Output tables for the test of Multiple comparisons.

July 3, 2017

1 Average rankings of Friedman test

Average ranks obtained by applying the Friedman procedure

Friedman statistic considering reduction performance (distributed according to chi-square with 11 degrees of freedom: 78.053846.

P-value computed by Friedman Test: 4.3673398231192095E-11.

Algorithm	Ranking
MIRSVM	2.4333
miGraph	3.8333
MIBoost	9.6
MIOptimalBall	7.8
MIDD	6.5667
MIWrapper	9.6
MISMO	5.2
MISVM	8.5667
SimpleMI	9.6
TLC	4.7
Bagging	4.8667
Stacking	5.2333

Table 1: Average Rankings of the algorithms

2 Post hoc comparisons

Results achieved on post hoc comparisons for $\alpha = 0.05$, $\alpha = 0.10$ and adjusted p-values.

2.1 P-values for $\alpha = 0.05$

Nemenyi's procedure rejects those hypotheses that have an unadjusted p-value ≤ 0.000758.
Holm's procedure rejects those hypotheses that have an unadjusted p-value ≤ 0.001111.
Shaffer's procedure rejects those hypotheses that have an unadjusted p-value ≤ 0.000758.

i	algorithms	$z = (R_0 - R_i)/SE$	p	Holm	Shaffer
66	MIRSVM vs. MIBoost	5.443474	0	0.000758	0.000758
65	MIRSVM vs. MIWrapper	5.443474	0	0.000769	0.000909
64	MIRSVM vs. SimpleMI	5.443474	0	0.000781	0.000909
63	MIRSVM vs. MISVM	4.658601	0.000003	0.000794	0.000909
62	miGraph vs. MIBoost	4.380098	0.000012	0.000806	0.000909
61	miGraph vs. MIWrapper	4.380098	0.000012	0.00082	0.000909
60	miGraph vs. SimpleMI	4.380098	0.000012	0.000833	0.000909
59	MIRSVM vs. MIOptimalBall	4.076276	0.000046	0.000847	0.000909
58	MIBoost vs. TLC	3.721817	0.000198	0.000862	0.000909
57	MIWrapper vs. TLC	3.721817	0.000198	0.000877	0.000909
56	SimpleMI vs. TLC	3.721817	0.000198	0.000893	0.000909
55	miGraph vs. MISVM	3.595225	0.000324	0.000909	0.000909
54	MIBoost vs. Bagging	3.595225	0.000324	0.000926	0.001087
53	MIWrapper vs. Bagging	3.595225	0.000324	0.000943	0.001087
52	SimpleMI vs. Bagging	3.595225	0.000324	0.000962	0.001087
51	MIBoost vs. MISMO	3.34204	0.000832	0.00098	0.001087
50	MIWrapper vs. MISMO	3.34204	0.000832	0.001	0.001087
49	MISMO vs. SimpleMI	3.34204	0.000832	0.00102	0.001087
48	MIBoost vs. Stacking	3.316721	0.000911	0.001042	0.001087
47	MIWrapper vs. Stacking	3.316721	0.000911	0.001064	0.001087
46	SimpleMI vs. Stacking	3.316721	0.000911	0.001087	0.001087
45	MIRSVM vs. MIDD	3.139492	0.001692	0.001111	0.001111
44	miGraph vs. MIOptimalBall	3.0129	0.002588	0.001136	0.001136
43	MISVM vs. TLC	2.936944	0.003315	0.001163	0.001163
42	MISVM vs. Bagging	2.810352	0.004949	0.00119	0.00119
41	MISMO vs. MISVM	2.557167	0.010553	0.00122	0.00122
40	MISVM vs. Stacking	2.531848	0.011346	0.00125	0.00125
39	MIOptimalBall vs. TLC	2.354619	0.018542	0.001282	0.001282
38	MIBoost vs. MIDD	2.303982	0.021224	0.001316	0.001316
37	MIDD vs. MIWrapper	2.303982	0.021224	0.001351	0.001351
36	MIDD vs. SimpleMI	2.303982	0.021224	0.001389	0.001389
35	MIOptimalBall vs. Bagging	2.228027	0.025879	0.001429	0.001429
34	MIRSVM vs. Stacking	2.126753	0.033441	0.001471	0.001471
33	MIRSVM vs. MISMO	2.101434	0.035603	0.001515	0.001515
32	miGraph vs. MIDD	2.076116	0.037883	0.001563	0.001563
31	MIOptimalBall vs. MISMO	1.974842	0.048286	0.001613	0.001613
30	MIOptimalBall vs. Stacking	1.949523	0.051233	0.001667	0.001667
29	MIRSVM vs. Bagging	1.848249	0.064566	0.001724	0.001724
28	MIRSVM vs. TLC	1.721657	0.085132	0.001786	0.001786
27	MIDD vs. MISVM	1.519109	0.128735	0.001852	0.001852
26	MIDD vs. TLC	1.417835	0.156239	0.001923	0.001923
25	MIBoost vs. MIOptimalBall	1.367198	0.171563	0.002	0.002
24	MIOptimalBall vs. MIWrapper	1.367198	0.171563	0.002083	0.002083
23	MIOptimalBall vs. SimpleMI	1.367198	0.171563	0.002174	0.002174
22	MIDD vs. Bagging	1.291243	0.19662	0.002273	0.002273
21	MIRSVM vs. miGraph	1.063376	0.287611	0.002381	0.002381
20	miGraph vs. Stacking	1.063376	0.287611	0.0025	0.0025
19	MIDD vs. MISMO	1.038058	0.299243	0.002632	0.002632
18	miGraph vs. MISMO	1.038058	0.299243	0.002778	0.002778
17	MIDD vs. Stacking	1.012739	0.311185	0.002941	0.002941
16	MIOptimalBall vs. MIDD	0.936784	0.34887	0.003125	0.003125
15	miGraph vs. Bagging	0.784873	0.432528	0.003333	0.003333
14	MIBoost vs. MISVM	0.784873	0.432528	0.003571	0.003571
13	MIWrapper vs. MISVM	0.784873	0.432528	0.003846	0.003846
12	MISVM vs. SimpleMI	0.784873	0.432528	0.004167	0.004167
11	miGraph vs. TLC	0.658281	0.510358	0.004545	0.004545
10	MIOptimalBall vs. MISVM	0.582325	0.560348	0.005	0.005
9	TLC vs. Stacking	0.405096	0.685407	0.005556	0.005556
8	MISMO vs. TLC	0.379777	0.704111	0.00625	0.00625
7	Bagging vs. Stacking	0.278503	0.780626	0.007143	0.007143
6	MISMO vs. Bagging	0.253185	0.800125	0.008333	0.008333
5	TLC vs. Bagging	0.126592	0.899263	0.01	0.01
4	MISMO vs. Stacking	0.025318	0.979801	0.0125	0.0125
3	MIBoost vs. MIWrapper	0	1	0.016667	0.016667
2	MIBoost vs. SimpleMI	0	1	0.025	0.025
1	MIWrapper vs. SimpleMI	0	1	0.05	0.05

Table 2: P-values Table for $\alpha = 0.05$

2.2 P-values for $\alpha = 0.10$

Nemenyi's procedure rejects those hypotheses that have an unadjusted p-value ≤ 0.001515.

Holm's procedure rejects those hypotheses that have an unadjusted p-value ≤ 0.002273.

Shaffer's procedure rejects those hypotheses that have an unadjusted p-value ≤ 0.001515.

i	algorithms	$z = (R_0 - R_i)/SE$	p	Holm	Shaffer
66	MIRSVM vs. MIBoost	5.443474	0	0.001515	0.001515
65	MIRSVM vs. MIWrapper	5.443474	0	0.001538	0.001818
64	MIRSVM vs. SimpleMI	5.443474	0	0.001563	0.001818
63	MIRSVM vs. MISVM	4.658601	0.000003	0.001587	0.001818
62	miGraph vs. MIBoost	4.380098	0.000012	0.001613	0.001818
61	miGraph vs. MIWrapper	4.380098	0.000012	0.001639	0.001818
60	miGraph vs. SimpleMI	4.380098	0.000012	0.001667	0.001818
59	MIRSVM vs. MIOptimalBall	4.076276	0.000046	0.001695	0.001818
58	MIBoost vs. TLC	3.721817	0.000198	0.001724	0.001818
57	MIWrapper vs. TLC	3.721817	0.000198	0.001754	0.001818
56	SimpleMI vs. TLC	3.721817	0.000198	0.001786	0.001818
55	miGraph vs. MISVM	3.595225	0.000324	0.001818	0.001818
54	MIBoost vs. Bagging	3.595225	0.000324	0.001852	0.002174
53	MIWrapper vs. Bagging	3.595225	0.000324	0.001887	0.002174
52	SimpleMI vs. Bagging	3.595225	0.000324	0.001923	0.002174
51	MIBoost vs. MISMO	3.34204	0.000832	0.001961	0.002174
50	MIWrapper vs. MISMO	3.34204	0.000832	0.002	0.002174
49	MISMO vs. SimpleMI	3.34204	0.000832	0.002041	0.002174
48	MIBoost vs. Stacking	3.316721	0.000911	0.002083	0.002174
47	MIWrapper vs. Stacking	3.316721	0.000911	0.002128	0.002174
46	SimpleMI vs. Stacking	3.316721	0.000911	0.002174	0.002174
45	MIRSVM vs. MIDD	3.139492	0.001692	0.002222	0.002222
44	miGraph vs. MIOptimalBall	3.0129	0.002588	0.002273	0.002564
43	MISVM vs. TLC	2.936944	0.003315	0.002326	0.002564
42	MISVM vs. Bagging	2.810352	0.004949	0.002381	0.002564
41	MISMO vs. MISVM	2.557167	0.010553	0.002439	0.002564
40	MISVM vs. Stacking	2.531848	0.011346	0.0025	0.002564
39	MIOptimalBall vs. TLC	2.354619	0.018542	0.002564	0.002564
38	MIBoost vs. MIDD	2.303982	0.021224	0.002632	0.002632
37	MIDD vs. MIWrapper	2.303982	0.021224	0.002703	0.002703
36	MIDD vs. SimpleMI	2.303982	0.021224	0.002778	0.002778
35	MIOptimalBall vs. Bagging	2.228027	0.025879	0.002857	0.002857
34	MIRSVM vs. Stacking	2.126753	0.033441	0.002941	0.002941
33	MIRSVM vs. MISMO	2.101434	0.035603	0.00303	0.00303
32	miGraph vs. MIDD	2.076116	0.037883	0.003125	0.003125
31	MIOptimalBall vs. MISMO	1.974842	0.048286	0.003226	0.003226
30	MIOptimalBall vs. Stacking	1.949523	0.051233	0.003333	0.003333
29	MIRSVM vs. Bagging	1.848249	0.064566	0.003448	0.003448
28	MIRSVM vs. TLC	1.721657	0.085132	0.003571	0.003571
27	MIDD vs. MISVM	1.519109	0.128735	0.003704	0.003704
26	MIDD vs. TLC	1.417835	0.156239	0.003846	0.003846
25	MIBoost vs. MIOptimalBall	1.367198	0.171563	0.004	0.004
24	MIOptimalBall vs. MIWrapper	1.367198	0.171563	0.004167	0.004167
23	MIOptimalBall vs. SimpleMI	1.367198	0.171563	0.004348	0.004348
22	MIDD vs. Bagging	1.291243	0.19662	0.004545	0.004545
21	MIRSVM vs. miGraph	1.063376	0.287611	0.004762	0.004762
20	miGraph vs. Stacking	1.063376	0.287611	0.005	0.005
19	MIDD vs. MISMO	1.038058	0.299243	0.005263	0.005263
18	miGraph vs. MISMO	1.038058	0.299243	0.005556	0.005556
17	MIDD vs. Stacking	1.012739	0.311185	0.005882	0.005882
16	MIOptimalBall vs. MIDD	0.936784	0.34887	0.00625	0.00625
15	miGraph vs. Bagging	0.784873	0.432528	0.006667	0.006667
14	MIBoost vs. MISVM	0.784873	0.432528	0.007143	0.007143
13	MIWrapper vs. MISVM	0.784873	0.432528	0.007692	0.007692
12	MISVM vs. SimpleMI	0.784873	0.432528	0.008333	0.008333
11	miGraph vs. TLC	0.658281	0.510358	0.009091	0.009091
10	MIOptimalBall vs. MISVM	0.582325	0.560348	0.01	0.01
9	TLC vs. Stacking	0.405096	0.685407	0.011111	0.011111
8	MISMO vs. TLC	0.379777	0.704111	0.0125	0.0125
7	Bagging vs. Stacking	0.278503	0.780626	0.014286	0.014286
6	MISMO vs. Bagging	0.253185	0.800125	0.016667	0.016667
5	TLC vs. Bagging	0.126592	0.899263	0.02	0.02
4	MISMO vs. Stacking	0.025318	0.979801	0.025	0.025
3	MIBoost vs. MIWrapper	0	1	0.033333	0.033333
2	MIBoost vs. SimpleMI	0	1	0.05	0.05
1	MIWrapper vs. SimpleMI	0	1	0.1	0.1

Table 3: P-values Table for $\alpha = 0.10$

2.3 Adjusted p-values

i	hypothesis	unadjusted p	p_{Neme}	p_{Holm}	p_{Shaf}
1	MIRSVM vs .MIBoost	0	0.000003	0.000003	0.000003
2	MIRSVM vs .MIWrapper	0	0.000003	0.000003	0.000003
3	MIRSVM vs .SimpleMI	0	0.000003	0.000003	0.000003
4	MIRSVM vs .MISVM	0.000003	0.00021	0.000201	0.000175
5	miGraph vs .MIBoost	0.000012	0.000783	0.000735	0.000652
6	miGraph vs .MIWrapper	0.000012	0.000783	0.000735	0.000652
7	miGraph vs .SimpleMI	0.000012	0.000783	0.000735	0.000652
8	MIRSVM vs .MIOptimalBall	0.000046	0.00302	0.0027	0.002517
9	MIBoost vs .TLC	0.000198	0.013054	0.011472	0.010879
10	MIWrapper vs .TLC	0.000198	0.013054	0.011472	0.010879
11	SimpleMI vs .TLC	0.000198	0.013054	0.011472	0.010879
12	miGraph vs .MISVM	0.000324	0.021391	0.017826	0.017826
13	MIBoost vs .Bagging	0.000324	0.021391	0.017826	0.017826
14	MIWrapper vs .Bagging	0.000324	0.021391	0.017826	0.017826
15	SimpleMI vs .Bagging	0.000324	0.021391	0.017826	0.017826
16	MIBoost vs .MISMO	0.000832	0.054889	0.042414	0.038256
17	MIWrapper vs .MISMO	0.000832	0.054889	0.042414	0.038256
18	MISMO vs .SimpleMI	0.000832	0.054889	0.042414	0.038256
19	MIBoost vs .Stacking	0.000911	0.060113	0.043719	0.041897
20	MIWrapper vs .Stacking	0.000911	0.060113	0.043719	0.041897
21	SimpleMI vs .Stacking	0.000911	0.060113	0.043719	0.041897
22	MIRSVM vs .MIDD	0.001692	0.111699	0.076158	0.076158
23	miGraph vs .MIOptimalBall	0.002588	0.170785	0.113856	0.100918
24	MISVM vs .TLC	0.003315	0.218766	0.142529	0.129271
25	MISVM vs .Bagging	0.004949	0.326617	0.207847	0.193001
26	MISMO vs .MISVM	0.010553	0.696489	0.432667	0.411561
27	MISVM vs .Stacking	0.011346	0.748856	0.453852	0.442506
28	MIOptimalBall vs .TLC	0.018542	1.223752	0.723126	0.723126
29	MIBoost vs .MIDD	0.021224	1.400761	0.806499	0.785275
30	MIDD vs .MIWrapper	0.021224	1.400761	0.806499	0.785275
31	MIDD vs .SimpleMI	0.021224	1.400761	0.806499	0.785275
32	MIOptimalBall vs .Bagging	0.025879	1.707997	0.905756	0.879877
33	MIRSVM vs .Stacking	0.033441	2.207082	1.136982	1.136982
34	MIRSVM vs .MISMO	0.035603	2.349789	1.174895	1.136982
35	miGraph vs .MIDD	0.037883	2.500295	1.212264	1.174381
36	MIOptimalBall vs .MISMO	0.048286	3.186883	1.496869	1.496869
37	MIOptimalBall vs .Stacking	0.051233	3.381376	1.536989	1.536989
38	MIRSVM vs .Bagging	0.064566	4.261374	1.872422	1.872422
39	MIRSVM vs .TLC	0.085132	5.618691	2.383687	2.383687
40	MIDD vs .MISVM	0.128735	8.496513	3.475846	3.475846
41	MIDD vs .TLC	0.156239	10.311768	4.062212	3.905973
42	MIBoost vs .MIOptimalBall	0.171563	11.323172	4.28908	4.28908
43	MIOptimalBall vs .MIWrapper	0.171563	11.323172	4.28908	4.28908
44	MIOptimalBall vs .SimpleMI	0.171563	11.323172	4.28908	4.28908
45	MIDD vs .Bagging	0.19662	12.976889	4.32563	4.32563
46	MIRSVM vs .miGraph	0.287611	18.982347	6.039838	6.039838
47	miGraph vs .Stacking	0.287611	18.982347	6.039838	6.039838
48	MIDD vs .MISMO	0.299243	19.750046	6.039838	6.039838
49	miGraph vs .MISMO	0.299243	19.750046	6.039838	6.039838
50	MIDD vs .Stacking	0.311185	20.538188	6.039838	6.039838
51	MIOptimalBall vs .MIDD	0.34887	23.025402	6.039838	6.039838
52	miGraph vs .Bagging	0.432528	28.54685	6.48792	6.48792
53	MIBoost vs .MISVM	0.432528	28.54685	6.48792	6.48792
54	MIWrapper vs .MISVM	0.432528	28.54685	6.48792	6.48792
55	MISVM vs .SimpleMI	0.432528	28.54685	6.48792	6.48792
56	miGraph vs .TLC	0.510358	33.683618	6.48792	6.48792
57	MIOptimalBall vs .MISVM	0.560348	36.982948	6.48792	6.48792
58	TLC vs .Stacking	0.685407	45.236871	6.48792	6.48792
59	MISMO vs .TLC	0.704111	46.47131	6.48792	6.48792
60	Bagging vs .Stacking	0.780626	51.521317	6.48792	6.48792
61	MISMO vs .Bagging	0.800125	52.808275	6.48792	6.48792
62	TLC vs .Bagging	0.899263	59.351358	6.48792	6.48792
63	MISMO vs .Stacking	0.979801	64.666861	6.48792	6.48792
64	MIBoost vs .MIWrapper	1	66	6.48792	6.48792
65	MIBoost vs .SimpleMI	1	66	6.48792	6.48792
66	MIWrapper vs .SimpleMI	1	66	6.48792	6.48792

Table 4: Adjusted p-values