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	7.6875
ADASYN	3.3125
SMOTE	3.2969
Bord	4.0312
NCL	6.5
SMOTE+TL	3.4531
SMOTE+ENN	3.9062
CCR	3.8125

Table 1: Average Rankings of the algorithms

Friedman statistic considering reduction performance (distributed according to chi-square with 7 degrees of freedom: 102.179688.

P-value computed by Friedman Test: 8.105083271203739E-11.

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	Base vs. SMOTE	7.169861	0	0.001786
27	Base vs. ADASYN	7.144345	0	0.002381
26	Base vs. SMOTE+TL	6.914705	0	0.002381
25	Base vs. CCR	6.327849	0	0.002381
24	Base vs. SMOTE+ENN	6.174755	0	0.002381
23	Base vs. Bord	5.970631	0	0.002381
22	SMOTE vs. NCL	5.230681	0	0.002381
21	ADASYN vs. NCL	5.205166	0	0.002381
20	NCL vs. SMOTE+TL	4.975526	0.000001	0.003125
19	NCL vs. CCR	4.388669	0.000011	0.003125
18	NCL vs. SMOTE+ENN	4.235576	0.000023	0.003125
17	Bord vs. NCL	4.031452	0.000055	0.003125
16	Base vs. NCL	1.939179	0.052479	0.003125
15	SMOTE vs. Bord	1.199229	0.230439	0.003333
14	ADASYN vs. Bord	1.173714	0.24051	0.003571
13	SMOTE vs. SMOTE+ENN	0.995105	0.319685	0.003846
12	ADASYN vs. SMOTE+ENN	0.96959	0.332251	0.004167
11	Bord vs. SMOTE+TL	0.944074	0.345132	0.004545
10	SMOTE vs. CCR	0.842012	0.399781	0.005
9	ADASYN vs. CCR	0.816497	0.414216	0.005556
8	SMOTE+TL vs. SMOTE+ENN	0.73995	0.45933	0.00625
7	SMOTE+TL vs. CCR	0.586857	0.5573	0.007143
6	Bord vs. CCR	0.357217	0.720929	0.008333
5	SMOTE vs. SMOTE+TL	0.255155	0.798603	0.01
4	ADASYN vs. SMOTE+TL	0.22964	0.818372	0.0125
3	Bord vs. SMOTE+ENN	0.204124	0.838256	0.016667
2	SMOTE+ENN vs. CCR	0.153093	0.878325	0.025
1	ADASYN vs. SMOTE	0.025516	0.979644	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	Base vs. SMOTE	7.169861	0	0.003571
27	Base vs. ADASYN	7.144345	0	0.004762
26	Base vs. SMOTE+TL	6.914705	0	0.004762
25	Base vs. CCR	6.327849	0	0.004762
24	Base vs. SMOTE+ENN	6.174755	0	0.004762
23	Base vs. Bord	5.970631	0	0.004762
22	SMOTE vs. NCL	5.230681	0	0.004762
21	ADASYN vs. NCL	5.205166	0	0.004762
20	NCL vs. SMOTE+TL	4.975526	0.000001	0.00625
19	NCL vs. CCR	4.388669	0.000011	0.00625
18	NCL vs. SMOTE+ENN	4.235576	0.000023	0.00625
17	Bord vs. NCL	4.031452	0.000055	0.00625
16	Base vs. NCL	1.939179	0.052479	0.00625
15	SMOTE vs. Bord	1.199229	0.230439	0.006667
14	ADASYN vs. Bord	1.173714	0.24051	0.007143
13	SMOTE vs. SMOTE+ENN	0.995105	0.319685	0.007692
12	ADASYN vs. SMOTE+ENN	0.96959	0.332251	0.008333
11	Bord vs. SMOTE+TL	0.944074	0.345132	0.009091
10	SMOTE vs. CCR	0.842012	0.399781	0.01
9	ADASYN vs. CCR	0.816497	0.414216	0.011111
8	SMOTE+TL vs. SMOTE+ENN	0.73995	0.45933	0.0125
7	SMOTE+TL vs. CCR	0.586857	0.5573	0.014286
6	Bord vs. CCR	0.357217	0.720929	0.016667
5	SMOTE vs. SMOTE+TL	0.255155	0.798603	0.02
4	ADASYN vs. SMOTE+TL	0.22964	0.818372	0.025
3	Bord vs. SMOTE+ENN	0.204124	0.838256	0.033333
2	SMOTE+ENN vs. CCR	0.153093	0.878325	0.05
1	ADASYN vs. SMOTE	0.025516	0.979644	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	Base vs .SMOTE	0	0
2	Base vs .ADASYN	0	0
3	Base vs .SMOTE+TL	0	0
4	Base vs .CCR	0	0
5	Base vs .SMOTE+ENN	0	0
6	Base vs .Bord	0	0
7	SMOTE vs .NCL	0	0.000004
8	ADASYN vs .NCL	0	0.000004
9	NCL vs .SMOTE+TL	0.000001	0.00001
10	NCL vs .CCR	0.000011	0.000182
11	NCL vs .SMOTE+ENN	0.000023	0.000365
12	Bord vs .NCL	0.000055	0.000887
13	Base vs .NCL	0.052479	0.839672
14	SMOTE vs .Bord	0.230439	3.456582
15	ADASYN vs .Bord	0.24051	3.456582
16	SMOTE vs .SMOTE+ENN	0.319685	4.155906
17	ADASYN vs .SMOTE+ENN	0.332251	4.155906
18	Bord vs .SMOTE+TL	0.345132	4.155906
19	SMOTE vs .CCR	0.399781	4.155906
20	ADASYN vs .CCR	0.414216	4.155906
21	SMOTE+TL vs .SMOTE+ENN	0.45933	4.155906
22	SMOTE+TL vs .CCR	0.5573	4.155906
23	Bord vs .CCR	0.720929	4.325575
24	SMOTE vs .SMOTE+TL	0.798603	4.325575
25	ADASYN vs .SMOTE+TL	0.818372	4.325575
26	Bord vs .SMOTE+ENN	0.838256	4.325575
27	SMOTE+ENN vs .CCR	0.878325	4.325575
28	ADASYN vs .SMOTE	0.979644	4.325575

Table 4: Adjusted p-values