

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	6.6875
ADASYN	3.4062
SMOTE	5.0469
Bord	4.9844
NCL	3.75
SMOTE+TL	4.5625
SMOTE+ENN	5.0938
CCR	2.4688

Table 1: Average Rankings of the algorithms

Friedman statistic considering reduction performance (distributed according to chi-square with 7 degrees of freedom: 61.653646.

P-value computed by Friedman Test: 1.1987633108390128E-10.

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	6.88919	0	0.001786
27	Base vs. ADASYN	5.358259	0	0.002381
26	Base vs. NCL	4.796917	0.000002	0.002381
25	SMOTE+ENN vs. CCR	4.286607	0.000018	0.002381
24	SMOTE vs. CCR	4.21006	0.000026	0.002381
23	Bord vs. CCR	4.107998	0.00004	0.002381
22	Base vs. SMOTE+TL	3.47011	0.00052	0.002381
21	SMOTE+TL vs. CCR	3.419079	0.000628	0.002381
20	Base vs. Bord	2.781191	0.005416	0.003125
19	ADASYN vs. SMOTE+ENN	2.755676	0.005857	0.003125
18	Base vs. SMOTE	2.679129	0.007381	0.003125
17	ADASYN vs. SMOTE	2.679129	0.007381	0.003125
16	Base vs. SMOTE+ENN	2.602583	0.009252	0.003125
15	ADASYN vs. Bord	2.577067	0.009964	0.003333
14	NCL vs. SMOTE+ENN	2.194335	0.028211	0.003571
13	SMOTE vs. NCL	2.117788	0.034193	0.003846
12	NCL vs. CCR	2.092272	0.036414	0.004167
11	Bord vs. NCL	2.015726	0.043829	0.004545
10	ADASYN vs. SMOTE+TL	1.888148	0.059006	0.005
9	ADASYN vs. CCR	1.530931	0.125786	0.005556
8	NCL vs. SMOTE+TL	1.326807	0.184573	0.00625
7	SMOTE+TL vs. SMOTE+ENN	0.867528	0.385653	0.007143
6	SMOTE vs. SMOTE+TL	0.790981	0.428955	0.008333
5	Bord vs. SMOTE+TL	0.688919	0.490874	0.01
4	ADASYN vs. NCL	0.561341	0.574565	0.0125
3	Bord vs. SMOTE+ENN	0.178609	0.858245	0.016667
2	SMOTE vs. Bord	0.102062	0.918707	0.025
1	SMOTE vs. SMOTE+ENN	0.076547	0.938984	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	6.88919	0	0.003571
27	Base vs. ADASYN	5.358259	0	0.004762
26	Base vs. NCL	4.796917	0.000002	0.004762
25	SMOTE+ENN vs. CCR	4.286607	0.000018	0.004762
24	SMOTE vs. CCR	4.21006	0.000026	0.004762
23	Bord vs. CCR	4.107998	0.00004	0.004762
22	Base vs. SMOTE+TL	3.47011	0.00052	0.004762
21	SMOTE+TL vs. CCR	3.419079	0.000628	0.004762
20	Base vs. Bord	2.781191	0.005416	0.00625
19	ADASYN vs. SMOTE+ENN	2.755676	0.005857	0.00625
18	Base vs. SMOTE	2.679129	0.007381	0.00625
17	ADASYN vs. SMOTE	2.679129	0.009252	0.00625
16	Base vs. SMOTE+ENN	2.602583	0.009964	0.006667
15	ADASYN vs. Bord	2.577067	0.028211	0.007143
14	NCL vs. SMOTE+ENN	2.194335	0.034193	0.007692
13	SMOTE vs. NCL	2.117788	0.036414	0.008333
12	NCL vs. CCR	2.092272	0.043829	0.009091
11	Bord vs. NCL	2.015726	0.059006	0.01
10	ADASYN vs. SMOTE+TL	1.888148	0.125786	0.01111
9	ADASYN vs. CCR	1.530931	0.184573	0.0125
8	NCL vs. SMOTE+TL	1.326807	0.385653	0.014286
7	SMOTE+TL vs. SMOTE+ENN	0.867528	0.428955	0.016667
6	SMOTE vs. SMOTE+TL	0.790981	0.490874	0.02
5	Bord vs. SMOTE+TL	0.688919	0.574565	0.025
4	ADASYN vs. NCL	0.561341	0.858245	0.033333
3	Bord vs. SMOTE+ENN	0.178609	0.918707	0.05
2	SMOTE vs. Bord	0.102062	0.938984	0.1
1	SMOTE vs. SMOTE+ENN	0.076547		

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_{Shelf}
1	Base vs .CCR	0	0
2	Base vs .ADASYN	0	0.000002
3	Base vs .NCL	0.000002	0.000034
4	SMOTE+ENN vs .CCR	0.000018	0.000381
5	SMOTE vs .CCR	0.000026	0.000536
6	Bord vs .CCR	0.00004	0.000838
7	Base vs .SMOTE+TL	0.00052	0.010925
8	SMOTE+TL vs .CCR	0.000628	0.013195
9	Base vs .Bord	0.005416	0.086656
10	ADASYN vs .SMOTE+ENN	0.005857	0.093714
11	Base vs .SMOTE	0.007381	0.118102
12	ADASYN vs .SMOTE	0.007381	0.118102
13	Base vs .SMOTE+ENN	0.009252	0.148039
14	ADASYN vs .Bord	0.009964	0.149464
15	NCL vs .SMOTE+ENN	0.028211	0.366748
16	SMOTE vs .NCL	0.034193	0.444509
17	NCL vs .CCR	0.036414	0.444509
18	Bord vs .NCL	0.043829	0.482115
19	ADASYN vs .SMOTE+TL	0.059006	0.59006
20	ADASYN vs .CCR	0.125786	1.132078
21	NCL vs .SMOTE+TL	0.184573	1.47658
22	SMOTE+TL vs .SMOTE+ENN	0.385653	2.699571
23	SMOTE vs .SMOTE+TL	0.428955	2.699571
24	Bord vs .SMOTE+TL	0.490874	2.699571
25	ADASYN vs .NCL	0.574565	2.699571
26	Bord vs .SMOTE+ENN	0.858245	2.699571
27	SMOTE vs .Bord	0.918707	2.699571
28	SMOTE vs .SMOTE+ENN	0.938984	2.699571

Table 4: Adjusted p -values