

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	4.9375
ADASYN	5.5
SMOTE	4.25
Bord	4.9062
NCL	4.6875
SMOTE+TL	4.625
SMOTE+ENN	4.0625
CCR	3.0312

Table 1: Average Rankings of the algorithms

Friedman statistic considering reduction performance (distributed according to chi-square with 7 degrees of freedom: 20.364583.

P-value computed by Friedman Test: 0.0048337500177836334.

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	ADASYN vs. CCR	4.031452	0.000055	0.001786
27	Base vs. CCR	3.112893	0.001853	0.002381
26	Bord vs. CCR	3.061862	0.0022	0.002381
25	NCL vs. CCR	2.704645	0.006838	0.002381
24	SMOTE+TL vs. CCR	2.602583	0.009252	0.002381
23	ADASYN vs. SMOTE+ENN	2.347428	0.018904	0.002381
22	ADASYN vs. SMOTE	2.041241	0.041227	0.002381
21	SMOTE vs. CCR	1.99021	0.046568	0.002381
20	SMOTE+ENN vs. CCR	1.684024	0.092177	0.0025
19	Base vs. SMOTE+ENN	1.428869	0.153042	0.002632
18	ADASYN vs. SMOTE+TL	1.428869	0.153042	0.002778
17	Bord vs. SMOTE+ENN	1.377838	0.168253	0.002941
16	ADASYN vs. NCL	1.326807	0.184573	0.003125
15	Base vs. SMOTE	1.122683	0.261572	0.003333
14	SMOTE vs. Bord	1.071652	0.283876	0.003571
13	NCL vs. SMOTE+ENN	1.020621	0.307434	0.003846
12	ADASYN vs. Bord	0.96959	0.332251	0.004167
11	Base vs. ADASYN	0.918559	0.358326	0.004545
10	SMOTE+TL vs. SMOTE+ENN	0.918559	0.358326	0.005
9	SMOTE vs. NCL	0.714435	0.474959	0.005556
8	SMOTE vs. SMOTE+TL	0.612372	0.540291	0.00625
7	Base vs. SMOTE+TL	0.51031	0.609834	0.007143
6	Bord vs. SMOTE+TL	0.459279	0.646034	0.008333
5	Base vs. NCL	0.408248	0.683091	0.01
4	Bord vs. NCL	0.357217	0.720929	0.0125
3	SMOTE vs. SMOTE+ENN	0.306186	0.759463	0.016667
2	NCL vs. SMOTE+TL	0.102062	0.918707	0.025
1	Base vs. Bord	0.051031	0.959301	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	ADASYN vs. CCR	4.031452	0.000055	0.003571
27	Base vs. CCR	3.112893	0.001853	0.004762
26	Bord vs. CCR	3.061862	0.0022	0.004762
25	NCL vs. CCR	2.704645	0.006838	0.004762
24	SMOTE+TL vs. CCR	2.602583	0.009252	0.004762
23	ADASYN vs. SMOTE+ENN	2.347428	0.018904	0.004762
22	ADASYN vs. SMOTE	2.041241	0.041227	0.004762
21	SMOTE vs. CCR	1.99021	0.046568	0.004762
20	SMOTE+ENN vs. CCR	1.684024	0.092177	0.005
19	Base vs. SMOTE+ENN	1.428869	0.153042	0.005263
18	ADASYN vs. SMOTE+TL	1.428869	0.153042	0.005556
17	Bord vs. SMOTE+ENN	1.377838	0.168253	0.005882
16	ADASYN vs. NCL	1.326807	0.184573	0.00625
15	Base vs. SMOTE	1.122683	0.261572	0.006667
14	SMOTE vs. Bord	1.071652	0.283876	0.007143
13	NCL vs. SMOTE+ENN	1.020621	0.307434	0.007692
12	ADASYN vs. Bord	0.96959	0.332251	0.008333
11	Base vs. ADASYN	0.918559	0.358326	0.009091
10	SMOTE+TL vs. SMOTE+ENN	0.918559	0.358326	0.01
9	SMOTE vs. NCL	0.714435	0.474959	0.011111
8	SMOTE vs. SMOTE+TL	0.612372	0.540291	0.0125
7	Base vs. SMOTE+TL	0.51031	0.609834	0.014286
6	Bord vs. SMOTE+TL	0.459279	0.646034	0.016667
5	Base vs. NCL	0.408248	0.683091	0.02
4	Bord vs. NCL	0.357217	0.720929	0.025
3	SMOTE vs. SMOTE+ENN	0.306186	0.759463	0.033333
2	NCL vs. SMOTE+TL	0.102062	0.918707	0.05
1	Base vs. Bord	0.051031	0.959301	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	ADASYN vs .CCR	0.000055	0.001552
2	Base vs .CCR	0.001853	0.038905
3	Bord vs .CCR	0.0022	0.046193
4	NCL vs .CCR	0.006838	0.143593
5	SMOTE+TL vs .CCR	0.009252	0.194301
6	ADASYN vs .SMOTE+ENN	0.018904	0.396974
7	ADASYN vs .SMOTE	0.041227	0.865764
8	SMOTE vs .CCR	0.046568	0.977923
9	SMOTE+ENN vs .CCR	0.092177	1.474832
10	Base vs .SMOTE+ENN	0.153042	2.44867
11	ADASYN vs .SMOTE+TL	0.153042	2.44867
12	Bord vs .SMOTE+ENN	0.168253	2.692053
13	ADASYN vs .NCL	0.184573	2.953161
14	Base vs .SMOTE	0.261572	3.923584
15	SMOTE vs .Bord	0.283876	3.923584
16	NCL vs .SMOTE+ENN	0.307434	3.996644
17	ADASYN vs .Bord	0.332251	3.996644
18	Base vs .ADASYN	0.358326	3.996644
19	SMOTE+TL vs .SMOTE+ENN	0.358326	3.996644
20	SMOTE vs .NCL	0.474959	4.274627
21	SMOTE vs .SMOTE+TL	0.540291	4.322331
22	Base vs .SMOTE+TL	0.609834	4.322331
23	Bord vs .SMOTE+TL	0.646034	4.322331
24	Base vs .NCL	0.683091	4.322331
25	Bord vs .NCL	0.720929	4.322331
26	SMOTE vs .SMOTE+ENN	0.759463	4.322331
27	NCL vs .SMOTE+TL	0.918707	4.322331
28	Base vs .Bord	0.959301	4.322331

Table 4: Adjusted p -values