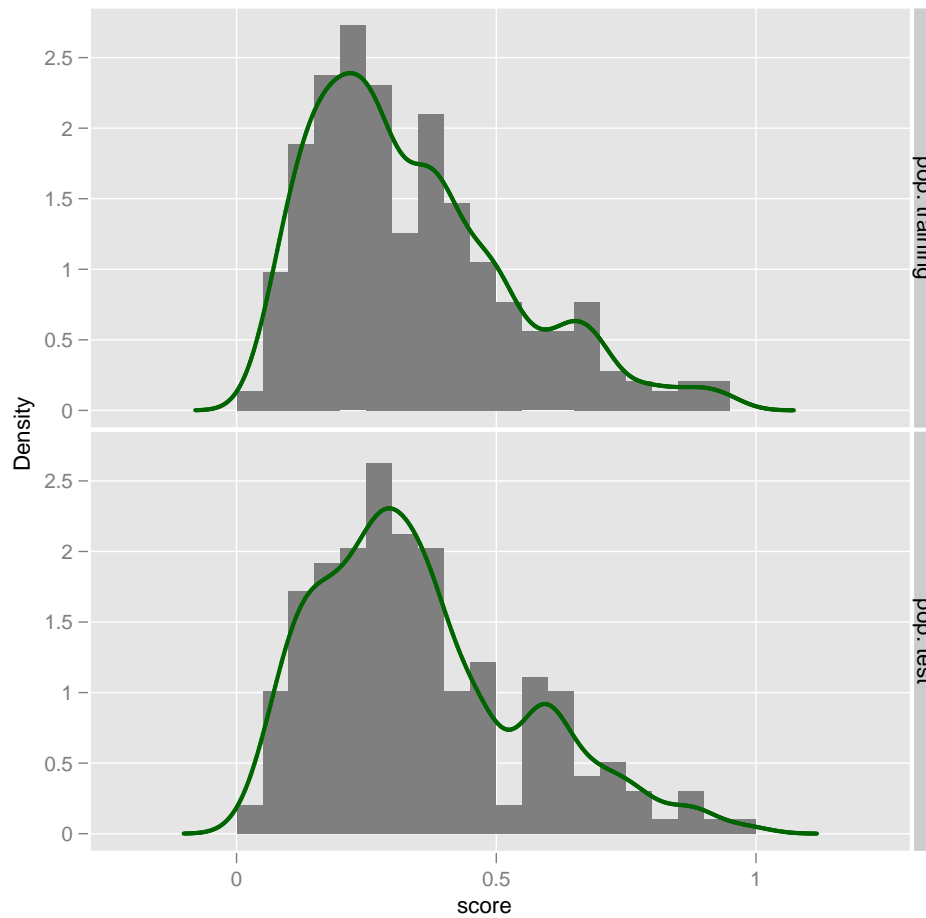
	3.years		5.years		10.years	
Low	0.97	[0.93,1.00]	0.95	[0.90,1.00]	0.85	[0.76,0.95]
High	0.84	[0.78,0.91]	0.74	[0.67,0.82]	0.68	[0.61,0.77]

1.18 GW.PCACV.MULTIV.RCOX.SURV

The following figure shows the evolution of the performance w.r.t. the signature size (best signature size is 10):

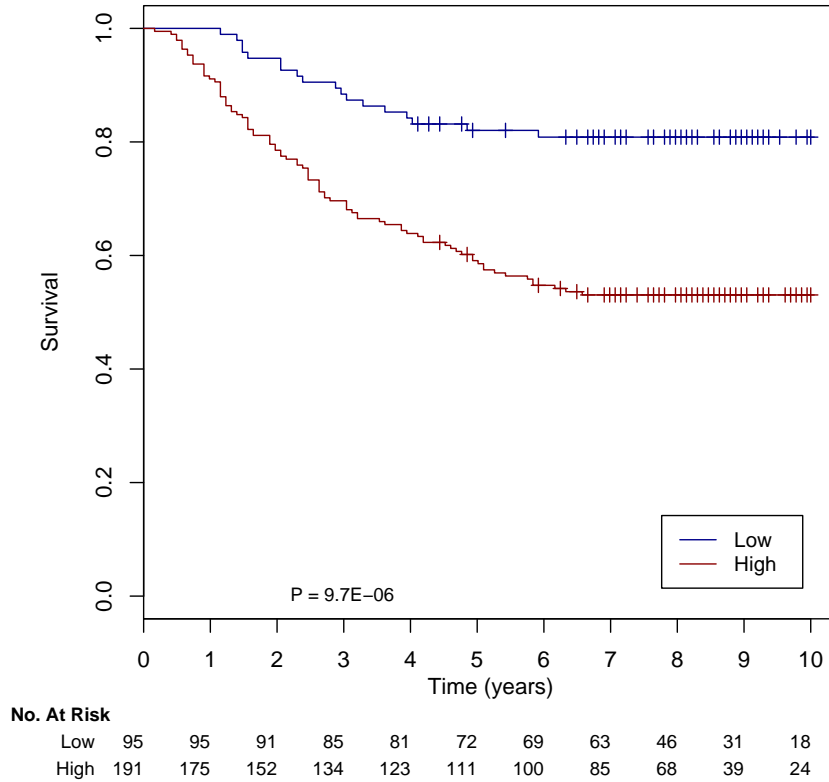


The following figure shows the distribution of the ggi :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of 4.00E-13, a concordance index of 0.686 95CI[0.636,0.736] (p-value of 2.16E-13) and an integrated Brier score of 0.161.

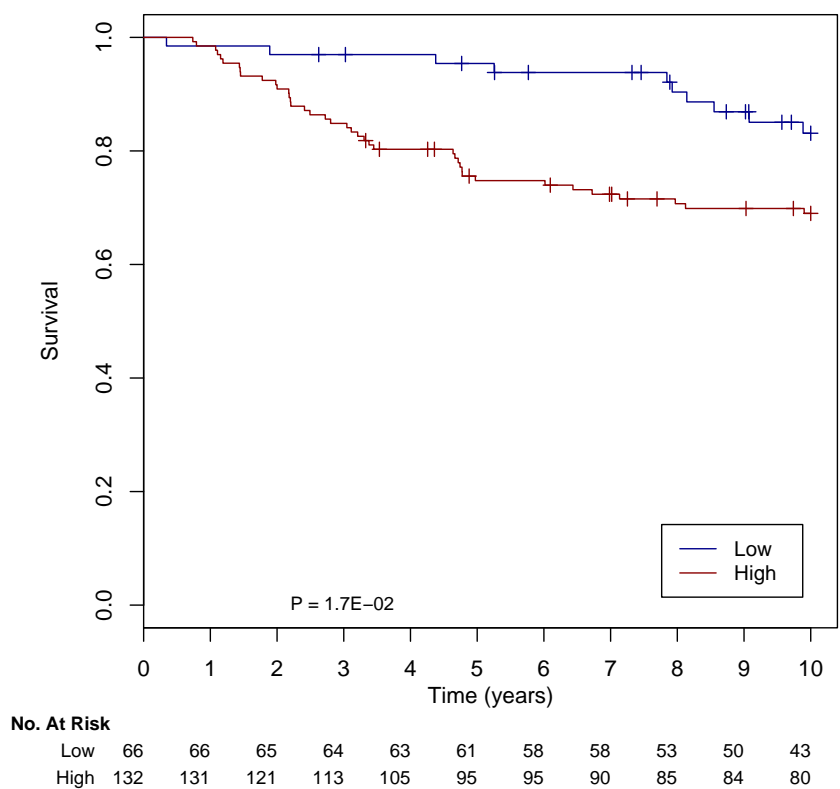
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of 2.65E-06, a concordance index of 0.754 95CI[0.66,0.848] (p-value of 6.18E-08) and an integrated Brier score of 0.178. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.87	[0.81,0.94]	0.82	[0.75,0.90]	0.81	[0.73,0.89]
High	0.68	[0.62,0.75]	0.59	[0.52,0.66]	0.53	[0.46,0.61]

Risk Score On TEST, the risk score exhibits a Cox p-value of 2.31E-05, a concordance index of 0.684 95CI[0.612,0.756] (p-value of 2.69E-07) and an integrated Brier score of 0.141.

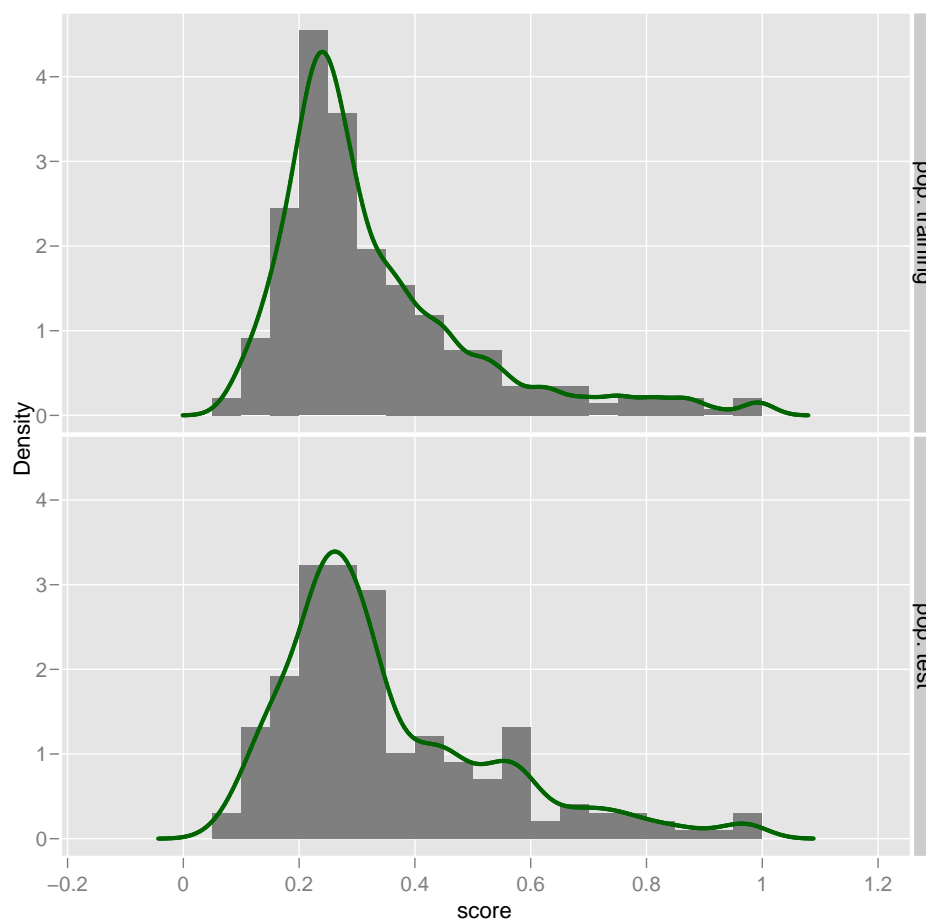
Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 1.02E-02, a concordance index of 0.722 95CI[0.583,0.86] (p-value of 8.72E-04) and an integrated Brier score of 0.141. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years	5.years	10.years
Low	0.97 [0.93,1.00]	0.94 [0.88,1.00]	0.83 [0.74,0.93]
High	0.84 [0.78,0.91]	0.74 [0.67,0.82]	0.69 [0.61,0.77]

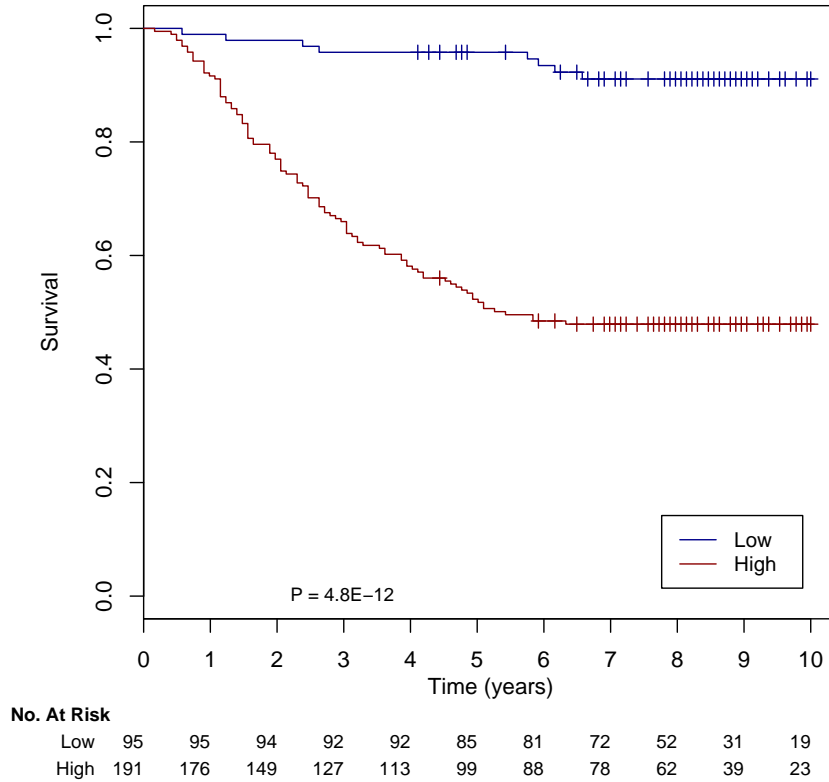
1.19 GENE76

The following figure shows the distribution of the ggi :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of 2.63E-14, a concordance index of 0.754 95CI[0.713,0.795] (p-value of 2.22E-34) and an integrated Brier score of 0.158.

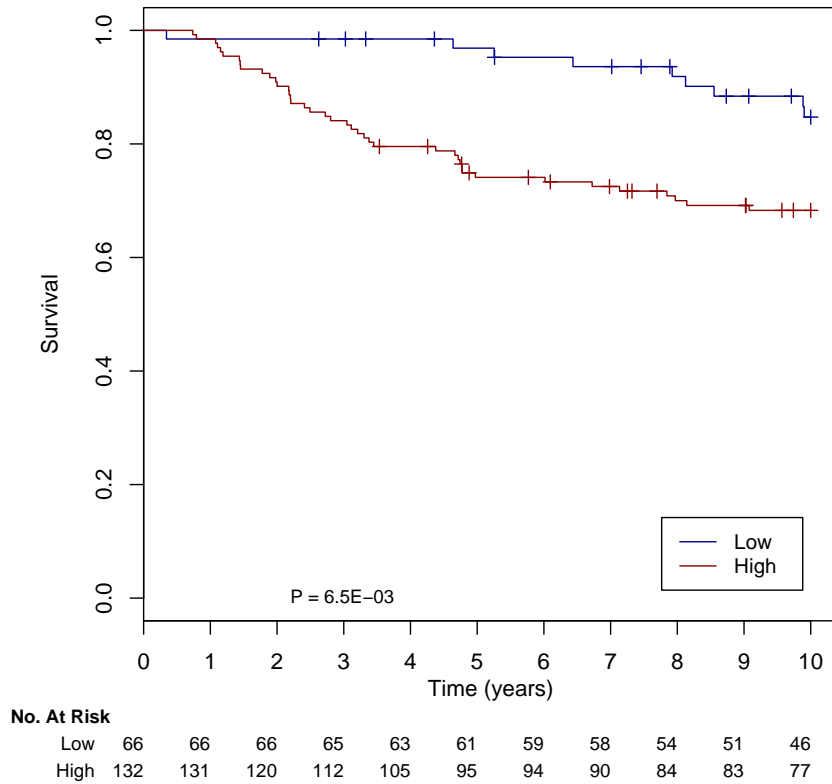
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of 1.21E-14, a concordance index of 0.903 95CI[0.838,0.969] (p-value of 4.23E-34) and an integrated Brier score of 0.16. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.96	[0.92,1.00]	0.96	[0.92,1.00]	0.91	[0.85,0.97]
High	0.64	[0.57,0.71]	0.52	[0.45,0.59]	0.48	[0.41,0.56]

Risk Score On TEST, the risk score exhibits a Cox p-value of 2.35E-03, a concordance index of 0.64 95CI[0.57,0.71] (p-value of 4.52E-05) and an integrated Brier score of 0.153.

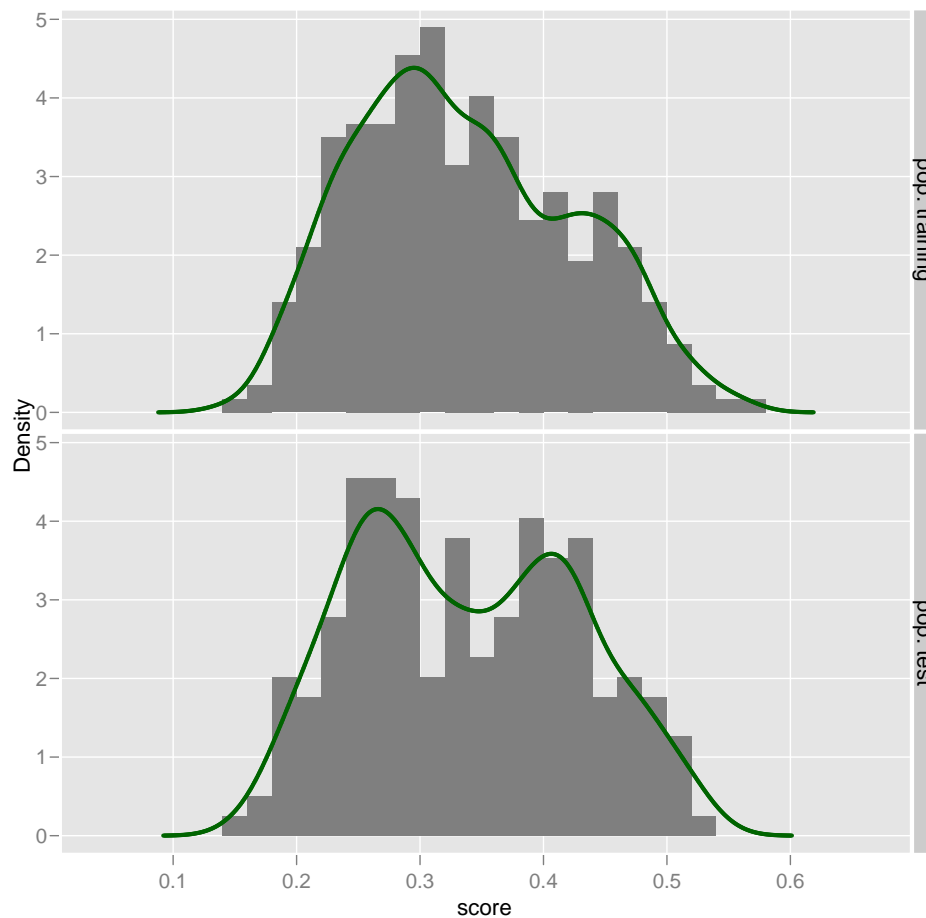
Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 2.38E-03, a concordance index of 0.756 95CI[0.623,0.888] (p-value of 7.84E-05) and an integrated Brier score of 0.146. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.98	[0.96,1.00]	0.95	[0.90,1.00]	0.85	[0.76,0.94]
High	0.83	[0.77,0.90]	0.74	[0.67,0.82]	0.68	[0.61,0.77]

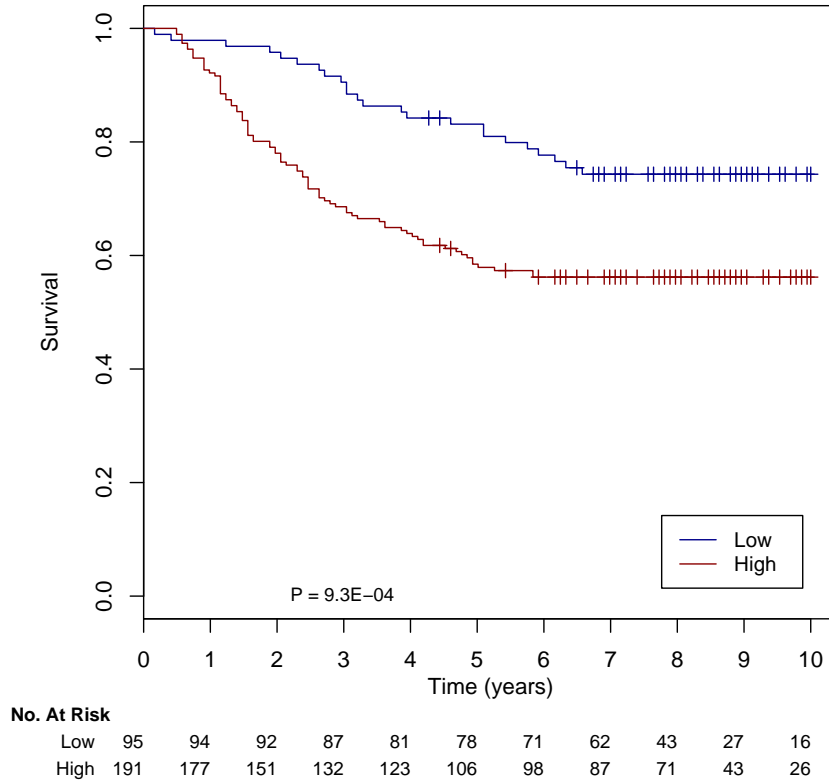
1.20 GGI

The following figure shows the distribution of the ggi :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of 1.44E-03, a concordance index of 0.613 95CI[0.559,0.667] (p-value of 2.15E-05) and an integrated Brier score of 0.183.

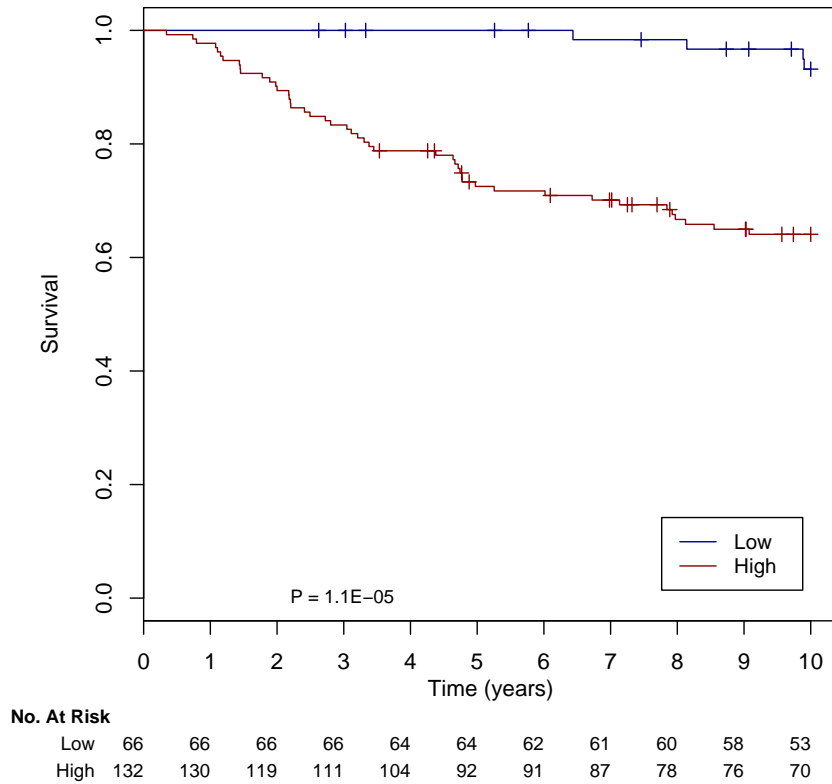
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of 5.72E-04, a concordance index of 0.706 95CI[0.611,0.8] (p-value of 9.82E-06) and an integrated Brier score of 0.181. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.88	[0.82,0.95]	0.81	[0.73,0.89]	0.74	[0.66,0.84]
High	0.68	[0.61,0.75]	0.58	[0.51,0.65]	0.56	[0.50,0.64]

Risk Score On TEST, the risk score exhibits a Cox p-value of 2.95E-03, a concordance index of 0.652 95CI[0.59,0.715] (p-value of 8.98E-07) and an integrated Brier score of 0.14.

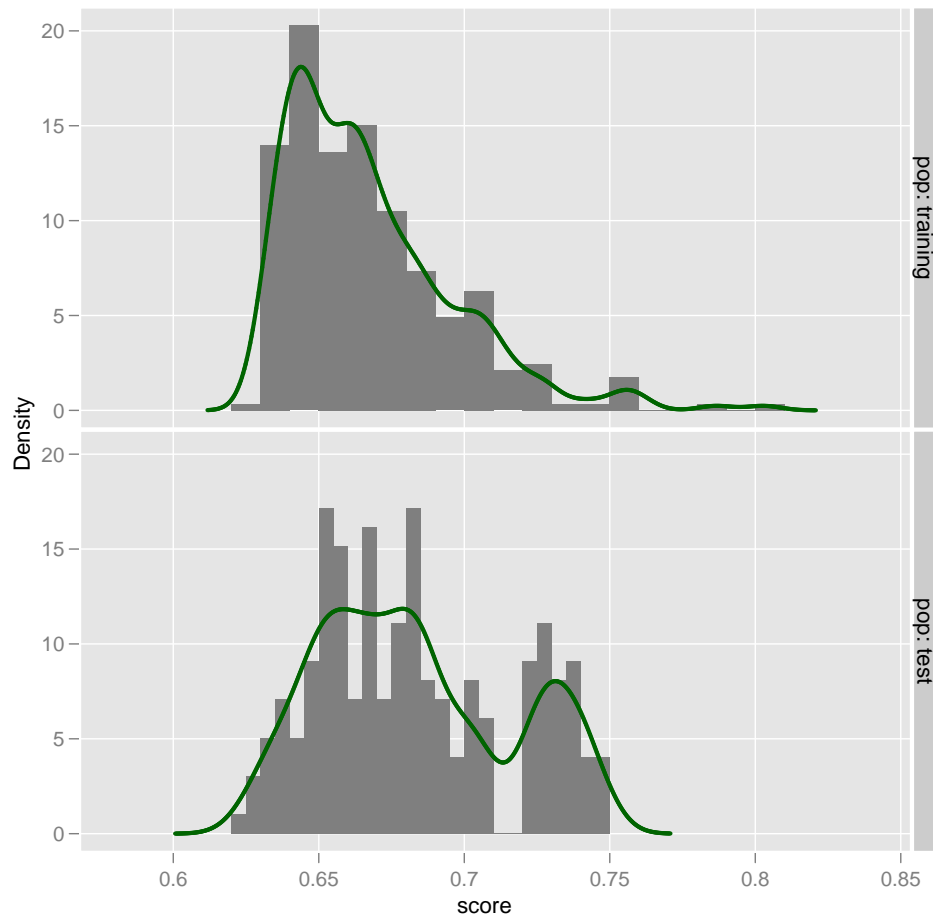
Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 1.16E-06, a concordance index of 0.906 95CI[0.82,0.992] (p-value of 1.06E-20) and an integrated Brier score of 0.133. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	1.00	[1.00,1.00]	1.00	[1.00,1.00]	0.93	[0.87,1.00]
High	0.83	[0.76,0.89]	0.72	[0.64,0.80]	0.64	[0.56,0.73]

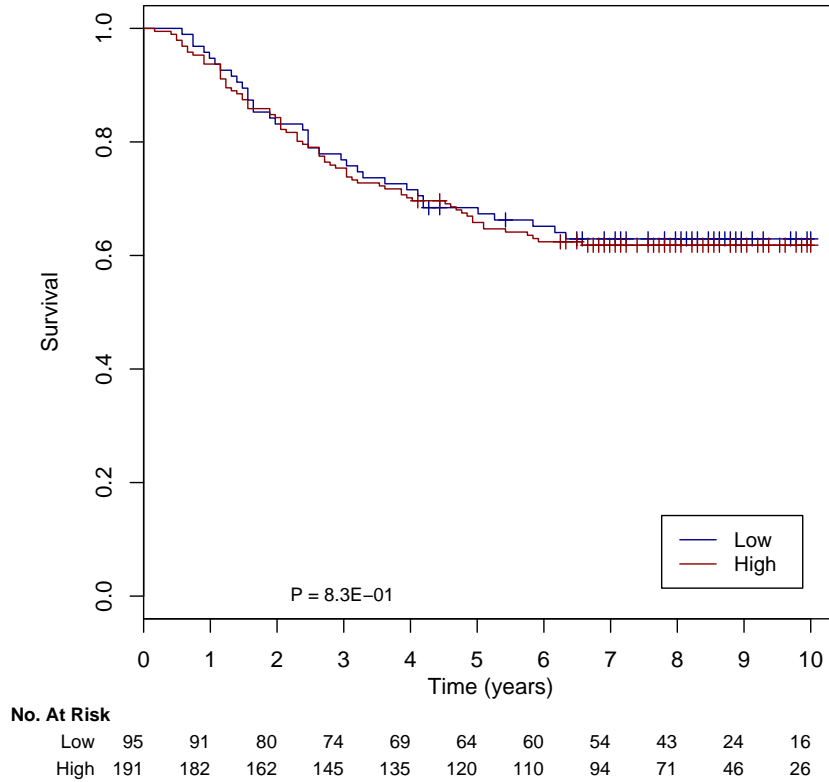
1.21 AOL

The following figure shows the distribution of the ggi :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of 2.91E-01, a concordance index of 0.495 95CI[0.443,0.547] (p-value of 4.25E-01) and an integrated Brier score of 0.188.

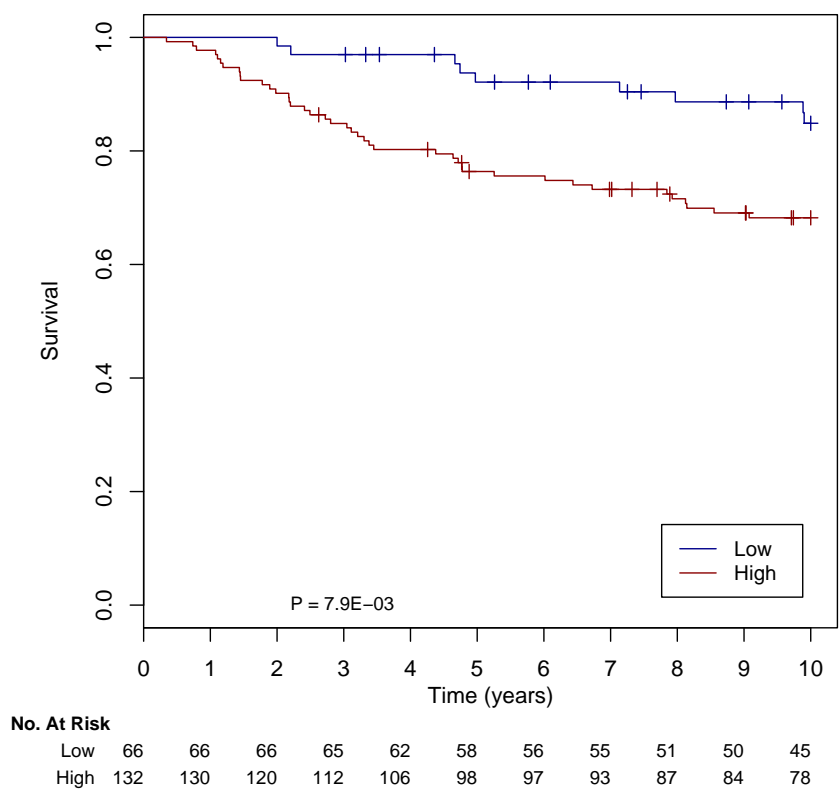
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of 8.23E-01, a concordance index of 0.514 95CI[0.413,0.615] (p-value of 3.93E-01) and an integrated Brier score of 0.189. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.76	[0.68,0.85]	0.67	[0.59,0.77]	0.63	[0.54,0.73]
High	0.74	[0.68,0.80]	0.65	[0.58,0.72]	0.62	[0.55,0.69]

Risk Score On TEST, the risk score exhibits a Cox p-value of 1.08E-03, a concordance index of 0.637 95CI[0.563,0.711] (p-value of 1.46E-04) and an integrated Brier score of 0.146.

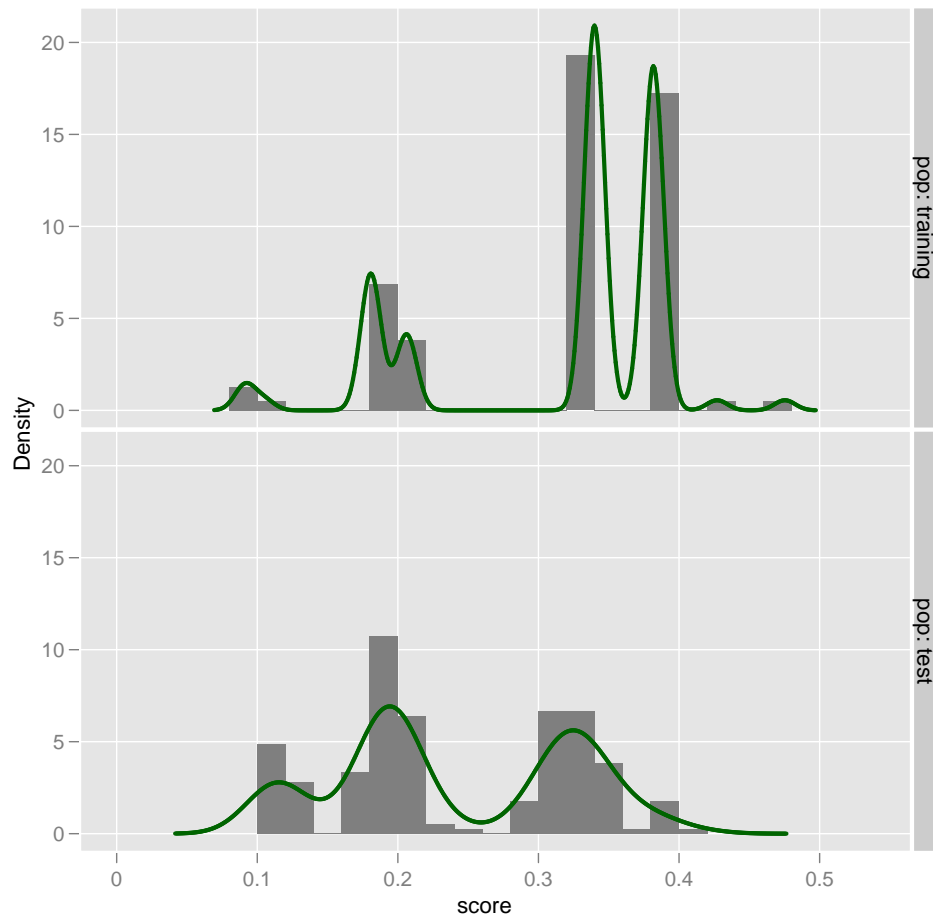
Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 5.17E-03, a concordance index of 0.742 95CI[0.606,0.879] (p-value of 2.54E-04) and an integrated Brier score of 0.144. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.97	[0.93,1.00]	0.92	[0.86,0.99]	0.85	[0.76,0.95]
High	0.84	[0.78,0.91]	0.76	[0.69,0.83]	0.68	[0.61,0.77]

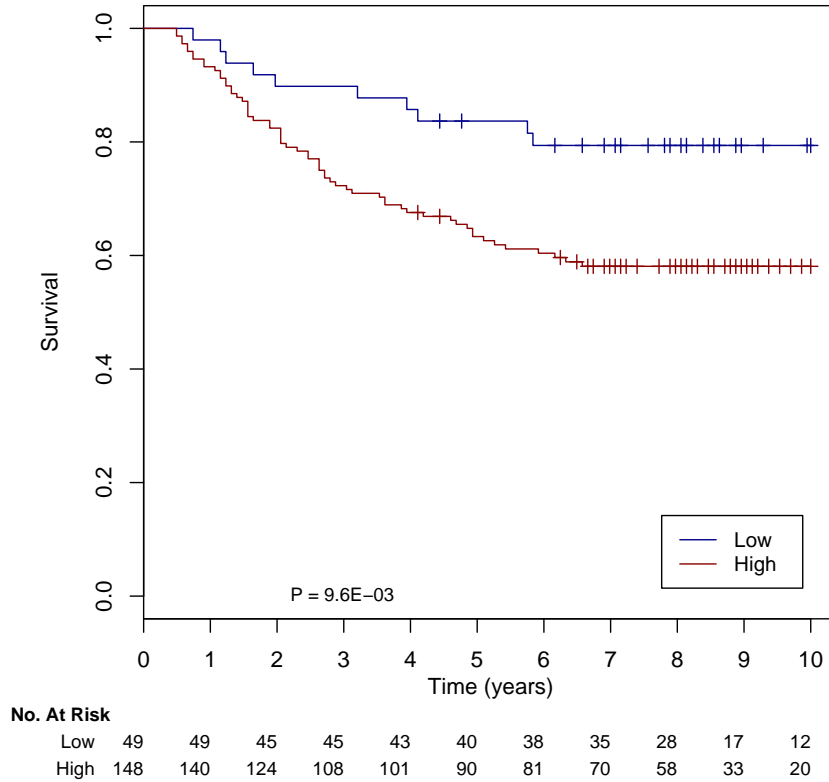
1.22 NPI

The following figure shows the distribution of the ggi :



Risk Score On TRAINING, the risk score exhibits a Cox p-value of 6.18E-03, a concordance index of 0.627 95CI[0.536,0.718] (p-value of 2.99E-03) and an integrated Brier score of 0.179.

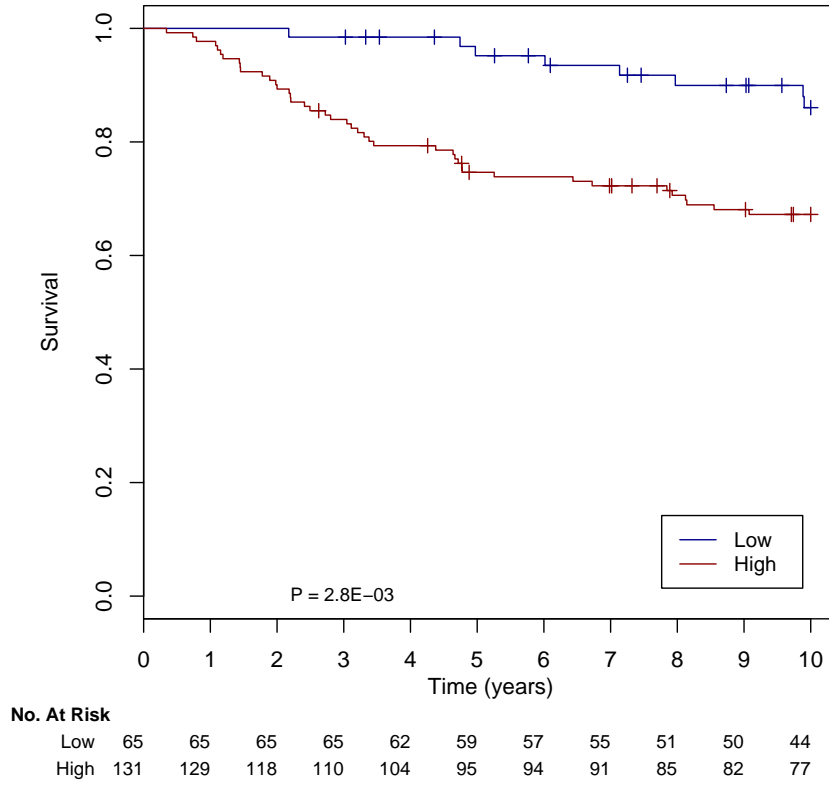
Risk Group On TRAINING, the binary classification computed from the risk score exhibits a Cox p-value of 5.55E-03, a concordance index of 0.706 95CI[0.566,0.845] (p-value of 1.99E-03) and an integrated Brier score of 0.179. The following figure shows the Kaplan-Meier survival curves for the two groups :



	3.years		5.years		10.years	
Low	0.88	[0.79,0.97]	0.82	[0.71,0.93]	0.79	[0.69,0.92]
High	0.72	[0.65,0.79]	0.63	[0.55,0.71]	0.58	[0.51,0.67]

Risk Score On TEST, the risk score exhibits a Cox p-value of 1.09E-02, a concordance index of 0.634 95CI[0.561,0.707] (p-value of 1.65E-04) and an integrated Brier score of 0.126.

Risk Group On TEST, the binary classification computed from the risk score exhibits a Cox p-value of 1.67E-03, a concordance index of 0.778 95CI[0.649,0.907] (p-value of 1.16E-05) and an integrated Brier score of 0.133. The following figure shows the Kaplan-Meier survival curves for the two groups :

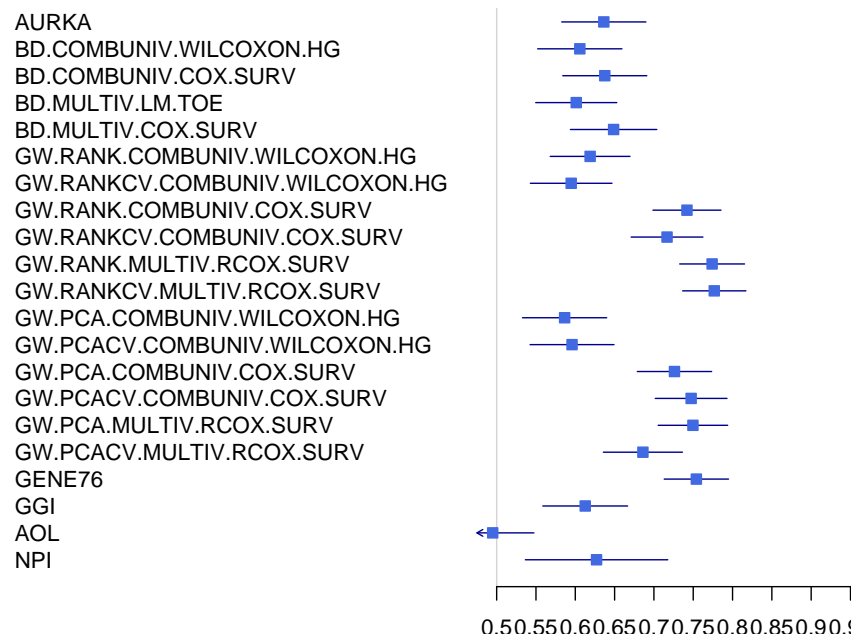


	3.years		5.years		10.years	
Low	0.98	[0.96,1.00]	0.95	[0.90,1.00]	0.86	[0.77,0.96]
High	0.83	[0.77,0.90]	0.74	[0.67,0.82]	0.67	[0.60,0.76]

1.23 Model Comparison

1.23.1 Training Set

Concordance Index for Risk Score The following foresplot shows the concordance indices and their confidence interval for each method :



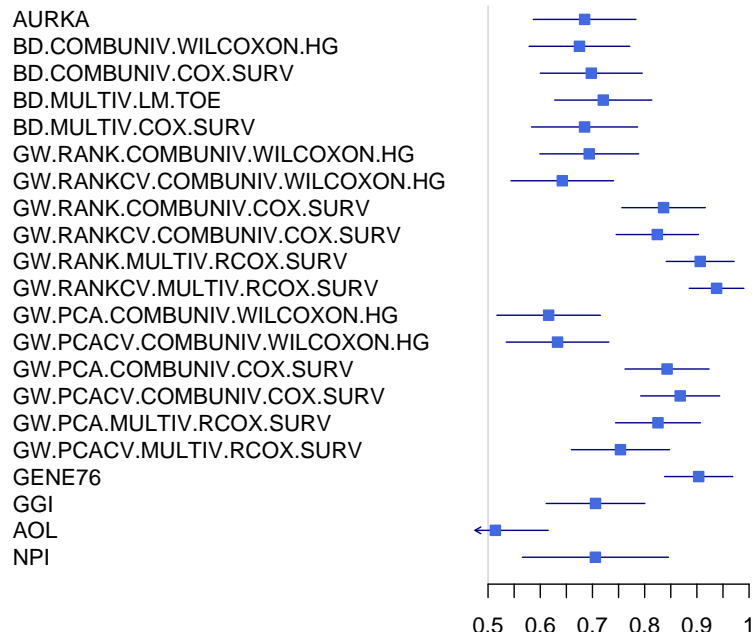
The following figure shows the pairwise comparison between the different methods. A red box represents a significant superiority (Student t test p-value < 0.05) of the method in row against the method in column. A green box represents no significant superiority (Student t test p-value ≥ 0.05) of the method in row against the method in column.

	AURKA	BD.COMBUNIV.WILCOXON.HG	BD.COMBUNIV.COX.SURV	BD.MULTIV.LM.TOE	BD.MULTIV.COX.SURV	GW.RANK.COMBUNIV.WILCOXON.HG	GW.RANKCV.COMBUNIV.WILCOXON.HG	GW.RANK.COMBUNIV.COX.SURV	GW.RANKCV.COMBUNIV.COX.SURV	GW.RANK.MULTIV.RCOX.SURV	GW.RANKCV.MULTIV.RCOX.SURV	GW.PCA.COMBUNIV.WILCOXON.HG	GW.PCACV.COMBUNIV.WILCOXON.HG	GW.PCA.COMBUNIV.COX.SURV	GW.PCACV.COMBUNIV.COX.SURV	GW.PCA.MULTIV.RCOX.SURV	GW.PCACV.MULTIV.RCOX.SURV	GENE76	GGI	AOL	NPI
AURKA																					
BD.COMBUNIV.WILCOXON.HG																					
BD.COMBUNIV.COX.SURV																					
BD.MULTIV.LM.TOE																					
BD.MULTIV.COX.SURV																					
GW.RANK.COMBUNIV.WILCOXON.HG																					
GW.RANKCV.COMBUNIV.WILCOXON.HG																					
GW.RANK.COMBUNIV.COX.SURV																					
GW.RANKCV.COMBUNIV.COX.SURV																					
GW.RANK.MULTIV.RCOX.SURV																					
GW.RANKCV.MULTIV.RCOX.SURV																					
GW.PCA.COMBUNIV.WILCOXON.HG																					
GW.PCACV.COMBUNIV.WILCOXON.HG																					
GW.PCA.COMBUNIV.COX.SURV																					
GW.PCACV.COMBUNIV.COX.SURV																					
GW.PCA.MULTIV.RCOX.SURV																					
GW.PCACV.MULTIV.RCOX.SURV																					
GENE76																					
GGI																					
AOL																					
NPI																					

The following table shows the comparison between the different methods and AURKA. A text in bold represents a significant superiority (Student t test p-value < 0.05) of the method in row against AURKA.

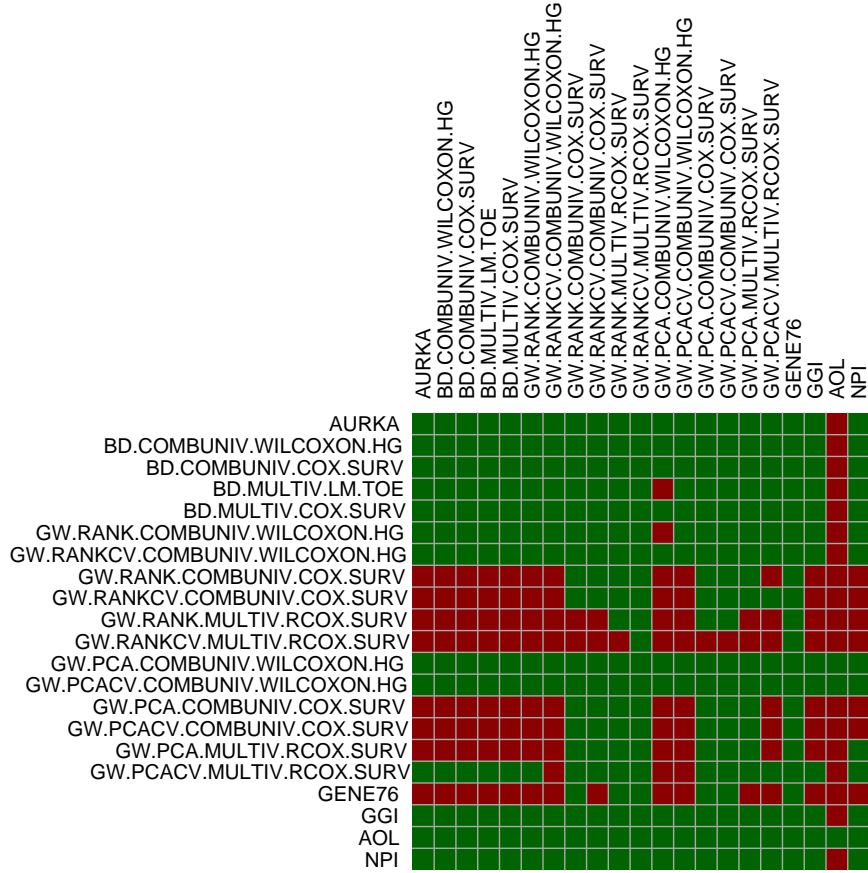
	concordance.index
AURKA	0.636
BD.COMBUNIV.WILCOXON.HG	0.606
BD.COMBUNIV.COX.SURV	0.638
BD.MULTIV.LM.TOE	0.601
BD.MULTIV.COX.SURV	0.649
GW.RANK.COMBUNIV.WILCOXON.HG	0.619
GW.RANKCV.COMBUNIV.WILCOXON.HG	0.595
GW.RANK.COMBUNIV.COX.SURV	0.742
GW.RANKCV.COMBUNIV.COX.SURV	0.717
GW.RANK.MULTIV.RCOX.SURV	0.774
GW.RANKCV.MULTIV.RCOX.SURV	0.777
GW.PCA.COMBUNIV.WILCOXON.HG	0.586
GW.PCACV.COMBUNIV.WILCOXON.HG	0.596
GW.PCA.COMBUNIV.COX.SURV	0.726
GW.PCACV.COMBUNIV.COX.SURV	0.747
GW.PCA.MULTIV.RCOX.SURV	0.75
GW.PCACV.MULTIV.RCOX.SURV	0.686
GENE76	0.754
GGI	0.613
AOL	0.495
NPI	0.627

Concordance Index for Risk Group The following foresplot shows the concordance indices and their confidence interval for each method :



The following figure shows the pairwise comparison between the different methods. A red box represents a significant superiority (Student t test p-value < 0.05) of the method in row

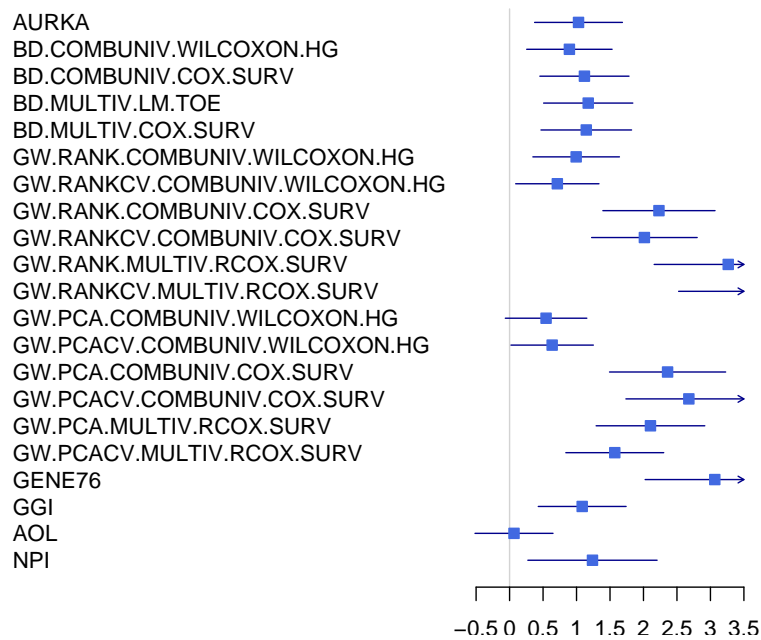
against the method in column. A green box represents no significant superiority (Student t test p-value ≥ 0.05) of the method in row against the method in column.



The following table shows the comparison between the different methods and AURKA. A text in bold represents a significant superiority (Student t test p-value < 0.05) of the method in row against AURKA.

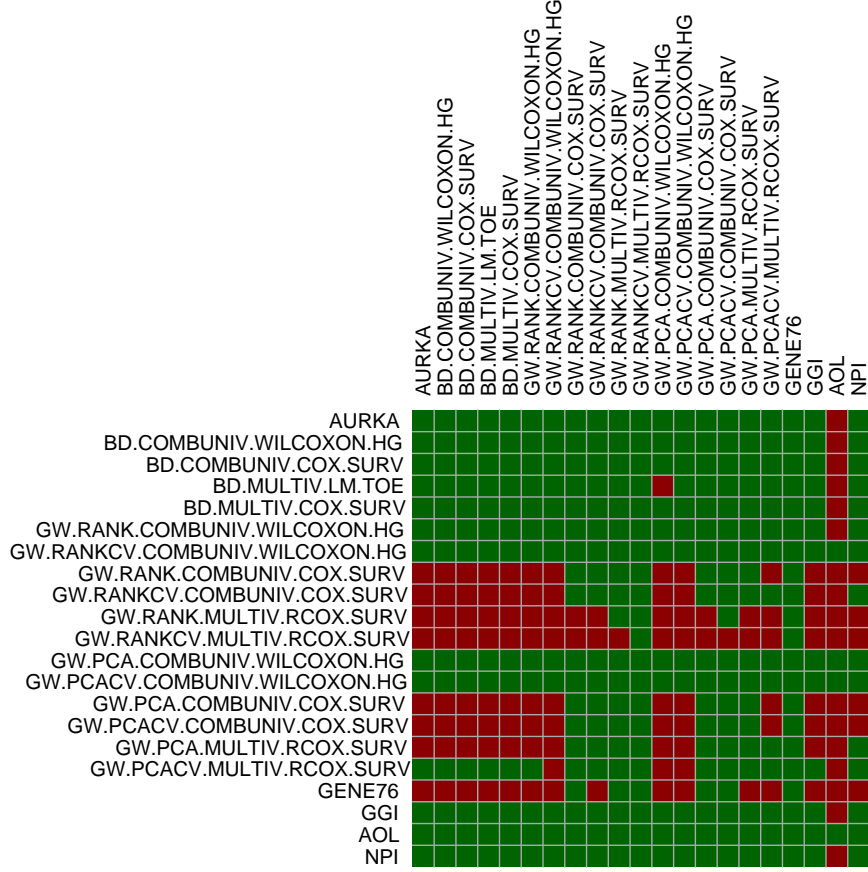
	concordance.index
AURKA	0.685
BD.COMBUNIV.WILCOXON.HG	0.675
BD.COMBUNIV.COX.SURV	0.698
BD.MULTIV.LM.TOE	0.721
BD.MULTIV.COX.SURV	0.685
GW.RANK.COMBUNIV.WILCOXON.HG	0.694
GW.RANKCV.COMBUNIV.WILCOXON.HG	0.642
GW.RANK.COMBUNIV.COX.SURV	0.836
GW.RANKCV.COMBUNIV.COX.SURV	0.824
GW.RANK.MULTIV.RCOX.SURV	0.906
GW.RANKCV.MULTIV.RCOX.SURV	0.938
GW.PCA.COMBUNIV.WILCOXON.HG	0.616
GW.PCACV.COMBUNIV.WILCOXON.HG	0.633
GW.PCA.COMBUNIV.COX.SURV	0.843
GW.PCACV.COMBUNIV.COX.SURV	0.868
GW.PCA.MULTIV.RCOX.SURV	0.826
GW.PCACV.MULTIV.RCOX.SURV	0.754
GENE76	0.903
GGI	0.706
AOL	0.514
NPI	0.706

Hazard Ratio for Risk Group The following foresplot shows the hazard ratios and their confidence interval for each method :



The following figure shows the pairwise comparison between the different methods. A red box represents a significant superiority (Student t test p-value < 0.05) of the method in row

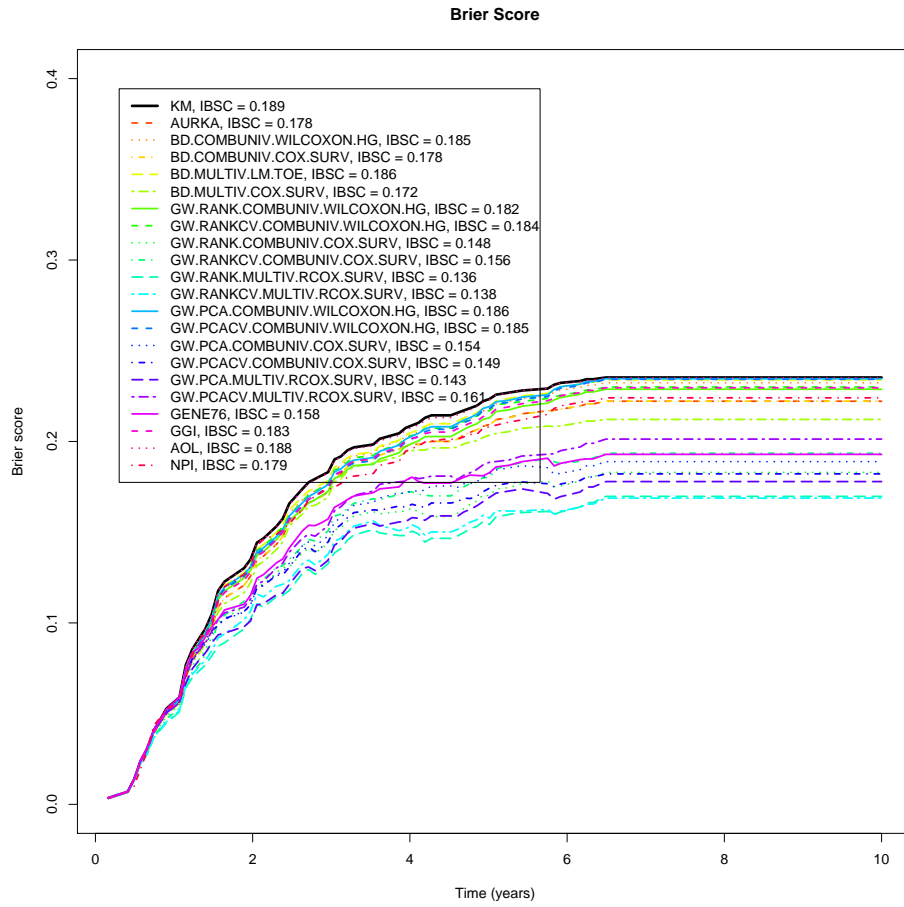
against the method in column. A green box represents no significant superiority (Student t test p-value ≥ 0.05) of the method in row against the method in column.



The following table shows the comparison between the different methods and AURKA. A text in bold represents a significant superiority (Student t test p-value < 0.05) of the method in row against AURKA.

	HR
AURKA	2.04
BD.COMBUNIV.WILCOXON.HG	1.86
BD.COMBUNIV.COX.SURV	2.17
BD.MULTIV.LM.TOE	2.26
BD.MULTIV.COX.SURV	2.21
GW.RANK.COMBUNIV.WILCOXON.HG	1.99
GW.RANKCV.COMBUNIV.WILCOXON.HG	1.64
GW.RANK.COMBUNIV.COX.SURV	4.69
GW.RANKCV.COMBUNIV.COX.SURV	4.04
GW.RANK.MULTIV.RCOX.SURV	9.62
GW.RANKCV.MULTIV.RCOX.SURV	14.1
GW.PCA.COMBUNIV.WILCOXON.HG	1.46
GW.PCACV.COMBUNIV.WILCOXON.HG	1.55
GW.PCA.COMBUNIV.COX.SURV	5.13
GW.PCACV.COMBUNIV.COX.SURV	6.4
GW.PCA.MULTIV.RCOX.SURV	4.3
GW.PCACV.MULTIV.RCOX.SURV	2.97
GENE76	8.37
GGI	2.12
AOL	1.05
NPI	2.36

Brier Score for Risk Score The following figure shows the Brier score w.r.t. the time for each method :



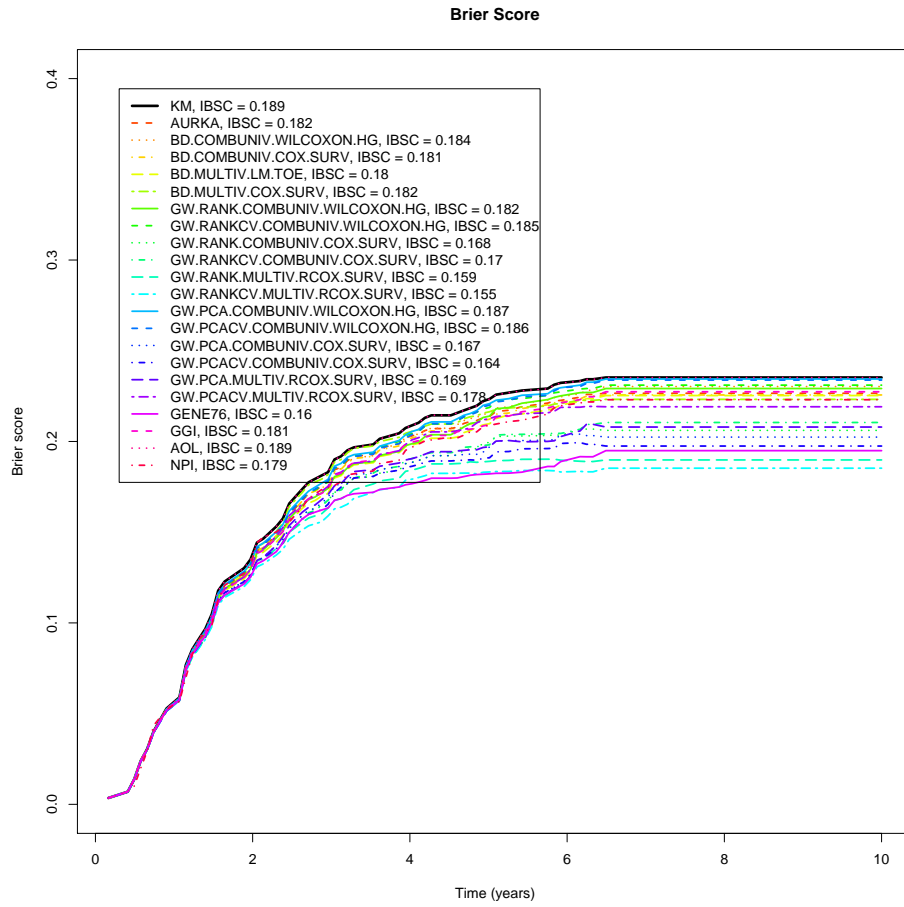
The following figure shows the pairwise comparison between the different methods. A red box represents a significant superiority (paired Wilcoxon rank sum test p-value < 0.05) of the method in row against the method in column. A green box represents no significant superiority (paired Wilcoxon rank sum test p-value ≥ 0.05) of the method in row against the method in column.

	KM	
	AURKA	
	BD.COMBUNIV.WILCOXON.HG	
	BD.COMBUNIV.COX.SURV	
	BD.MULTIV.LM.TOE	
	BD.MULTIV.COX.SURV	
	GW.RANK.COMBUNIV.WILCOXON.HG	
	GW.RANKCV.COMBUNIV.WILCOXON.HG	
	GW.RANK.COMBUNIV.COX.SURV	
	GW.RANKCV.COMBUNIV.COX.SURV	
	GW.RANK.MULTIV.RCOX.SURV	
	GW.RANKCV.MULTIV.RCOX.SURV	
	GW.PCA.COMBUNIV.WILCOXON.HG	
	GW.PCACV.COMBUNIV.WILCOXON.HG	
	GW.PCA.COMBUNIV.COX.SURV	
	GW.PCACV.COMBUNIV.COX.SURV	
	GW.PCA.MULTIV.RCOX.SURV	
	GW.PCACV.MULTIV.RCOX.SURV	
	GENE76	
	GGI	
	AOL	
	NPI	
KM		
AURKA		
BD.COMBUNIV.WILCOXON.HG		
BD.COMBUNIV.COX.SURV		
BD.MULTIV.LM.TOE		
BD.MULTIV.COX.SURV		
GW.RANK.COMBUNIV.WILCOXON.HG		
GW.RANKCV.COMBUNIV.WILCOXON.HG		
GW.RANK.COMBUNIV.COX.SURV		
GW.RANKCV.COMBUNIV.COX.SURV		
GW.RANK.MULTIV.RCOX.SURV		
GW.RANKCV.MULTIV.RCOX.SURV		
GW.PCA.COMBUNIV.WILCOXON.HG		
GW.PCACV.COMBUNIV.WILCOXON.HG		
GW.PCA.COMBUNIV.COX.SURV		
GW.PCACV.COMBUNIV.COX.SURV		
GW.PCA.MULTIV.RCOX.SURV		
GW.PCACV.MULTIV.RCOX.SURV		
GENE76		
GGI		
AOL		
NPI		

The following table shows the comparison between the different methods and AURKA. A text in bold represents a significant superiority (Student t test p-value < 0.05) of the method in row against AURKA.

	IBSC
KM	0.189
AURKA	0.178
BD.COMBUNIV.WILCOXON.HG	0.185
BD.COMBUNIV.COX.SURV	0.178
BD.MULTIV.LM.TOE	0.186
BD.MULTIV.COX.SURV	0.172
GW.RANK.COMBUNIV.WILCOXON.HG	0.182
GW.RANKCV.COMBUNIV.WILCOXON.HG	0.184
GW.RANK.COMBUNIV.COX.SURV	0.148
GW.RANKCV.COMBUNIV.COX.SURV	0.156
GW.RANK.MULTIV.RCOX.SURV	0.136
GW.RANKCV.MULTIV.RCOX.SURV	0.138
GW.PCA.COMBUNIV.WILCOXON.HG	0.186
GW.PCACV.COMBUNIV.WILCOXON.HG	0.185
GW.PCA.COMBUNIV.COX.SURV	0.154
GW.PCACV.COMBUNIV.COX.SURV	0.149
GW.PCA.MULTIV.RCOX.SURV	0.143
GW.PCACV.MULTIV.RCOX.SURV	0.161
GENE76	0.158
GGI	0.183
AOL	0.188
NPI	0.179

Brier Score for Risk Group The following figure shows the Brier score w.r.t. the time for each method :



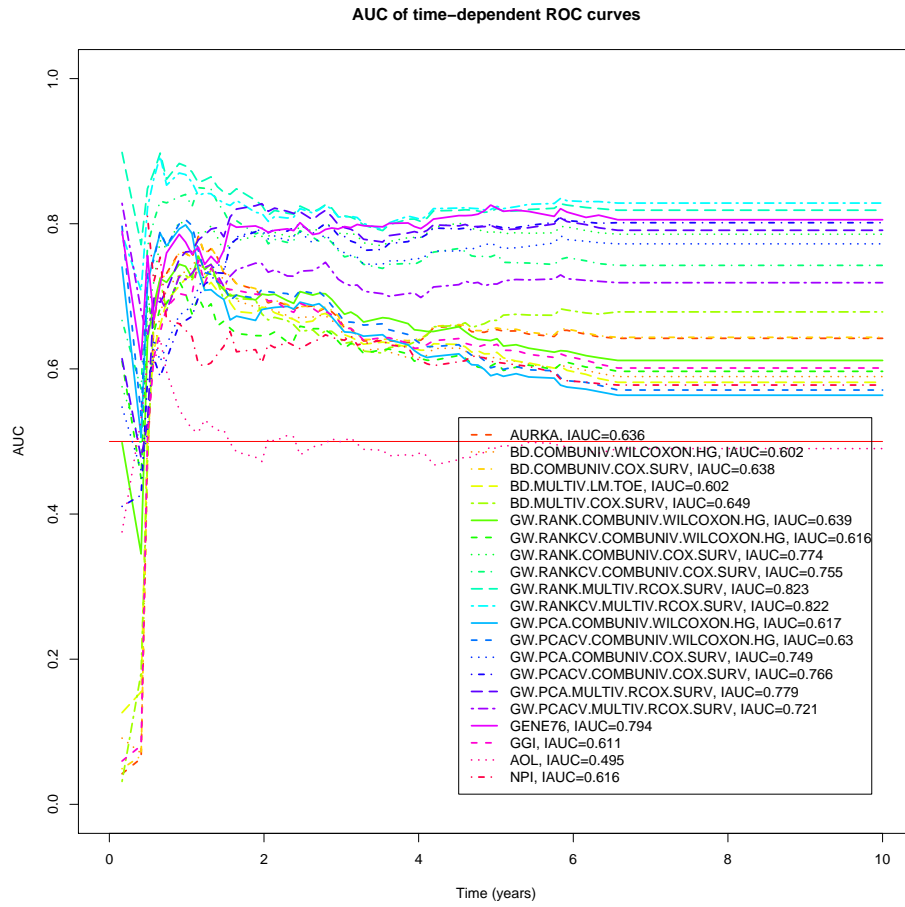
The following figure shows the pairwise comparison between the different methods. A red box represents a significant superiority (paired Wilcoxon rank sum test p-value < 0.05) of the method in row against the method in column. A green box represents no significant superiority (paired Wilcoxon rank sum test p-value ≥ 0.05) of the method in row against the method in column.

	KM	
	AURKA	
	BD.COMBUNIV.WILCOXON.HG	
	BD.COMBUNIV.COX.SURV	
	BD.MULTIV.LM.TOE	
	BD.MULTIV.COX.SURV	
	GW.RANK.COMBUNIV.WILCOXON.HG	
	GW.RANKCV.COMBUNIV.WILCOXON.HG	
	GW.RANK.COMBUNIV.COX.SURV	
	GW.RANKCV.COMBUNIV.COX.SURV	
	GW.RANK.MULTIV.RCOX.SURV	
	GW.RANKCV.MULTIV.RCOX.SURV	
	GW.PCA.COMBUNIV.WILCOXON.HG	
	GW.PCACV.COMBUNIV.WILCOXON.HG	
	GW.PCA.COMBUNIV.COX.SURV	
	GW.PCACV.COMBUNIV.COX.SURV	
	GW.PCA.MULTIV.RCOX.SURV	
	GW.PCACV.MULTIV.RCOX.SURV	
	GENE76	
	GGI	
	AOL	
	NPI	
KM		
AURKA		
BD.COMBUNIV.WILCOXON.HG		
BD.COMBUNIV.COX.SURV		
BD.MULTIV.LM.TOE		
BD.MULTIV.COX.SURV		
GW.RANK.COMBUNIV.WILCOXON.HG		
GW.RANKCV.COMBUNIV.WILCOXON.HG		
GW.RANK.COMBUNIV.COX.SURV		
GW.RANKCV.COMBUNIV.COX.SURV		
GW.RANK.MULTIV.RCOX.SURV		
GW.RANKCV.MULTIV.RCOX.SURV		
GW.PCA.COMBUNIV.WILCOXON.HG		
GW.PCACV.COMBUNIV.WILCOXON.HG		
GW.PCA.COMBUNIV.COX.SURV		
GW.PCACV.COMBUNIV.COX.SURV		
GW.PCA.MULTIV.RCOX.SURV		
GW.PCACV.MULTIV.RCOX.SURV		
GENE76		
GGI		
AOL		
NPI		

The following table shows the comparison between the different methods and AURKA. A text in bold represents a significant superiority (Student t test p-value < 0.05) of the method in row against AURKA.

	IBSC
KM	0.189
AURKA	0.182
BD.COMBUNIV.WILCOXON.HG	0.184
BD.COMBUNIV.COX.SURV	0.181
BD.MULTIV.LM.TOE	0.18
BD.MULTIV.COX.SURV	0.182
GW.RANK.COMBUNIV.WILCOXON.HG	0.182
GW.RANKCV.COMBUNIV.WILCOXON.HG	0.185
GW.RANK.COMBUNIV.COX.SURV	0.168
GW.RANKCV.COMBUNIV.COX.SURV	0.17
GW.RANK.MULTIV.RCOX.SURV	0.159
GW.RANKCV.MULTIV.RCOX.SURV	0.155
GW.PCA.COMBUNIV.WILCOXON.HG	0.187
GW.PCACV.COMBUNIV.WILCOXON.HG	0.186
GW.PCA.COMBUNIV.COX.SURV	0.167
GW.PCACV.COMBUNIV.COX.SURV	0.164
GW.PCA.MULTIV.RCOX.SURV	0.169
GW.PCACV.MULTIV.RCOX.SURV	0.178
GENE76	0.16
GGI	0.181
AOL	0.189
NPI	0.179

Time-Dependent ROC Curves for Risk Score The following figure shows the evolution of the AUC of the time-dependent ROC curves with respect to the time for each method :



The following figure shows the pairwise comparison between the different methods. A red box represents a significant superiority (paired Wilcoxon rank sum test p -value < 0.05) of the method in row against the method in column. A green box represents no significant superiority (paired Wilcoxon rank sum test p -value ≥ 0.05) of the method in row against the method in column.

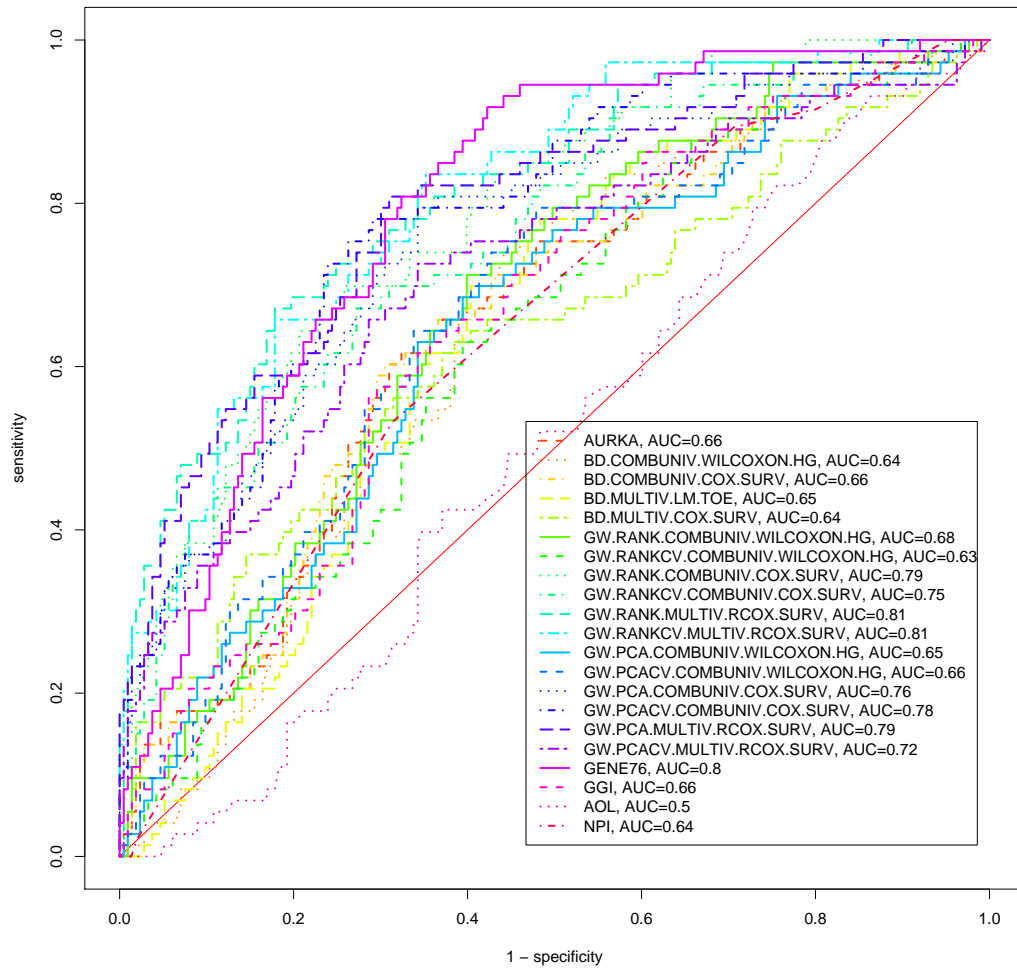
	AURKA	BD.COMBUNIV.WILCOXON.HG	BD.COMBUNIV.COX.SURV	BD.MULTIV.LM.TOE	BD.MULTIV.COX.SURV	GW.RANK.COMBUNIV.WILCOXON.HG	GW.RANKCV.COMBUNIV.WILCOXON.HG	GW.RANK.COMBUNIV.COX.SURV	GW.RANKCV.COMBUNIV.COX.SURV	GW.RANK.MULTIV.RCOX.SURV	GW.RANKCV.MULTIV.RCOX.SURV	GW.PCA.COMBUNIV.WILCOXON.HG	GW.PCACV.COMBUNIV.WILCOXON.HG	GW.PCA.COMBUNIV.COX.SURV	GW.PCACV.COMBUNIV.COX.SURV	GW.PCA.MULTIV.RCOX.SURV	GW.PCACV.MULTIV.RCOX.SURV	GENE76	GGI	AOL	NPI
AURKA																					
BD.COMBUNIV.WILCOXON.HG																					
BD.COMBUNIV.COX.SURV																					
BD.MULTIV.LM.TOE																					
BD.MULTIV.COX.SURV																					
GW.RANK.COMBUNIV.WILCOXON.HG																					
GW.RANKCV.COMBUNIV.WILCOXON.HG																					
GW.RANK.COMBUNIV.COX.SURV																					
GW.RANKCV.COMBUNIV.COX.SURV																					
GW.RANK.MULTIV.RCOX.SURV																					
GW.RANKCV.MULTIV.RCOX.SURV																					
GW.PCA.COMBUNIV.WILCOXON.HG																					
GW.PCACV.COMBUNIV.WILCOXON.HG																					
GW.PCA.COMBUNIV.COX.SURV																					
GW.PCACV.COMBUNIV.COX.SURV																					
GW.PCA.MULTIV.RCOX.SURV																					
GW.PCACV.MULTIV.RCOX.SURV																					
GENE76																					
GGI																					
AOL																					
NPI																					

The following table shows the comparison between the different methods and AURKA. A text in bold represents a significant superiority (Student t test p-value < 0.05) of the method in row against AURKA.

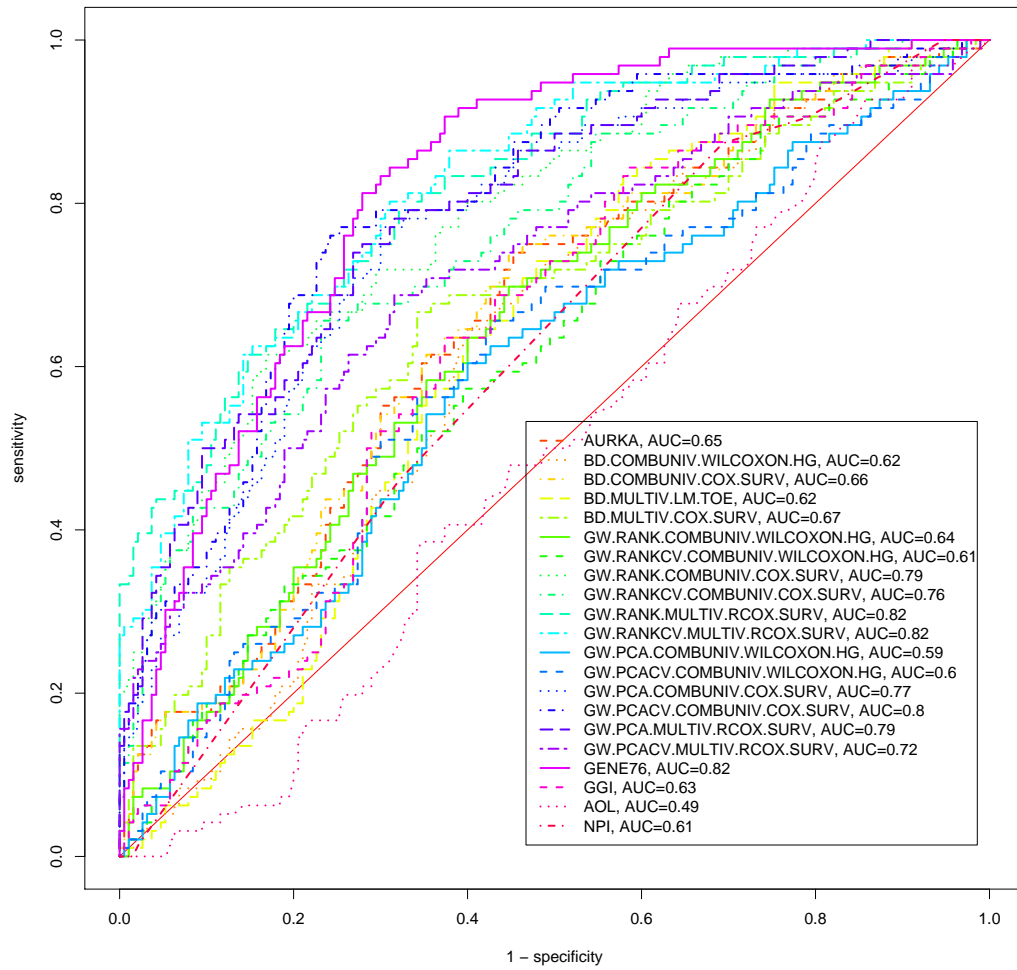
	IAUC
AURKA	0.636
BD.COMBUNIV.WILCOXON.HG	0.602
BD.COMBUNIV.COX.SURV	0.638
BD.MULTIV.LM.TOE	0.602
BD.MULTIV.COX.SURV	0.649
GW.RANK.COMBUNIV.WILCOXON.HG	0.639
GW.RANKCV.COMBUNIV.WILCOXON.HG	0.616
GW.RANK.COMBUNIV.COX.SURV	0.774
GW.RANKCV.COMBUNIV.COX.SURV	0.755
GW.RANK.MULTIV.RCOX.SURV	0.823
GW.RANKCV.MULTIV.RCOX.SURV	0.822
GW.PCA.COMBUNIV.WILCOXON.HG	0.617
GW.PCACV.COMBUNIV.WILCOXON.HG	0.63
GW.PCA.COMBUNIV.COX.SURV	0.749
GW.PCACV.COMBUNIV.COX.SURV	0.766
GW.PCA.MULTIV.RCOX.SURV	0.779
GW.PCACV.MULTIV.RCOX.SURV	0.721
GENE76	0.794
GGI	0.611
AOL	0.495
NPI	0.616

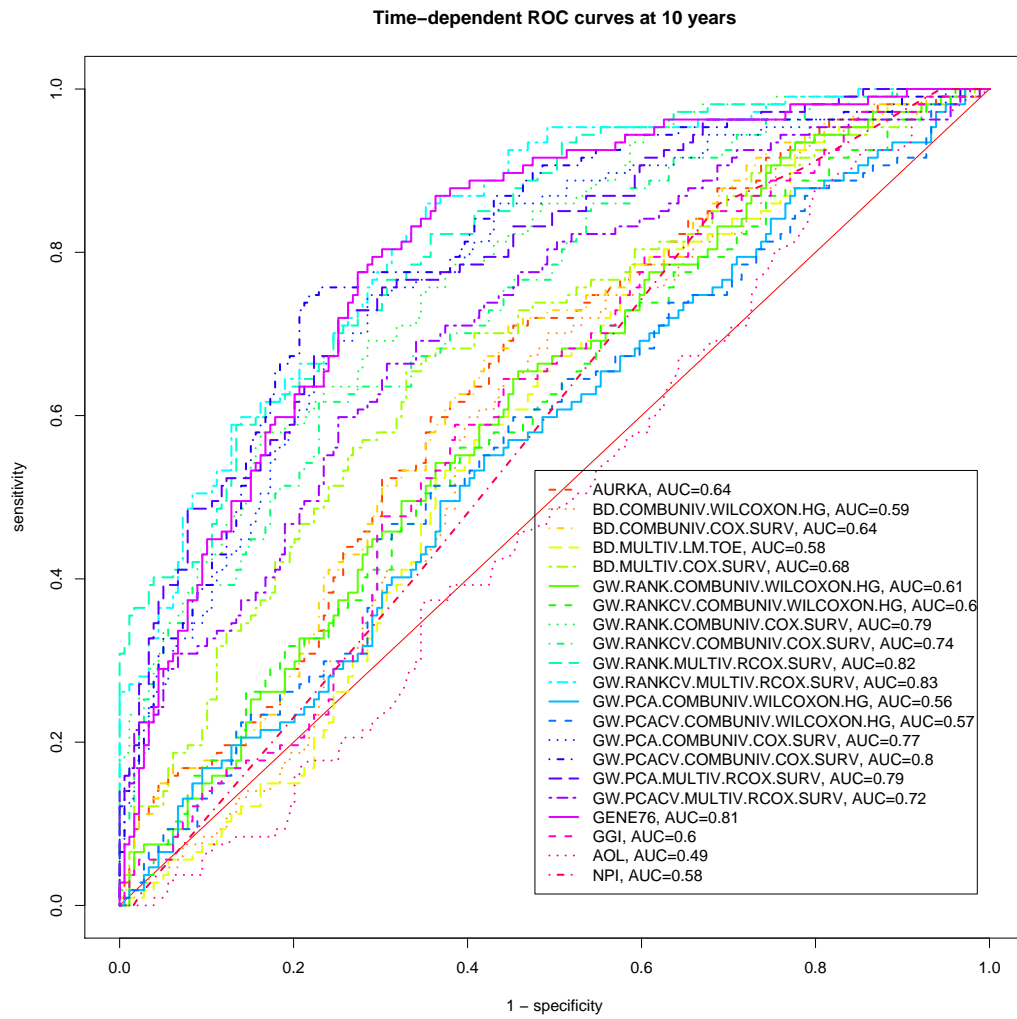
The following figure shows the time-dependent ROC curves and their corresponding AUC for each method :

Time-dependent ROC curves at 3 years



Time-dependent ROC curves at 5 years





The following table shows the specificity for a given sensitivity of 90% at some points in time:

	years.3	years.5	years.10
AURKA	0.249	0.253	0.263
BD.COMBUNIV.WILCOXON.HG	0.263	0.247	0.246
BD.COMBUNIV.COX.SURV	0.272	0.268	0.279
BD.MULTIV.LM.TOE	0.263	0.268	0.223
BD.MULTIV.COX.SURV	0.174	0.205	0.257
GW.RANK.COMBUNIV.WILCOXON.HG	0.315	0.258	0.251
GW.RANKCV.COMBUNIV.WILCOXON.HG	0.258	0.242	0.184
GW.RANK.COMBUNIV.COX.SURV	0.432	0.400	0.419
GW.RANKCV.COMBUNIV.COX.SURV	0.437	0.353	0.369
GW.RANK.MULTIV.RCOX.SURV	0.432	0.468	0.497
GW.RANKCV.MULTIV.RCOX.SURV	0.488	0.526	0.553
GW.PCA.COMBUNIV.WILCOXON.HG	0.258	0.147	0.151
GW.PCACV.COMBUNIV.WILCOXON.HG	0.244	0.147	0.134
GW.PCA.COMBUNIV.COX.SURV	0.390	0.426	0.413
GW.PCACV.COMBUNIV.COX.SURV	0.460	0.505	0.514
GW.PCA.MULTIV.RCOX.SURV	0.362	0.405	0.402
GW.PCACV.MULTIV.RCOX.SURV	0.300	0.300	0.313
GENE76	0.582	0.626	0.536
GGI	0.277	0.258	0.201
AOL	0.164	0.142	0.145
NPI	0.200	0.209	0.216

The following table shows the sensitivity of the methods in leaving 33% of the patients in the low-risk group at some points in time:

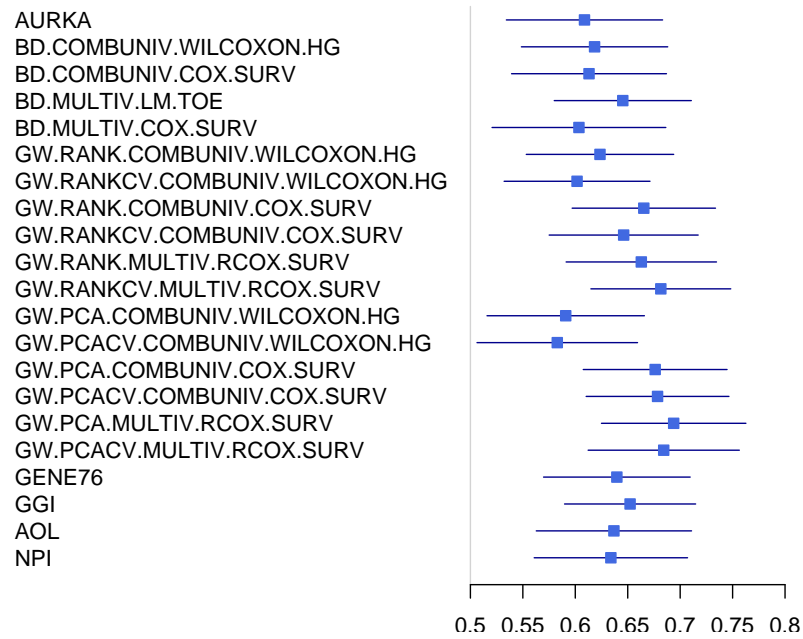
	years.3	years.5	years.10
AURKA	0.808	0.802	0.785
BD.COMBUNIV.WILCOXON.HG	0.836	0.792	0.757
BD.COMBUNIV.COX.SURV	0.822	0.813	0.785
BD.MULTIV.LM.TOE	0.863	0.833	0.785
BD.MULTIV.COX.SURV	0.767	0.792	0.804
GW.RANK.COMBUNIV.WILCOXON.HG	0.863	0.813	0.776
GW.RANKCV.COMBUNIV.WILCOXON.HG	0.808	0.760	0.738
GW.RANK.COMBUNIV.COX.SURV	0.918	0.885	0.879
GW.RANKCV.COMBUNIV.COX.SURV	0.918	0.885	0.860
GW.RANK.MULTIV.RCOX.SURV	0.945	0.927	0.935
GW.RANKCV.MULTIV.RCOX.SURV	0.973	0.948	0.953
GW.PCA.COMBUNIV.WILCOXON.HG	0.795	0.740	0.720
GW.PCACV.COMBUNIV.WILCOXON.HG	0.808	0.760	0.738
GW.PCA.COMBUNIV.COX.SURV	0.890	0.896	0.888
GW.PCACV.COMBUNIV.COX.SURV	0.918	0.917	0.907
GW.PCA.MULTIV.RCOX.SURV	0.890	0.896	0.869
GW.PCACV.MULTIV.RCOX.SURV	0.836	0.823	0.832
GENE76	0.945	0.958	0.925
GGI	0.863	0.844	0.785
AOL	0.616	0.604	0.598
NPI	1.000	1.000	1.000

The following table shows the specificity of the methods in leaving 33% of the patients in the low-risk group at some points in time:

	years.3	years.5	years.10
AURKA	0.371	0.389	0.391
BD.COMBUNIV.WILCOXON.HG	0.385	0.389	0.380
BD.COMBUNIV.COX.SURV	0.380	0.400	0.397
BD.MULTIV.LM.TOE	0.394	0.411	0.397
BD.MULTIV.COX.SURV	0.362	0.389	0.408
GW.RANK.COMBUNIV.WILCOXON.HG	0.394	0.400	0.391
GW.RANKCV.COMBUNIV.WILCOXON.HG	0.376	0.374	0.369
GW.RANK.COMBUNIV.COX.SURV	0.413	0.437	0.453
GW.RANKCV.COMBUNIV.COX.SURV	0.413	0.437	0.441
GW.RANK.MULTIV.RCOX.SURV	0.423	0.458	0.486
GW.RANKCV.MULTIV.RCOX.SURV	0.432	0.468	0.497
GW.PCA.COMBUNIV.WILCOXON.HG	0.371	0.363	0.358
GW.PCACV.COMBUNIV.WILCOXON.HG	0.376	0.374	0.369
GW.PCA.COMBUNIV.COX.SURV	0.404	0.442	0.458
GW.PCACV.COMBUNIV.COX.SURV	0.413	0.453	0.469
GW.PCA.MULTIV.RCOX.SURV	0.404	0.442	0.447
GW.PCACV.MULTIV.RCOX.SURV	0.385	0.405	0.425
GENE76	0.423	0.474	0.480
GGI	0.394	0.416	0.397
AOL	0.394	0.389	0.385
NPI	0.047	0.052	0.056

1.23.2 Test Set

Concordance Index for Risk Score The following foresplot shows the concordance indices and their confidence interval for each method :



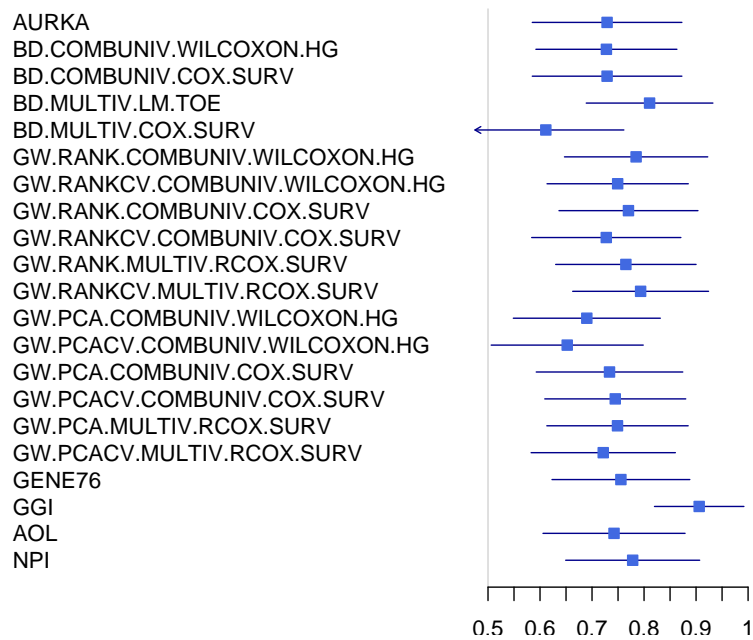
The following figure shows the pairwise comparison between the different methods. A red box represents a significant superiority (Student t test p-value < 0.05) of the method in row against the method in column. A green box represents no significant superiority (Student t test p-value ≥ 0.05) of the method in row against the method in column.

	AURKA	BD.COMBUNIV.WILCOXON.HG	BD.COMBUNIV.COX.SURV	BD.MULTIV.LM.TOE	BD.MULTIV.COX.SURV	GW.RANK.COMBUNIV.WILCOXON.HG	GW.RANKCV.COMBUNIV.WILCOXON.HG	GW.RANK.COMBUNIV.COX.SURV	GW.RANKCV.COMBUNIV.COX.SURV	GW.RANK.MULTIV.RCOX.SURV	GW.RANKCV.MULTIV.RCOX.SURV	GW.PCA.COMBUNIV.WILCOXON.HG	GW.PCACV.COMBUNIV.WILCOXON.HG	GW.PCA.COMBUNIV.COX.SURV	GW.PCACV.COMBUNIV.COX.SURV	GW.PCA.MULTIV.RCOX.SURV	GW.PCACV.MULTIV.RCOX.SURV	GENE76	GGI	AOL	NPI
AURKA																					
BD.COMBUNIV.WILCOXON.HG																					
BD.COMBUNIV.COX.SURV																					
BD.MULTIV.LM.TOE																					
BD.MULTIV.COX.SURV																					
GW.RANK.COMBUNIV.WILCOXON.HG																					
GW.RANKCV.COMBUNIV.WILCOXON.HG																					
GW.RANK.COMBUNIV.COX.SURV																					
GW.RANKCV.COMBUNIV.COX.SURV																					
GW.RANK.MULTIV.RCOX.SURV																					
GW.RANKCV.MULTIV.RCOX.SURV																					
GW.PCA.COMBUNIV.WILCOXON.HG																					
GW.PCACV.COMBUNIV.WILCOXON.HG																					
GW.PCA.COMBUNIV.COX.SURV																					
GW.PCACV.COMBUNIV.COX.SURV																					
GW.PCA.MULTIV.RCOX.SURV																					
GW.PCACV.MULTIV.RCOX.SURV																					
GENE76																					
GGI																					
AOL																					
NPI																					

The following table shows the comparison between the different methods and AURKA. A text in bold represents a significant superiority (Student t test p-value < 0.05) of the method in row against AURKA.

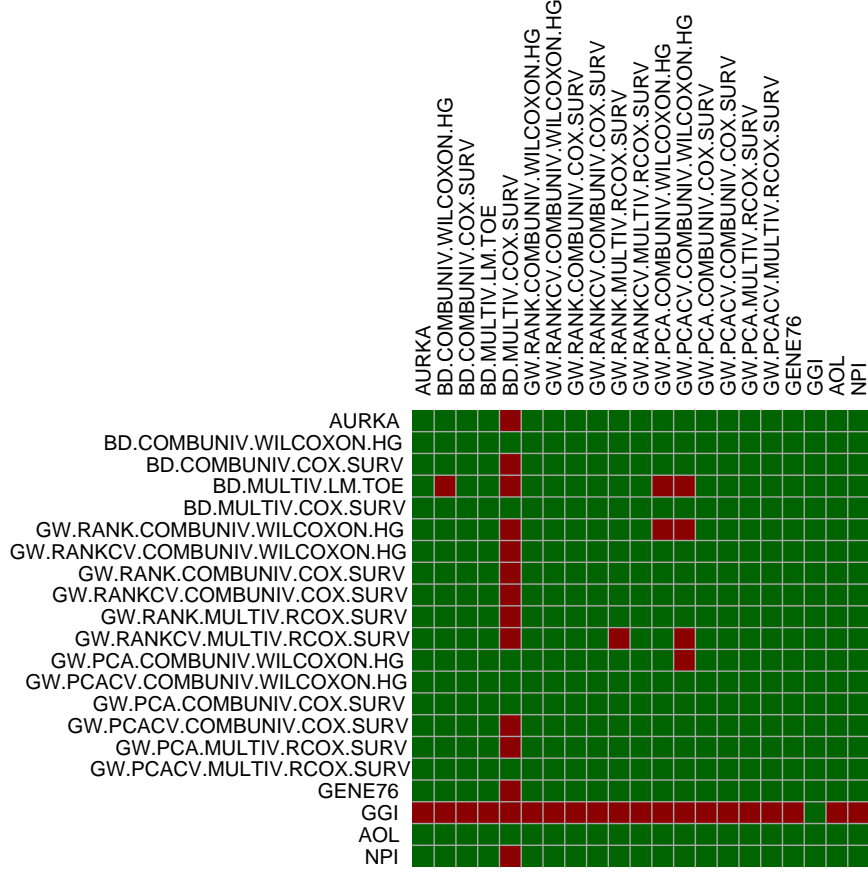
	concordance.index
AURKA	0.609
BD.COMBUNIV.WILCOXON.HG	0.618
BD.COMBUNIV.COX.SURV	0.613
BD.MULTIV.LM.TOE	0.645
BD.MULTIV.COX.SURV	0.603
GW.RANK.COMBUNIV.WILCOXON.HG	0.624
GW.RANKCV.COMBUNIV.WILCOXON.HG	0.602
GW.RANK.COMBUNIV.COX.SURV	0.665
GW.RANKCV.COMBUNIV.COX.SURV	0.646
GW.RANK.MULTIV.RCOX.SURV	0.663
GW.RANKCV.MULTIV.RCOX.SURV	0.682
GW.PCA.COMBUNIV.WILCOXON.HG	0.591
GW.PCACV.COMBUNIV.WILCOXON.HG	0.583
GW.PCA.COMBUNIV.COX.SURV	0.676
GW.PCACV.COMBUNIV.COX.SURV	0.678
GW.PCA.MULTIV.RCOX.SURV	0.694
GW.PCACV.MULTIV.RCOX.SURV	0.684
GENE76	0.64
GGI	0.652
AOL	0.637
NPI	0.634

Concordance Index for Risk Group The following foresplot shows the concordance indices and their confidence interval for each method :



The following figure shows the pairwise comparison between the different methods. A red box represents a significant superiority (Student t test p-value < 0.05) of the method in row

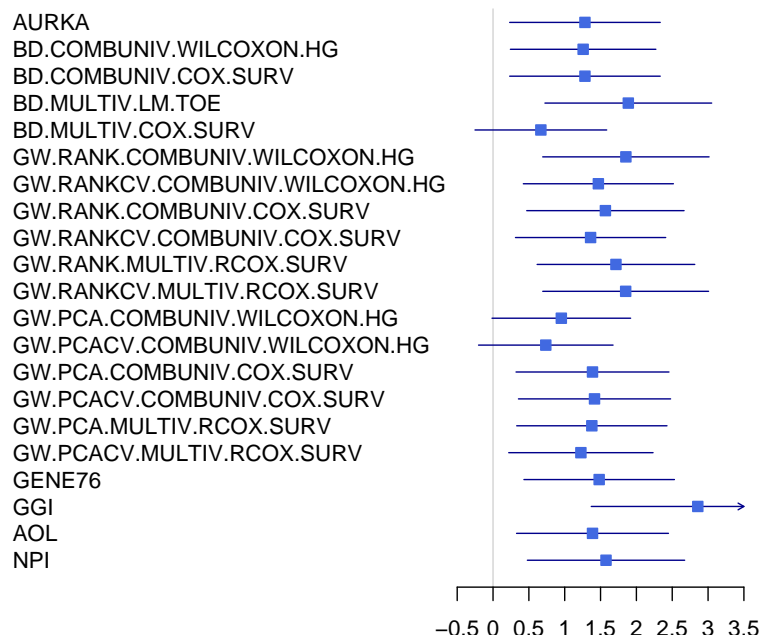
against the method in column. A green box represents no significant superiority (Student t test p-value ≥ 0.05) of the method in row against the method in column.



The following table shows the comparison between the different methods and AURKA. A text in bold represents a significant superiority (Student t test p-value < 0.05) of the method in row against AURKA.

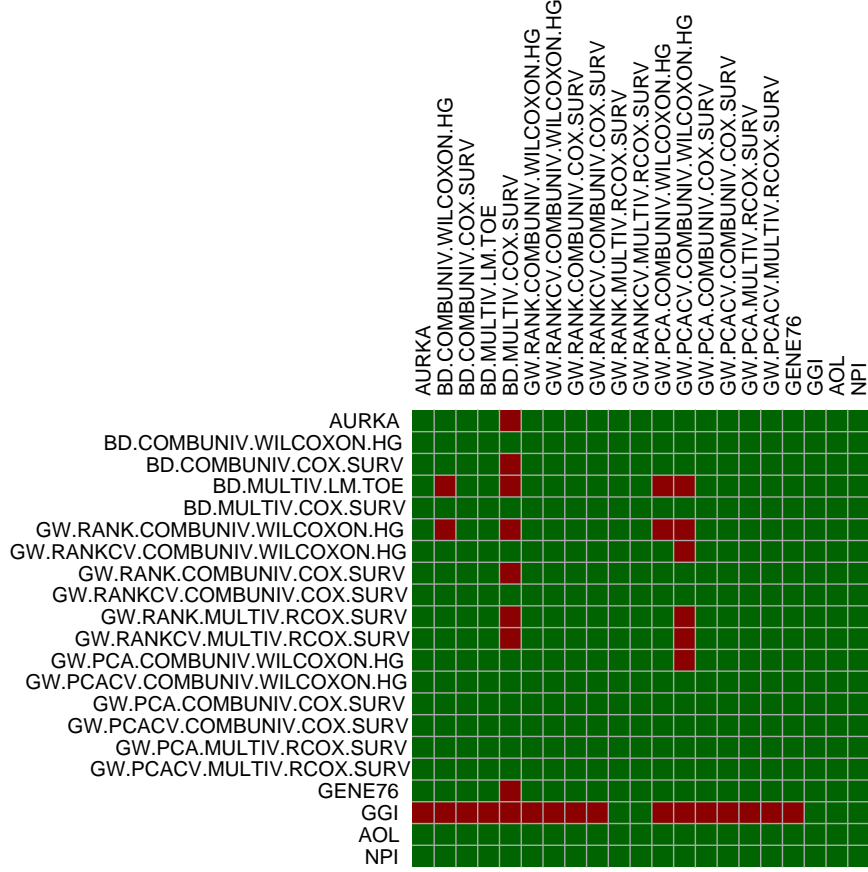
	concordance.index
AURKA	0.729
BD.COMBUNIV.WILCOXON.HG	0.728
BD.COMBUNIV.COX.SURV	0.729
BD.MULTIV.LM.TOE	0.811
BD.MULTIV.COX.SURV	0.611
GW.RANK.COMBUNIV.WILCOXON.HG	0.785
GW.RANKCV.COMBUNIV.WILCOXON.HG	0.749
GW.RANK.COMBUNIV.COX.SURV	0.77
GW.RANKCV.COMBUNIV.COX.SURV	0.727
GW.RANK.MULTIV.RCOX.SURV	0.765
GW.RANKCV.MULTIV.RCOX.SURV	0.793
GW.PCA.COMBUNIV.WILCOXON.HG	0.69
GW.PCACV.COMBUNIV.WILCOXON.HG	0.652
GW.PCA.COMBUNIV.COX.SURV	0.734
GW.PCACV.COMBUNIV.COX.SURV	0.745
GW.PCA.MULTIV.RCOX.SURV	0.749
GW.PCACV.MULTIV.RCOX.SURV	0.722
GENE76	0.756
GGI	0.906
AOL	0.742
NPI	0.778

Hazard Ratio for Risk Group The following foresplot shows the hazard ratios and their confidence interval for each method :



The following figure shows the pairwise comparison between the different methods. A red box represents a significant superiority (Student t test p-value < 0.05) of the method in row

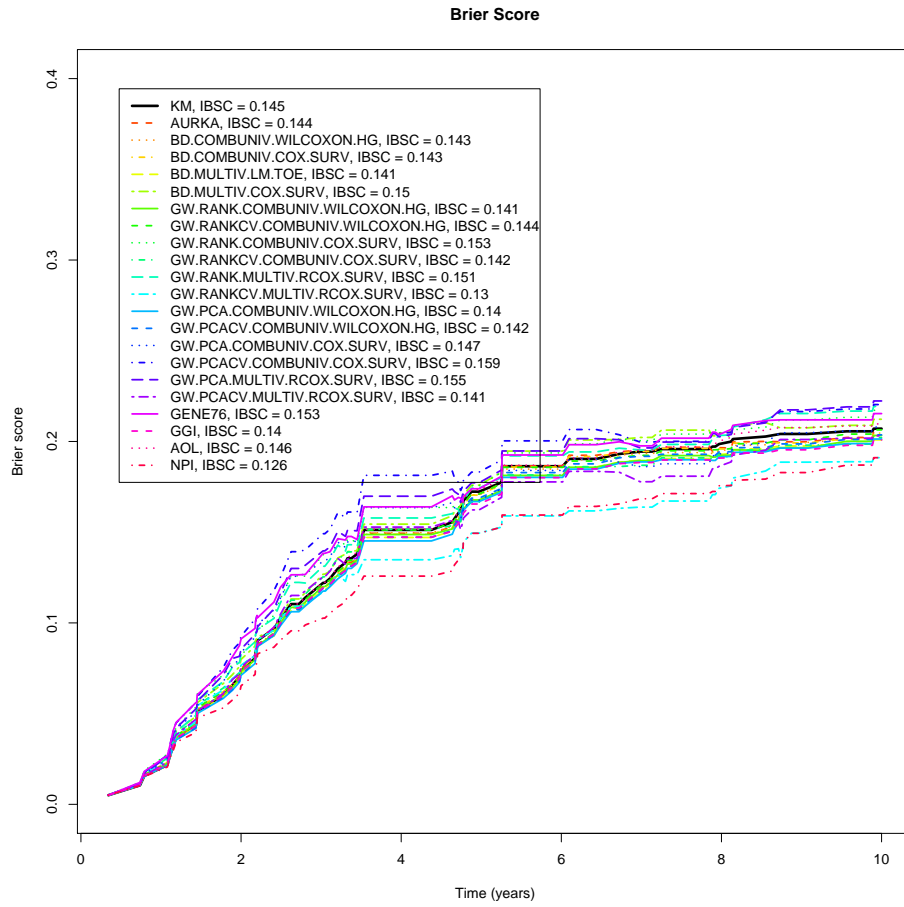
against the method in column. A green box represents no significant superiority (Student t test p-value ≥ 0.05) of the method in row against the method in column.



The following table shows the comparison between the different methods and AURKA. A text in bold represents a significant superiority (Student t test p-value < 0.05) of the method in row against AURKA.

	HR
AURKA	2.43
BD.COMBUNIV.WILCOXON.HG	2.39
BD.COMBUNIV.COX.SURV	2.43
BD.MULTIV.LM.TOE	3.7
BD.MULTIV.COX.SURV	1.59
GW.RANK.COMBUNIV.WILCOXON.HG	3.61
GW.RANKCV.COMBUNIV.WILCOXON.HG	2.77
GW.RANK.COMBUNIV.COX.SURV	2.96
GW.RANKCV.COMBUNIV.COX.SURV	2.57
GW.RANK.MULTIV.RCOX.SURV	3.28
GW.RANKCV.MULTIV.RCOX.SURV	3.61
GW.PCA.COMBUNIV.WILCOXON.HG	1.94
GW.PCACV.COMBUNIV.WILCOXON.HG	1.67
GW.PCA.COMBUNIV.COX.SURV	2.62
GW.PCACV.COMBUNIV.COX.SURV	2.67
GW.PCA.MULTIV.RCOX.SURV	2.6
GW.PCACV.MULTIV.RCOX.SURV	2.34
GENE76	2.79
GGI	7.24
AOL	2.62
NPI	2.98

Brier Score for Risk Score The following figure shows the Brier score w.r.t. the time for each method :



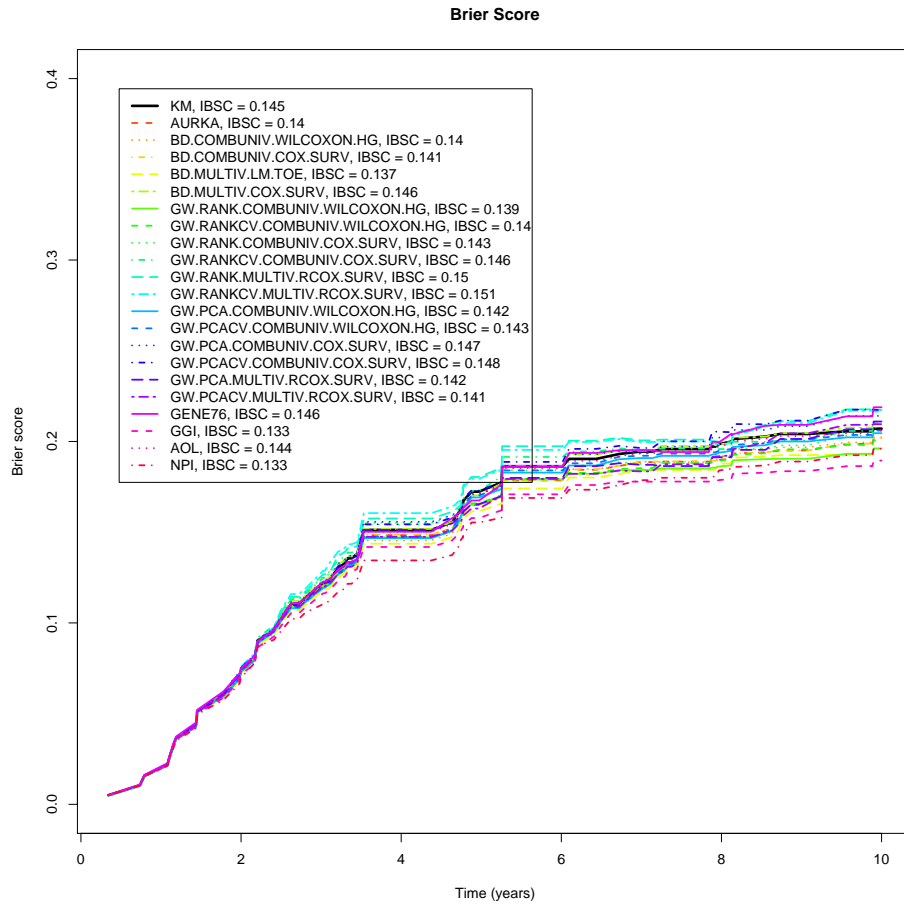
The following figure shows the pairwise comparison between the different methods. A red box represents a significant superiority (paired Wilcoxon rank sum test p-value < 0.05) of the method in row against the method in column. A green box represents no significant superiority (paired Wilcoxon rank sum test p-value ≥ 0.05) of the method in row against the method in column.

	KM	
	AURKA	
	BD.COMBUNIV.WILCOXON.HG	
	BD.COMBUNIV.COX.SURV	
	BD.MULTIV.LM.TOE	
	BD.MULTIV.COX.SURV	
	GW.RANK.COMBUNIV.WILCOXON.HG	
	GW.RANKCV.COMBUNIV.WILCOXON.HG	
	GW.RANK.COMBUNIV.COX.SURV	
	GW.RANKCV.COMBUNIV.COX.SURV	
	GW.RANK.MULTIV.RCOX.SURV	
	GW.RANKCV.MULTIV.RCOX.SURV	
	GW.PCA.COMBUNIV.WILCOXON.HG	
	GW.PCACV.COMBUNIV.WILCOXON.HG	
	GW.PCA.COMBUNIV.COX.SURV	
	GW.PCACV.COMBUNIV.COX.SURV	
	GW.PCA.MULTIV.RCOX.SURV	
	GW.PCACV.MULTIV.RCOX.SURV	
	GENE76	
	GGI	
	AOL	
	NPI	
KM		
AURKA		
BD.COMBUNIV.WILCOXON.HG		
BD.COMBUNIV.COX.SURV		
BD.MULTIV.LM.TOE		
BD.MULTIV.COX.SURV		
GW.RANK.COMBUNIV.WILCOXON.HG		
GW.RANKCV.COMBUNIV.WILCOXON.HG		
GW.RANK.COMBUNIV.COX.SURV		
GW.RANKCV.COMBUNIV.COX.SURV		
GW.RANK.MULTIV.RCOX.SURV		
GW.RANKCV.MULTIV.RCOX.SURV		
GW.PCA.COMBUNIV.WILCOXON.HG		
GW.PCACV.COMBUNIV.WILCOXON.HG		
GW.PCA.COMBUNIV.COX.SURV		
GW.PCACV.COMBUNIV.COX.SURV		
GW.PCA.MULTIV.RCOX.SURV		
GW.PCACV.MULTIV.RCOX.SURV		
GENE76		
GGI		
AOL		
NPI		

The following table shows the comparison between the different methods and AURKA. A text in bold represents a significant superiority (Student t test p-value < 0.05) of the method in row against AURKA.

	IBSC
KM	0.145
AURKA	0.144
BD.COMBUNIV.WILCOXON.HG	0.143
BD.COMBUNIV.COX.SURV	0.143
BD.MULTIV.LM.TOE	0.141
BD.MULTIV.COX.SURV	0.15
GW.RANK.COMBUNIV.WILCOXON.HG	0.141
GW.RANKCV.COMBUNIV.WILCOXON.HG	0.144
GW.RANK.COMBUNIV.COX.SURV	0.153
GW.RANKCV.COMBUNIV.COX.SURV	0.142
GW.RANK.MULTIV.RCOX.SURV	0.151
GW.RANKCV.MULTIV.RCOX.SURV	0.13
GW.PCA.COMBUNIV.WILCOXON.HG	0.14
GW.PCACV.COMBUNIV.WILCOXON.HG	0.142
GW.PCA.COMBUNIV.COX.SURV	0.147
GW.PCACV.COMBUNIV.COX.SURV	0.159
GW.PCA.MULTIV.RCOX.SURV	0.155
GW.PCACV.MULTIV.RCOX.SURV	0.141
GENE76	0.153
GGI	0.14
AOL	0.146
NPI	0.126

Brier Score for Risk Group The following figure shows the Brier score w.r.t. the time for each method :



The following figure shows the pairwise comparison between the different methods. A red box represents a significant superiority (paired Wilcoxon rank sum test p-value < 0.05) of the method in row against the method in column. A green box represents no significant superiority (paired Wilcoxon rank sum test p-value ≥ 0.05) of the method in row against the method in column.

	KM	
	AURKA	
	BD.COMBUNIV.WILCOXON.HG	
	BD.COMBUNIV.COX.SURV	
	BD.MULTIV.LM.TOE	
	BD.MULTIV.COX.SURV	
	GW.RANK.COMBUNIV.WILCOXON.HG	
	GW.RANKCV.COMBUNIV.WILCOXON.HG	
	GW.RANK.COMBUNIV.COX.SURV	
	GW.RANKCV.COMBUNIV.COX.SURV	
	GW.RANK.MULTIV.RCOX.SURV	
	GW.RANKCV.MULTIV.RCOX.SURV	
	GW.PCA.COMBUNIV.WILCOXON.HG	
	GW.PCACV.COMBUNIV.WILCOXON.HG	
	GW.PCA.COMBUNIV.COX.SURV	
	GW.PCACV.COMBUNIV.COX.SURV	
	GW.PCA.MULTIV.RCOX.SURV	
	GW.PCACV.MULTIV.RCOX.SURV	
	GENE76	
	GGI	
	AOL	
	NPI	
KM		
AURKA		
BD.COMBUNIV.WILCOXON.HG		
BD.COMBUNIV.COX.SURV		
BD.MULTIV.LM.TOE		
BD.MULTIV.COX.SURV		
GW.RANK.COMBUNIV.WILCOXON.HG		
GW.RANKCV.COMBUNIV.WILCOXON.HG		
GW.RANK.COMBUNIV.COX.SURV		
GW.RANKCV.COMBUNIV.COX.SURV		
GW.RANK.MULTIV.RCOX.SURV		
GW.RANKCV.MULTIV.RCOX.SURV		
GW.PCA.COMBUNIV.WILCOXON.HG		
GW.PCACV.COMBUNIV.WILCOXON.HG		
GW.PCA.COMBUNIV.COX.SURV		
GW.PCACV.COMBUNIV.COX.SURV		
GW.PCA.MULTIV.RCOX.SURV		
GW.PCACV.MULTIV.RCOX.SURV		
GENE76		
GGI		
AOL		
NPI		

The following table shows the comparison between the different methods and AURKA. A text in bold represents a significant superiority (Student t test p-value < 0.05) of the method in row against AURKA.

	IBSC
KM	0.145
AURKA	0.14
BD.COMBUNIV.WILCOXON.HG	0.14
BD.COMBUNIV.COX.SURV	0.141
BD.MULTIV.LM.TOE	0.137
BD.MULTIV.COX.SURV	0.146
GW.RANK.COMBUNIV.WILCOXON.HG	0.139
GW.RANKCV.COMBUNIV.WILCOXON.HG	0.14
GW.RANK.COMBUNIV.COX.SURV	0.143
GW.RANKCV.COMBUNIV.COX.SURV	0.146
GW.RANK.MULTIV.RCOX.SURV	0.15
GW.RANKCV.MULTIV.RCOX.SURV	0.151
GW.PCA.COMBUNIV.WILCOXON.HG	0.142
GW.PCACV.COMBUNIV.WILCOXON.HG	0.143
GW.PCA.COMBUNIV.COX.SURV	0.147
GW.PCACV.COMBUNIV.COX.SURV	0.148
GW.PCA.MULTIV.RCOX.SURV	0.142
GW.PCACV.MULTIV.RCOX.SURV	0.141
GENE76	0.146
GGI	0.133
AOL	0.144
NPI	0.133

Time-Dependent ROC Curves for Risk Score The following figure shows the evolution of the AUC of the time-dependent ROC curves with respect to the time for each method :

Figure 1 is a line graph showing the Area Under the Curve (AUC) over time (years) for various survival analysis models. The y-axis represents AUC from 0.0 to 1.0, and the x-axis represents time in years from 0 to 10. A horizontal red line is drawn at AUC = 0.5. Multiple colored lines represent different models, each with a corresponding legend entry showing the model name and its IAUC value. The models include AURKA, BD.COMBUNIV.WILCOXON.HG, BD.COMBUNIV.COX.SURV, BD.MULTIV.LM.TOE, BD.MULTIV.COX.SURV, GW.RANK.COMBUNIV.WILCOXON.HG, GW.RANKCV.COMBUNIV.WILCOXON.HG, GW.RANK.COMBUNIV.COX.SURV, GW.RANKCV.COMBUNIV.COX.SURV, GW.RANK.MULTIV.RCOX.SURV, GW.RANKCV.MULTIV.RCOX.SURV, GW.PCA.COMBUNIV.WILCOXON.HG, GW.PCACV.COMBUNIV.WILCOXON.HG, GW.PCA.COMBUNIV.COX.SURV, GW.PCACV.COMBUNIV.COX.SURV, GW.PCA.MULTIV.RCOX.SURV, GW.PCACV.MULTIV.RCOX.SURV, GENE76, GGI, AOL, and NPI. Most models show an initial increase in AUC, peaking around year 2, and then gradually declining or stabilizing. The AURKA model (dashed red line) consistently shows the highest AUC values, while the GENE76 model (solid purple line) shows the lowest AUC values.

110

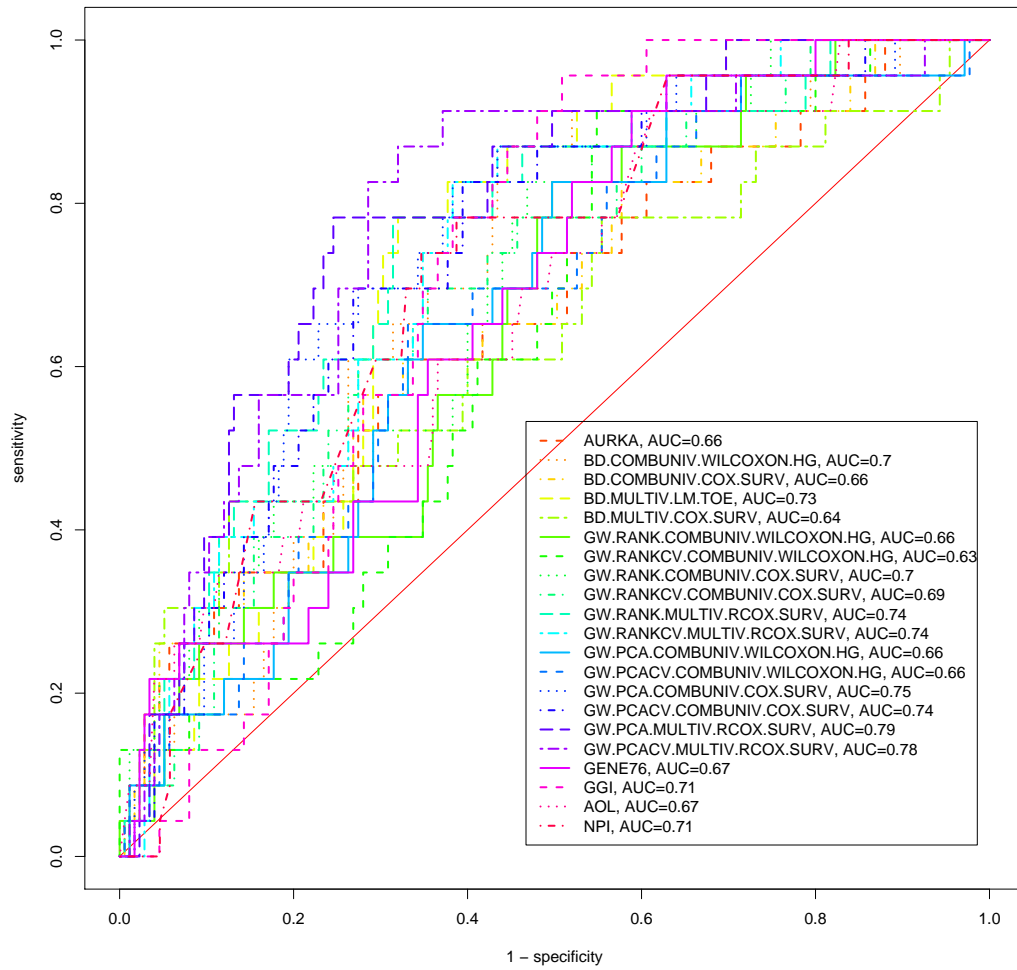
	AURKA	BD.COMBUNIV.WILCOXON.HG	BD.COMBUNIV.COX.SURV	BD.MULTIV.LM.TOE	BD.MULTIV.COX.SURV	GW.RANK.COMBUNIV.WILCOXON.HG	GW.RANKCV.COMBUNIV.WILCOXON.HG	GW.RANK.COMBUNIV.COX.SURV	GW.RANKCV.COMBUNIV.COX.SURV	GW.RANK.MULTIV.RCOX.SURV	GW.RANKCV.MULTIV.RCOX.SURV	GW.PCA.COMBUNIV.WILCOXON.HG	GW.PCACV.COMBUNIV.WILCOXON.HG	GW.PCA.COMBUNIV.COX.SURV	GW.PCACV.COMBUNIV.COX.SURV	GW.PCA.MULTIV.RCOX.SURV	GW.PCACV.MULTIV.RCOX.SURV	GENE76	GGI	AOL	NPI
AURKA																					
BD.COMBUNIV.WILCOXON.HG																					
BD.COMBUNIV.COX.SURV																					
BD.MULTIV.LM.TOE																					
BD.MULTIV.COX.SURV																					
GW.RANK.COMBUNIV.WILCOXON.HG																					
GW.RANKCV.COMBUNIV.WILCOXON.HG																					
GW.RANK.COMBUNIV.COX.SURV																					
GW.RANKCV.COMBUNIV.COX.SURV																					
GW.RANK.MULTIV.RCOX.SURV																					
GW.RANKCV.MULTIV.RCOX.SURV																					
GW.PCA.COMBUNIV.WILCOXON.HG																					
GW.PCACV.COMBUNIV.WILCOXON.HG																					
GW.PCA.COMBUNIV.COX.SURV																					
GW.PCACV.COMBUNIV.COX.SURV																					
GW.PCA.MULTIV.RCOX.SURV																					
GW.PCACV.MULTIV.RCOX.SURV																					
GENE76																					
GGI																					
AOL																					
NPI																					

The following table shows the comparison between the different methods and AURKA. A text in bold represents a significant superiority (Student t test p-value < 0.05) of the method in row against AURKA.

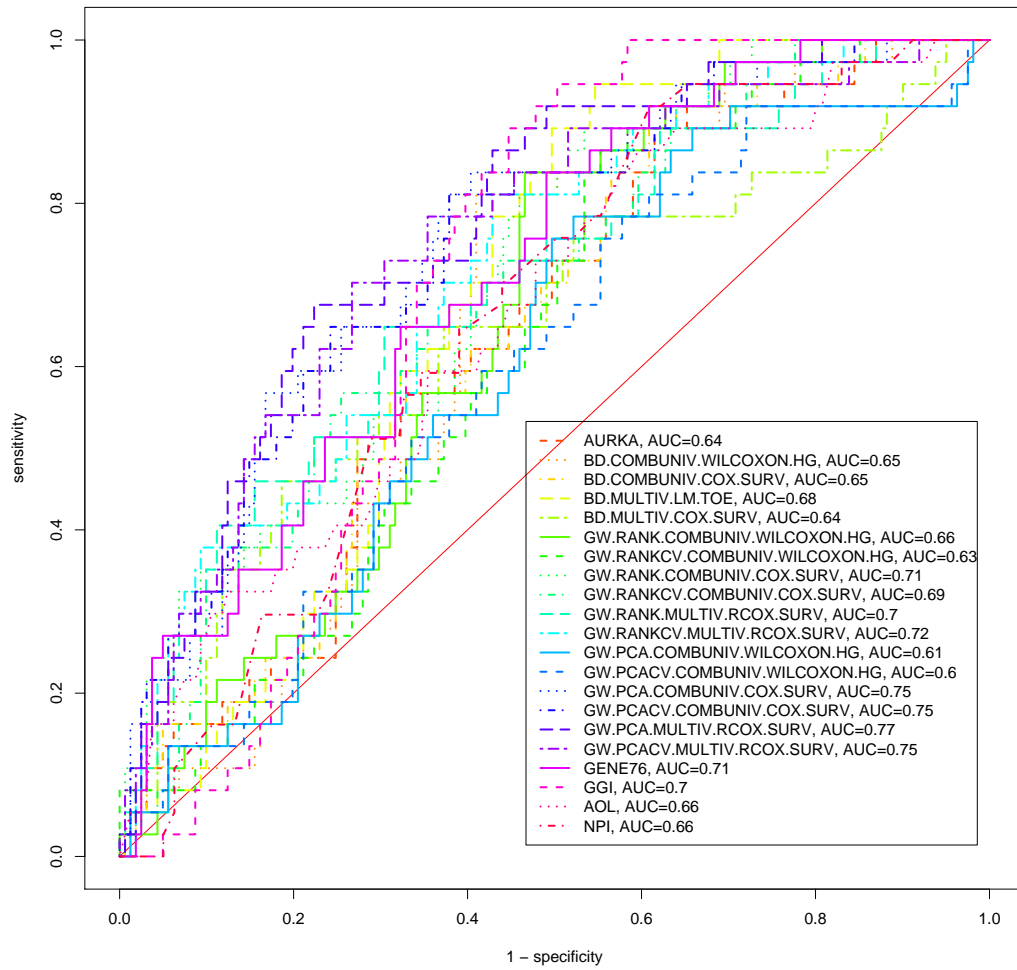
	IAUC
AURKA	0.601
BD.COMBUNIV.WILCOXON.HG	0.643
BD.COMBUNIV.COX.SURV	0.607
BD.MULTIV.LM.TOE	0.681
BD.MULTIV.COX.SURV	0.596
GW.RANK.COMBUNIV.WILCOXON.HG	0.617
GW.RANKCV.COMBUNIV.WILCOXON.HG	0.603
GW.RANK.COMBUNIV.COX.SURV	0.686
GW.RANKCV.COMBUNIV.COX.SURV	0.655
GW.RANK.MULTIV.RCOX.SURV	0.715
GW.RANKCV.MULTIV.RCOX.SURV	0.717
GW.PCA.COMBUNIV.WILCOXON.HG	0.616
GW.PCACV.COMBUNIV.WILCOXON.HG	0.605
GW.PCA.COMBUNIV.COX.SURV	0.705
GW.PCACV.COMBUNIV.COX.SURV	0.708
GW.PCA.MULTIV.RCOX.SURV	0.733
GW.PCACV.MULTIV.RCOX.SURV	0.721
GENE76	0.632
GGI	0.671
AOL	0.672
NPI	0.665

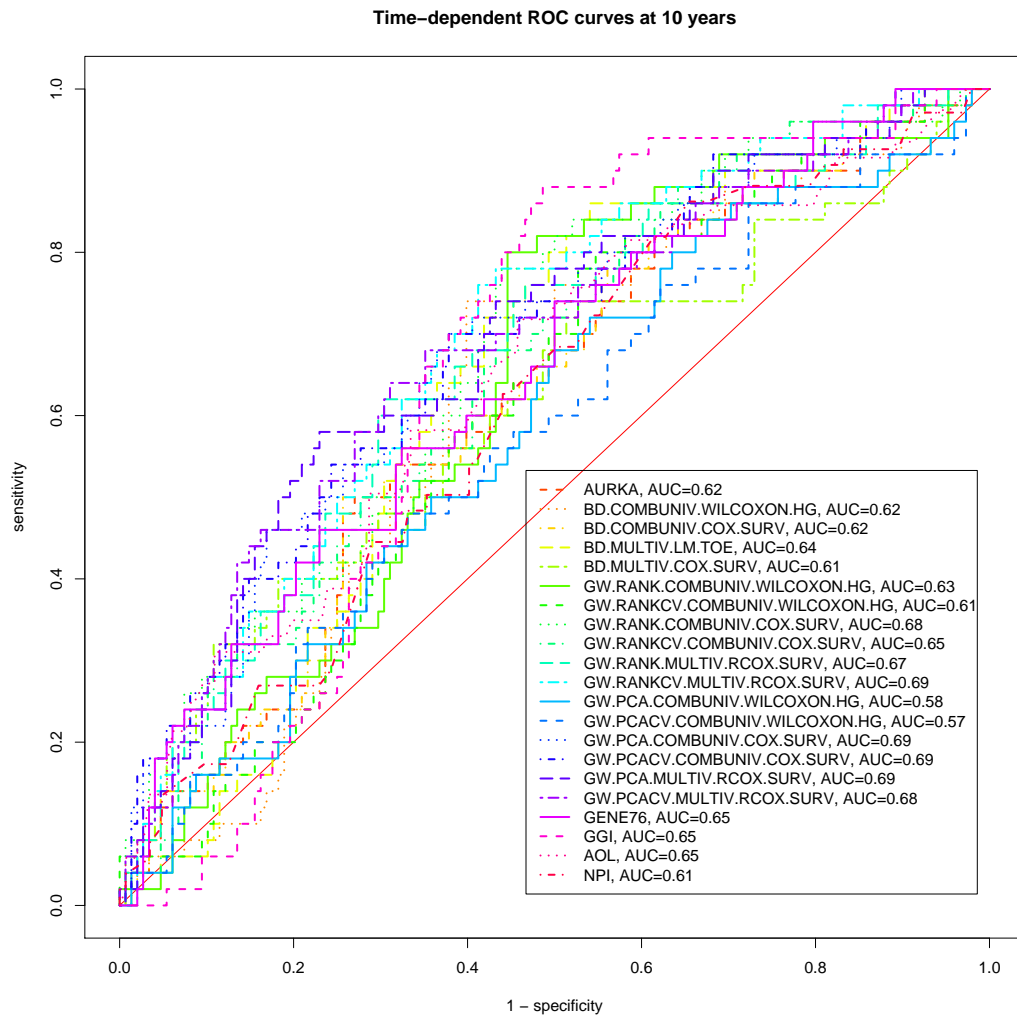
The following figure shows the time-dependent ROC curves and their corresponding AUC for each method :

Time-dependent ROC curves at 3 years



Time-dependent ROC curves at 5 years





The following table shows the specificity for a given sensitivity of 90% at some points in time:

	years.3	years.5	years.10
AURKA	0.217	0.348	0.236
BD.COMBUNIV.WILCOXON.HG	0.480	0.311	0.216
BD.COMBUNIV.COX.SURV	0.246	0.360	0.270
BD.MULTIV.LM.TOE	0.474	0.460	0.304
BD.MULTIV.COX.SURV	0.189	0.118	0.108
GW.RANK.COMBUNIV.WILCOXON.HG	0.286	0.373	0.318
GW.RANKCV.COMBUNIV.WILCOXON.HG	0.451	0.292	0.250
GW.RANK.COMBUNIV.COX.SURV	0.337	0.360	0.331
GW.RANKCV.COMBUNIV.COX.SURV	0.349	0.298	0.311
GW.RANK.MULTIV.RCOX.SURV	0.371	0.242	0.223
GW.RANKCV.MULTIV.RCOX.SURV	0.411	0.360	0.331
GW.PCA.COMBUNIV.WILCOXON.HG	0.371	0.298	0.128
GW.PCACV.COMBUNIV.WILCOXON.HG	0.337	0.280	0.149
GW.PCA.COMBUNIV.COX.SURV	0.394	0.379	0.270
GW.PCACV.COMBUNIV.COX.SURV	0.400	0.366	0.318
GW.PCA.MULTIV.RCOX.SURV	0.503	0.509	0.318
GW.PCACV.MULTIV.RCOX.SURV	0.629	0.373	0.270
GENE76	0.411	0.391	0.236
GGI	0.520	0.522	0.432
AOL	0.389	0.199	0.175
NPI	0.370	0.390	0.189

The following table shows the sensitivity of the methods in leaving 33% of the patients in the low-risk group at some points in time:

	years.3	years.5	years.10
AURKA	0.826	0.892	0.820
BD.COMBUNIV.WILCOXON.HG	0.913	0.892	0.800
BD.COMBUNIV.COX.SURV	0.826	0.892	0.820
BD.MULTIV.LM.TOE	0.957	0.946	0.860
BD.MULTIV.COX.SURV	0.783	0.784	0.740
GW.RANK.COMBUNIV.WILCOXON.HG	0.870	0.892	0.860
GW.RANKCV.COMBUNIV.WILCOXON.HG	0.913	0.892	0.820
GW.RANK.COMBUNIV.COX.SURV	0.870	0.892	0.840
GW.RANKCV.COMBUNIV.COX.SURV	0.870	0.865	0.840
GW.RANK.MULTIV.RCOX.SURV	0.913	0.892	0.860
GW.RANKCV.MULTIV.RCOX.SURV	0.913	0.892	0.860
GW.PCA.COMBUNIV.WILCOXON.HG	0.913	0.838	0.780
GW.PCACV.COMBUNIV.WILCOXON.HG	0.870	0.811	0.760
GW.PCA.COMBUNIV.COX.SURV	0.913	0.892	0.820
GW.PCACV.COMBUNIV.COX.SURV	0.957	0.892	0.820
GW.PCA.MULTIV.RCOX.SURV	0.913	0.919	0.820
GW.PCACV.MULTIV.RCOX.SURV	0.913	0.892	0.800
GENE76	0.957	0.919	0.820
GGI	1.000	1.000	0.920
AOL	0.870	0.838	0.796
NPI	0.957	0.946	0.881

The following table shows the specificity of the methods in leaving 33% of the patients in the low-risk group at some points in time:

	years.3	years.5	years.10
AURKA	0.349	0.379	0.378
BD.COMBUNIV.WILCOXON.HG	0.360	0.379	0.372
BD.COMBUNIV.COX.SURV	0.349	0.379	0.378
BD.MULTIV.LM.TOE	0.366	0.391	0.392
BD.MULTIV.COX.SURV	0.343	0.354	0.351
GW.RANK.COMBUNIV.WILCOXON.HG	0.354	0.379	0.392
GW.RANKCV.COMBUNIV.WILCOXON.HG	0.360	0.379	0.378
GW.RANK.COMBUNIV.COX.SURV	0.354	0.379	0.385
GW.RANKCV.COMBUNIV.COX.SURV	0.354	0.373	0.385
GW.RANK.MULTIV.RCOX.SURV	0.360	0.379	0.392
GW.RANKCV.MULTIV.RCOX.SURV	0.360	0.379	0.392
GW.PCA.COMBUNIV.WILCOXON.HG	0.360	0.366	0.365
GW.PCACV.COMBUNIV.WILCOXON.HG	0.354	0.360	0.358
GW.PCA.COMBUNIV.COX.SURV	0.360	0.379	0.378
GW.PCACV.COMBUNIV.COX.SURV	0.366	0.379	0.378
GW.PCA.MULTIV.RCOX.SURV	0.360	0.385	0.378
GW.PCACV.MULTIV.RCOX.SURV	0.360	0.379	0.372
GENE76	0.366	0.385	0.378
GGI	0.371	0.404	0.412
AOL	0.400	0.416	0.426
NPI	0.260	0.277	0.277