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	7.7344
ADASYN	3.6719
SMOTE	3.2969
Bord	3.875
NCL	6.7188
SMOTE+TL	3.4219
SMOTE+ENN	4.4844
CCR	2.7969

Table 1: Average Rankings of the algorithms

Friedman statistic considering reduction performance (distributed according to chi-square with 7 degrees of freedom: 117.179688.

P-value computed by Friedman Test: 6.898215332284963E-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. CCR	8.062904	0	0.001786
27	Base vs. SMOTE	7.246407	0	0.002381
26	Base vs. SMOTE+TL	7.042283	0	0.002381
25	Base vs. ADASYN	6.634035	0	0.002381
24	NCL vs. CCR	6.404395	0	0.002381
23	Base vs. Bord	6.302333	0	0.002381
22	SMOTE vs. NCL	5.587898	0	0.002381
21	NCL vs. SMOTE+TL	5.383774	0	0.002381
20	Base vs. SMOTE+ENN	5.307228	0	0.003125
19	ADASYN vs. NCL	4.975526	0.000001	0.003125
18	Bord vs. NCL	4.643824	0.000003	0.003125
17	NCL vs. SMOTE+ENN	3.648719	0.000264	0.003125
16	SMOTE+ENN vs. CCR	2.755676	0.005857	0.003125
15	SMOTE vs. SMOTE+ENN	1.939179	0.052479	0.003333
14	Bord vs. CCR	1.760571	0.078311	0.003571
13	SMOTE+TL vs. SMOTE+ENN	1.735055	0.082731	0.003846
12	Base vs. NCL	1.658509	0.097215	0.004167
11	ADASYN vs. CCR	1.428869	0.153042	0.004545
10	ADASYN vs. SMOTE+ENN	1.326807	0.184573	0.005
9	SMOTE+TL vs. CCR	1.020621	0.307434	0.005556
8	Bord vs. SMOTE+ENN	0.995105	0.319685	0.00625
7	SMOTE vs. Bord	0.944074	0.345132	0.007143
6	SMOTE vs. CCR	0.816497	0.414216	0.008333
5	Bord vs. SMOTE+TL	0.73995	0.45933	0.01
4	ADASYN vs. SMOTE	0.612372	0.540291	0.0125
3	ADASYN vs. SMOTE+TL	0.408248	0.683091	0.016667
2	ADASYN vs. Bord	0.331702	0.740114	0.025
1	SMOTE vs. SMOTE+TL	0.204124	0.838256	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. CCR	8.062904	0	0.003571
27	Base vs. SMOTE	7.246407	0	0.004762
26	Base vs. SMOTE+TL	7.042283	0	0.004762
25	Base vs. ADASYN	6.634035	0	0.004762
24	NCL vs. CCR	6.404395	0	0.004762
23	Base vs. Bord	6.302333	0	0.004762
22	SMOTE vs. NCL	5.587898	0	0.004762
21	NCL vs. SMOTE+TL	5.383774	0	0.004762
20	Base vs. SMOTE+ENN	5.307228	0	0.00625
19	ADASYN vs. NCL	4.975526	0.000001	0.00625
18	Bord vs. NCL	4.643824	0.000003	0.00625
17	NCL vs. SMOTE+ENN	3.648719	0.000264	0.00625
16	SMOTE+ENN vs. CCR	2.755676	0.005857	0.00625
15	SMOTE vs. SMOTE+ENN	1.939179	0.052479	0.006667
14	Bord vs. CCR	1.760571	0.078311	0.007143
13	SMOTE+TL vs. SMOTE+ENN	1.735055	0.082731	0.007692
12	Base vs. NCL	1.658509	0.097215	0.008333
11	ADASYN vs. CCR	1.428869	0.153042	0.009091
10	ADASYN vs. SMOTE+ENN	1.326807	0.184573	0.01
9	SMOTE+TL vs. CCR	1.020621	0.307434	0.011111
8	Bord vs. SMOTE+ENN	0.995105	0.319685	0.0125
7	SMOTE vs. Bord	0.944074	0.345132	0.014286
6	SMOTE vs. CCR	0.816497	0.414216	0.016667
5	Bord vs. SMOTE+TL	0.73995	0.45933	0.02
4	ADASYN vs. SMOTE	0.612372	0.540291	0.025
3	ADASYN vs. SMOTE+TL	0.408248	0.683091	0.033333
2	ADASYN vs. Bord	0.331702	0.740114	0.05
1	SMOTE vs. SMOTE+TL	0.204124	0.838256	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 .CCR	0	0
2	Base vs .SMOTE	0	0
3	Base vs .SMOTE+TL	0	0
4	Base vs .ADASYN	0	0
5	NCL vs .CCR	0	0
6	Base vs .Bord	0	0
7	SMOTE vs .NCL	0	0
8	NCL vs .SMOTE+TL	0	0.000002
9	Base vs .SMOTE+ENN	0	0.000002
10	ADASYN vs .NCL	0.000001	0.00001
11	Bord vs .NCL	0.000003	0.000055
12	NCL vs .SMOTE+ENN	0.000264	0.004217
13	SMOTE+ENN vs .CCR	0.005857	0.093714
14	SMOTE vs .SMOTE+ENN	0.052479	0.787192
15	Bord vs .CCR	0.078311	1.018044
16	SMOTE+TL vs .SMOTE+ENN	0.082731	1.075503
17	Base vs .NCL	0.097215	1.166578
18	ADASYN vs .CCR	0.153042	1.683461
19	ADASYN vs .SMOTE+ENN	0.184573	1.845726
20	SMOTE+TL vs .CCR	0.307434	2.766907
21	Bord vs .SMOTE+ENN	0.319685	2.766907
22	SMOTE vs .Bord	0.345132	2.766907
23	SMOTE vs .CCR	0.414216	2.766907
24	Bord vs .SMOTE+TL	0.45933	2.766907
25	ADASYN vs .SMOTE	0.540291	2.766907
26	ADASYN vs .SMOTE+TL	0.683091	2.766907
27	ADASYN vs .Bord	0.740114	2.766907
28	SMOTE vs .SMOTE+TL	0.838256	2.766907

Table 4: Adjusted p-values