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	6.8438
ADASYN	3
SMOTE	4.4375
Bord	5.1094
NCL	4.9375
SMOTE+TL	3.9375
SMOTE+ENN	5.3906
CCR	2.3438

Table 1: Average Rankings of the algorithms

Friedman statistic considering reduction performance (distributed according to chi-square with 7 degrees of freedom: 75.033854.

P-value computed by Friedman Test: 7.074485441904699E-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	7.348469	0	0.001786
27	Base vs. ADASYN	6.276817	0	0.002381
26	SMOTE+ENN vs. CCR	4.975526	0.000001	0.002381
25	Base vs. SMOTE+TL	4.745886	0.000002	0.002381
24	Bord vs. CCR	4.516247	0.000006	0.002381
23	NCL vs. CCR	4.235576	0.000023	0.002381
22	Base vs. SMOTE	3.92939	0.000085	0.002381
21	ADASYN vs. SMOTE+ENN	3.903874	0.000095	0.002381
20	ADASYN vs. Bord	3.444595	0.000572	0.003125
19	SMOTE vs. CCR	3.419079	0.000628	0.003125
18	ADASYN vs. NCL	3.163924	0.001557	0.003125
17	Base vs. NCL	3.112893	0.001853	0.003125
16	Base vs. Bord	2.832223	0.004623	0.003125
15	SMOTE+TL vs. CCR	2.602583	0.009252	0.003333
14	Base vs. SMOTE+ENN	2.372943	0.017647	0.003571
13	SMOTE+TL vs. SMOTE+ENN	2.372943	0.017647	0.003846
12	ADASYN vs. SMOTE	2.347428	0.018904	0.004167
11	Bord vs. SMOTE+TL	1.913664	0.055663	0.004545
10	NCL vs. SMOTE+TL	1.632993	0.10247	0.005
9	SMOTE vs. SMOTE+ENN	1.556447	0.119602	0.005556
8	ADASYN vs. SMOTE+TL	1.530931	0.125786	0.00625
7	SMOTE vs. Bord	1.097167	0.272568	0.007143
6	ADASYN vs. CCR	1.071652	0.283876	0.008333
5	SMOTE vs. NCL	0.816497	0.414216	0.01
4	SMOTE vs. SMOTE+TL	0.816497	0.414216	0.0125
3	NCL vs. SMOTE+ENN	0.73995	0.45933	0.016667
2	Bord vs. SMOTE+ENN	0.459279	0.646034	0.025
1	Bord vs. NCL	0.280671	0.778963	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	7.348469	0	0.003571
27	Base vs. ADASYN	6.276817	0	0.004762
26	SMOTE+ENN vs. CCR	4.975526	0.000001	0.004762
25	Base vs. SMOTE+TL	4.745886	0.000002	0.004762
24	Bord vs. CCR	4.516247	0.000006	0.004762
23	NCL vs. CCR	4.235576	0.000023	0.004762
22	Base vs. SMOTE	3.92939	0.000085	0.004762
21	ADASYN vs. SMOTE+ENN	3.903874	0.000095	0.004762
20	ADASYN vs. Bord	3.444595	0.000572	0.00625
19	SMOTE vs. CCR	3.419079	0.000628	0.00625
18	ADASYN vs. NCL	3.163924	0.001557	0.00625
17	Base vs. NCL	3.112893	0.001853	0.00625
16	Base vs. Bord	2.832223	0.004623	0.00625
15	SMOTE+TL vs. CCR	2.602583	0.009252	0.006667
14	Base vs. SMOTE+ENN	2.372943	0.017647	0.007143
13	SMOTE+TL vs. SMOTE+ENN	2.372943	0.017647	0.007692
12	ADASYN vs. SMOTE	2.347428	0.018904	0.008333
11	Bord vs. SMOTE+TL	1.913664	0.055663	0.009091
10	NCL vs. SMOTE+TL	1.632993	0.10247	0.01
9	SMOTE vs. SMOTE+ENN	1.556447	0.119602	0.011111
8	ADASYN vs. SMOTE+TL	1.530931	0.125786	0.0125
7	SMOTE vs. Bord	1.097167	0.272568	0.014286
6	ADASYN vs. CCR	1.071652	0.283876	0.016667
5	SMOTE vs. NCL	0.816497	0.414216	0.02
4	SMOTE vs. SMOTE+TL	0.816497	0.414216	0.025
3	NCL vs. SMOTE+ENN	0.73995	0.45933	0.033333
2	Bord vs. SMOTE+ENN	0.459279	0.646034	0.05
1	Bord vs. NCL	0.280671	0.778963	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 .ADASYN	0	0
3	SMOTE+ENN vs .CCR	0.000001	0.000014
4	Base vs .SMOTE+TL	0.000002	0.000044
5	Bord vs .CCR	0.000006	0.000132
6	NCL vs .CCR	0.000023	0.000479
7	Base vs .SMOTE	0.000085	0.001788
8	ADASYN vs .SMOTE+ENN	0.000095	0.001988
9	ADASYN vs .Bord	0.000572	0.009151
10	SMOTE vs .CCR	0.000628	0.010053
11	ADASYN vs .NCL	0.001557	0.024905
12	Base vs .NCL	0.001853	0.029642
13	Base vs .Bord	0.004623	0.073961
14	SMOTE+TL vs .CCR	0.009252	0.138787
15	Base vs .SMOTE+ENN	0.017647	0.229411
16	SMOTE+TL vs .SMOTE+ENN	0.017647	0.229411
17	ADASYN vs .SMOTE	0.018904	0.229411
18	Bord vs .SMOTE+TL	0.055663	0.612294
19	NCL vs .SMOTE+TL	0.10247	1.024704
20	SMOTE vs .SMOTE+ENN	0.119602	1.076417
21	ADASYN vs .SMOTE+TL	0.125786	1.076417
22	SMOTE vs .Bord	0.272568	1.907978
23	ADASYN vs .CCR	0.283876	1.907978
24	SMOTE vs .NCL	0.414216	2.071081
25	SMOTE vs .SMOTE+TL	0.414216	2.071081
26	NCL vs .SMOTE+ENN	0.45933	2.071081
27	Bord vs .SMOTE+ENN	0.646034	2.071081
28	Bord vs .NCL	0.778963	2.071081

Table 4: Adjusted p-values