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	2.2969
ADASYN	5.9531
SMOTE	4.6875
Bord	5.1875
NCL	2.4062
SMOTE+TL	4.6875
SMOTE+ENN	3.6562
CCR	7.125

Table 1: Average Rankings of the algorithms

Friedman statistic considering reduction performance (distributed according to chi-square with 7 degrees of freedom: 103.971354.

P-value computed by Friedman Test: 4.8962611742808804E-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	7.884295	0	0.001786
27	NCL vs. CCR	7.705686	0	0.002381
26	Base vs. ADASYN	5.970631	0	0.002381
25	ADASYN vs. NCL	5.792023	0	0.002381
24	SMOTE+ENN vs. CCR	5.664445	0	0.002381
23	Base vs. Bord	4.720371	0.000002	0.002381
22	Bord vs. NCL	4.541762	0.000006	0.002381
21	SMOTE vs. CCR	3.980421	0.000069	0.002381
20	SMOTE+TL vs. CCR	3.980421	0.000069	0.003125
19	Base vs. SMOTE	3.903874	0.000095	0.003125
18	Base vs. SMOTE+TL	3.903874	0.000095	0.003125
17	ADASYN vs. SMOTE+ENN	3.750781	0.000176	0.003125
16	SMOTE vs. NCL	3.725266	0.000195	0.003125
15	NCL vs. SMOTE+TL	3.725266	0.000195	0.003333
14	Bord vs. CCR	3.163924	0.001557	0.003846
13	Bord vs. SMOTE+ENN	2.500521	0.012401	0.003846
12	Base vs. SMOTE+ENN	2.21985	0.026429	0.004167
11	ADASYN vs. SMOTE	2.066757	0.038757	0.004545
10	ADASYN vs. SMOTE+TL	2.066757	0.038757	0.005
9	NCL vs. SMOTE+ENN	2.041241	0.041227	0.005556
8	ADASYN vs. CCR	1.913664	0.055663	0.00625
7	SMOTE vs. SMOTE+ENN	1.684024	0.092177	0.007143
6	SMOTE+TL vs. SMOTE+ENN	1.684024	0.092177	0.008333
5	ADASYN vs. Bord	1.25026	0.211204	0.01
4	SMOTE vs. Bord	0.816497	0.414216	0.0125
3	Bord vs. SMOTE+TL	0.816497	0.414216	0.016667
2	Base vs. NCL	0.178609	0.858245	0.025
1	SMOTE vs. SMOTE+TL	0	1	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	7.884295	0	0.003571
27	NCL vs. CCR	7.705686	0	0.004762
26	Base vs. ADASYN	5.970631	0	0.004762
25	ADASYN vs. NCL	5.792023	0	0.004762
24	SMOTE+ENN vs. CCR	5.664445	0	0.004762
23	Base vs. Bord	4.720371	0.000002	0.004762
22	Bord vs. NCL	4.541762	0.000006	0.004762
21	SMOTE vs. CCR	3.980421	0.000069	0.004762
20	SMOTE+TL vs. CCR	3.980421	0.000069	0.00625
19	Base vs. SMOTE	3.903874	0.000095	0.00625
18	Base vs. SMOTE+TL	3.903874	0.000095	0.00625
17	ADASYN vs. SMOTE+ENN	3.750781	0.000176	0.00625
16	SMOTE vs. NCL	3.725266	0.000195	0.00625
15	NCL vs. SMOTE+TL	3.725266	0.000195	0.006667
14	Bord vs. CCR	3.163924	0.001557	0.007692
13	Bord vs. SMOTE+ENN	2.500521	0.012401	0.007692
12	Base vs. SMOTE+ENN	2.21985	0.026429	0.008333
11	ADASYN vs. SMOTE	2.066757	0.038757	0.009091
10	ADASYN vs. SMOTE+TL	2.066757	0.038757	0.01
9	NCL vs. SMOTE+ENN	2.041241	0.041227	0.011111
8	ADASYN vs. CCR	1.913664	0.055663	0.0125
7	SMOTE vs. SMOTE+ENN	1.684024	0.092177	0.014286
6	SMOTE+TL vs. SMOTE+ENN	1.684024	0.092177	0.016667
5	ADASYN vs. Bord	1.25026	0.211204	0.02
4	SMOTE vs. Bord	0.816497	0.414216	0.025
3	Bord vs. SMOTE+TL	0.816497	0.414216	0.033333
2	Base vs. NCL	0.178609	0.858245	0.05
1	SMOTE vs. SMOTE+TL	0	1	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	NCL vs .CCR	0	0
3	Base vs .ADASYN	0	0
4	ADASYN vs .NCL	0	0
5	SMOTE+ENN vs .CCR	0	0
6	Base vs .Bord	0.000002	0.000049
7	Bord vs .NCL	0.000006	0.000117
8	SMOTE vs .CCR	0.000069	0.001445
9	SMOTE+TL vs .CCR	0.000069	0.001445
10	Base vs .SMOTE	0.000095	0.001515
11	Base vs .SMOTE+TL	0.000095	0.001515
12	ADASYN vs .SMOTE+ENN	0.000176	0.002821
13	SMOTE vs .NCL	0.000195	0.003122
14	NCL vs .SMOTE+TL	0.000195	0.003122
15	Bord vs .CCR	0.001557	0.020235
16	Bord vs .SMOTE+ENN	0.012401	0.161214
17	Base vs .SMOTE+ENN	0.026429	0.317147
18	ADASYN vs .SMOTE	0.038757	0.426328
19	ADASYN vs .SMOTE+TL	0.038757	0.426328
20	NCL vs .SMOTE+ENN	0.041227	0.426328
21	ADASYN vs .CCR	0.055663	0.445305
22	SMOTE vs .SMOTE+ENN	0.092177	0.645239
23	SMOTE+TL vs .SMOTE+ENN	0.092177	0.645239
24	ADASYN vs .Bord	0.211204	1.056022
25	SMOTE vs .Bord	0.414216	1.656865
26	Bord vs .SMOTE+TL	0.414216	1.656865
27	Base vs .NCL	0.858245	1.71649
28	SMOTE vs .SMOTE+TL	1	1.71649

Table 4: Adjusted p-values