Output tables for the test of Multiple comparisons.

June 12, 2017

1 Average rankings of Friedman test

Average ranks obtained by applying the Friedman procedure

Algorithm	Ranking
Base	4.9688
ADASYN	4.1875
SMOTE	4.7188
Bord	4.4062
NCL	3.4062
SMOTE+TL	4.4688
SMOTE+ENN	4.5
CCR	5.3438

Table 1: Average Rankings of the algorithms

Friedman statistic considering reduction performance (distributed according to chi-square with 7 degrees of freedom: 12.177083.

P-value computed by Friedman Test: 0.09488372468206341.

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 $\alpha = 0.05$

i	algorithms	$z = (R_0 - R_i)/SE$	p	Shaffer
28	NCL vs. CCR	3.163924	0.001557	0.001786
27	Base vs. NCL	2.551552	0.010724	0.002381
26	SMOTE vs. NCL	2.143304	0.032089	0.002381
25	ADASYN vs. CCR	1.888148	0.059006	0.002381
24	NCL vs. SMOTE+ENN	1.786086	0.074085	0.002381
23	NCL vs. SMOTE+TL	1.735055	0.082731	0.002381
22	Bord vs. NCL	1.632993	0.10247	0.002381
21	Bord vs. CCR	1.530931	0.125786	0.002381
20	SMOTE+TL vs. CCR	1.428869	0.153042	0.0025
19	SMOTE+ENN vs. CCR	1.377838	0.168253	0.002632
18	Base vs. ADASYN	1.275776	0.202035	0.002778
17	ADASYN vs. NCL	1.275776	0.202035	0.002941
16	SMOTE vs. CCR	1.020621	0.307434	0.003125
15	Base vs. Bord	0.918559	0.358326	0.003333
14	ADASYN vs. SMOTE	0.867528	0.385653	0.003571
13	Base vs. SMOTE+TL	0.816497	0.414216	0.003846
12	Base vs. SMOTE+ENN	0.765466	0.443994	0.004167
11	Base vs. CCR	0.612372	0.540291	0.004545
10	ADASYN vs. SMOTE+ENN	0.51031	0.609834	0.005
9	SMOTE vs. Bord	0.51031	0.609834	0.005556
8	ADASYN vs. SMOTE+TL	0.459279	0.646034	0.00625
7	Base vs. SMOTE	0.408248	0.683091	0.007143
6	SMOTE vs. SMOTE+TL	0.408248	0.683091	0.008333
5	ADASYN vs. Bord	0.357217	0.720929	0.01
4	SMOTE vs. SMOTE+ENN	0.357217	0.720929	0.0125
3	Bord vs. SMOTE+ENN	0.153093	0.878325	0.016667
2	Bord vs. SMOTE+TL	0.102062	0.918707	0.025
1	SMOTE+TL vs. SMOTE+ENN	0.051031	0.959301	0.05

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

Shaffer's procedure rejects those hypotheses that have an unadjusted p-value ≤ 0.001786.

2.2 P-values for $\alpha = 0.10$

i	algorithms	$z = (R_0 - R_i)/SE$	p	Shaffer
28	NCL vs. CCR	3.163924	0.001557	0.003571
27	Base vs. NCL	2.551552	0.010724	0.004762
26	SMOTE vs. NCL	2.143304	0.032089	0.004762
25	ADASYN vs. CCR	1.888148	0.059006	0.004762
24	NCL vs. SMOTE+ENN	1.786086	0.074085	0.004762
23	NCL vs. SMOTE+TL	1.735055	0.082731	0.004762
22	Bord vs. NCL	1.632993	0.10247	0.004762
21	Bord vs. CCR	1.530931	0.125786	0.004762
20	SMOTE+TL vs. CCR	1.428869	0.153042	0.005
19	SMOTE+ENN vs. CCR	1.377838	0.168253	0.005263
18	Base vs. ADASYN	1.275776	0.202035	0.005556
17	ADASYN vs. NCL	1.275776	0.202035	0.005882
16	SMOTE vs. CCR	1.020621	0.307434	0.00625
15	Base vs. Bord	0.918559	0.358326	0.006667
14	ADASYN vs. SMOTE	0.867528	0.385653	0.007143
13	Base vs. SMOTE+TL	0.816497	0.414216	0.007692
12	Base vs. SMOTE+ENN	0.765466	0.443994	0.008333
11	Base vs. CCR	0.612372	0.540291	0.009091
10	ADASYN vs. SMOTE+ENN	0.51031	0.609834	0.01
9	SMOTE vs. Bord	0.51031	0.609834	0.011111
8	ADASYN vs. SMOTE+TL	0.459279	0.646034	0.0125
7	Base vs. SMOTE	0.408248	0.683091	0.014286
6	SMOTE vs. SMOTE+TL	0.408248	0.683091	0.016667
5	ADASYN vs. Bord	0.357217	0.720929	0.02
4	SMOTE vs. SMOTE+ENN	0.357217	0.720929	0.025
3	Bord vs. SMOTE+ENN	0.153093	0.878325	0.033333
2	Bord vs. SMOTE+TL	0.102062	0.918707	0.05
1	SMOTE+TL vs. SMOTE+ENN	0.051031	0.959301	0.1

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

Shaffer's procedure rejects those hypotheses that have an unadjusted p-value ≤ 0.003571.

2.3 Adjusted p-values

i	hypothesis	unadjusted p	p_{Shaf}
1	NCL vs .CCR	0.001557	0.043584
2	Base vs .NCL	0.010724	0.225213
3	SMOTE vs .NCL	0.032089	0.673863
4	ADASYN vs .CCR	0.059006	1.239127
5	NCL vs .SMOTE+ENN	0.074085	1.555791
6	NCL vs .SMOTE+TL	0.082731	1.737351
7	Bord vs .NCL	0.10247	2.151879
8	Bord vs .CCR	0.125786	2.641515
9	SMOTE+TL vs .CCR	0.153042	2.641515
10	SMOTE+ENN vs .CCR	0.168253	2.692053
11	Base vs .ADASYN	0.202035	3.232556
12	ADASYN vs .NCL	0.202035	3.232556
13	SMOTE vs .CCR	0.307434	4.918947
14	Base vs .Bord	0.358326	5.374897
15	ADASYN vs .SMOTE	0.385653	5.374897
16	Base vs .SMOTE+TL	0.414216	5.38481
17	Base vs .SMOTE+ENN	0.443994	5.38481
18	Base vs .CCR	0.540291	5.943205
19	ADASYN vs .SMOTE+ENN	0.609834	6.09834
20	SMOTE vs .Bord	0.609834	6.09834
21	ADASYN vs .SMOTE+TL	0.646034	6.09834
22	Base vs .SMOTE	0.683091	6.09834
23	SMOTE vs .SMOTE+TL	0.683091	6.09834
24	ADASYN vs .Bord	0.720929	6.09834
25	SMOTE vs .SMOTE+ENN	0.720929	6.09834
26	Bord vs .SMOTE+ENN	0.878325	6.09834
27	Bord vs .SMOTE+TL	0.918707	6.09834
28	SMOTE+TL vs .SMOTE+ENN	0.959301	6.09834

Table 4: Adjusted p-values