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	5.0469
ADASYN	5.3125
SMOTE	4.2188
Bord	3.8438
NCL	4.5781
SMOTE+TL	3.7812
SMOTE+ENN	3.75
CCR	5.4688

Table 1: Average Rankings of the algorithms

Friedman statistic considering reduction performance (distributed according to chi-square with 7 degrees of freedom: 18.627604.

P-value computed by Friedman Test: 0.0094375143906816341634.

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	SMOTE+ENN vs. CCR	2.806707	0.005005	0.001786
27	SMOTE+TL vs. CCR	2.755676	0.005857	0.001852
26	Bord vs. CCR	2.653614	0.007963	0.001923
25	ADASYN vs. SMOTE+ENN	2.551552	0.010724	0.002
24	ADASYN vs. SMOTE+TL	2.500521	0.012401	0.002083
23	ADASYN vs. Bord	2.398459	0.016464	0.002174
22	Base vs. SMOTE+ENN	2.117788	0.034193	0.002273
21	Base vs. SMOTE+TL	2.066757	0.038757	0.002381
20	SMOTE vs. CCR	2.041241	0.041227	0.0025
19	Base vs. Bord	1.964695	0.04945	0.002632
18	ADASYN vs. SMOTE	1.786086	0.074085	0.002778
17	NCL vs. CCR	1.454385	0.14584	0.002941
16	Base vs. SMOTE	1.352322	0.176272	0.003125
15	NCL vs. SMOTE+ENN	1.352322	0.176272	0.003333
14	NCL vs. SMOTE+TL	1.301291	0.193159	0.003571
13	ADASYN vs. NCL	1.199229	0.230439	0.003846
12	Bord vs. NCL	1.199229	0.230439	0.004167
11	Base vs. NCL	0.765466	0.443994	0.004545
10	SMOTE vs. SMOTE+ENN	0.765466	0.443994	0.005
9	SMOTE vs. SMOTE+TL	0.714435	0.474959	0.005556
8	Base vs. CCR	0.688919	0.490874	0.00625
7	SMOTE vs. Bord	0.612372	0.540291	0.007143
6	SMOTE vs. NCL	0.586857	0.5573	0.008333
5	Base vs. ADASYN	0.433764	0.66446	0.01
4	ADASYN vs. CCR	0.255155	0.798603	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 $\alpha = 0.05$

2.2 P-values for $\alpha = 0.10$

i	algorithms	$z = (R_0 - R_i)/SE$	p	Shaffer
28	SMOTE+ENN vs. CCR	2.806707	0.005005	0.003571
27	SMOTE+TL vs. CCR	2.755676	0.005857	0.003704
26	Bord vs. CCR	2.653614	0.007963	0.003846
25	ADASYN vs. SMOTE+ENN	2.551552	0.010724	0.004
24	ADASYN vs. SMOTE+TL	2.500521	0.012401	0.004167
23	ADASYN vs. Bord	2.398459	0.016464	0.004348
22	Base vs. SMOTE+ENN	2.117788	0.034193	0.004545
21	Base vs. SMOTE+TL	2.066757	0.038757	0.004762
20	SMOTE vs. CCR	2.041241	0.041227	0.005
19	Base vs. Bord	1.964695	0.04945	0.005263
18	ADASYN vs. SMOTE	1.786086	0.074085	0.005556
17	NCL vs. CCR	1.454385	0.14584	0.005882
16	Base vs. SMOTE	1.352322	0.176272	0.00625
15	NCL vs. SMOTE+ENN	1.352322	0.176272	0.006667
14	NCL vs. SMOTE+TL	1.301291	0.193159	0.007143
13	ADASYN vs. NCL	1.199229	0.230439	0.007692
12	Bord vs. NCL	1.199229	0.230439	0.008333
11	Base vs. NCL	0.765466	0.443994	0.009091
10	SMOTE vs. SMOTE+ENN	0.765466	0.443994	0.01
9	SMOTE vs. SMOTE+TL	0.714435	0.474959	0.011111
8	Base vs. CCR	0.688919	0.490874	0.0125
7	SMOTE vs. Bord	0.612372	0.540291	0.014286
6	SMOTE vs. NCL	0.586857	0.5573	0.016667
5	Base vs. ADASYN	0.433764	0.66446	0.02
4	ADASYN vs. CCR	0.255155	0.798603	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 $\alpha = 0.10$

2.3 Adjusted p-values

i	hypothesis	unadjusted p	p_{Shaf}
1	SMOTE+ENN vs .CCR	0.005005	0.140142
2	SMOTE+TL vs .CCR	0.005857	0.140142
3	Bord vs .CCR	0.007963	0.167233
4	ADASYN vs .SMOTE+ENN	0.010724	0.225213
5	ADASYN vs .SMOTE+TL	0.012401	0.260423
6	ADASYN vs .Bord	0.016464	0.345749
7	Base vs .SMOTE+ENN	0.034193	0.718054
8	Base vs .SMOTE+TL	0.038757	0.813898
9	SMOTE vs .CCR	0.041227	0.813898
10	Base vs .Bord	0.04945	0.813898
11	ADASYN vs .SMOTE	0.074085	1.185365
12	NCL vs .CCR	0.14584	2.333436
13	Base vs .SMOTE	0.176272	2.820355
14	NCL vs .SMOTE+ENN	0.176272	2.820355
15	NCL vs .SMOTE+TL	0.193159	2.820355
16	ADASYN vs .NCL	0.230439	2.995704
17	Bord vs .NCL	0.230439	2.995704
18	Base vs .NCL	0.443994	4.883938
19	SMOTE vs .SMOTE+ENN	0.443994	4.883938
20	SMOTE vs .SMOTE+TL	0.474959	4.883938
21	Base vs .CCR	0.490874	4.883938
22	SMOTE vs .Bord	0.540291	4.883938
23	SMOTE vs .NCL	0.5573	4.883938
24	Base vs .ADASYN	0.66446	4.883938
25	ADASYN vs .CCR	0.798603	4.883938
26	Bord vs .SMOTE+ENN	0.878325	4.883938
27	Bord vs .SMOTE+TL	0.918707	4.883938
28	SMOTE+TL vs .SMOTE+ENN	0.959301	4.883938

Table 4: Adjusted p-values