

Output tables for the test of Multiple comparisons.

December 21, 2011

1 Average rankings of Friedman test

Average ranks obtained by applying the Friedman procedure

Algorithm	Ranking
Self-Training (C45)	4.4727
Self-Training (SMO)	4.9659
Co-Training (SMO)	4.4159
Democratic-Co	4.2295
TriTraining (C45)	3.9455
TriTraining (SMO)	4.8023
Co-Bagging (C45)	4.2727
Co-Bagging (SMO)	4.8955

Table 1: Average Rankings of the algorithms

Friedman statistic considering reduction performance (distributed according to chi-square with 7 degrees of freedom: 33.181818).

P-value computed by Friedman Test: 2.4489291586160533E-5.

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	Holm	Shaffer
28	Self-Training (SMO) vs. TriTraining (C45)	4.369325	0.000012	0.001786	0.001786
27	TriTraining (C45) vs. Co-Bagging (SMO)	4.067657	0.000047	0.001852	0.002381
26	TriTraining (C45) vs. TriTraining (SMO)	3.668676	0.000244	0.001923	0.002381
25	Self-Training (SMO) vs. Democratic-Co	3.152921	0.001616	0.002	0.002381
24	Self-Training (SMO) vs. Co-Bagging (C45)	2.968027	0.002997	0.002083	0.002381
23	Democratic-Co vs. Co-Bagging (SMO)	2.851252	0.004355	0.002174	0.002381
22	Co-Bagging (C45) vs. Co-Bagging (SMO)	2.666359	0.007668	0.002273	0.002381
21	Democratic-Co vs. TriTraining (SMO)	2.452272	0.014196	0.002381	0.002381
20	Self-Training (SMO) vs. Co-Training (SMO)	2.354959	0.018525	0.0025	0.0025
19	TriTraining (SMO) vs. Co-Bagging (C45)	2.267378	0.023367	0.002632	0.002632
18	Self-Training (C45) vs. TriTraining (C45)	2.257647	0.023968	0.002778	0.002778
17	Self-Training (C45) vs. Self-Training (SMO)	2.111678	0.034714	0.002941	0.002941
16	Co-Training (SMO) vs. Co-Bagging (SMO)	2.053291	0.040044	0.003125	0.003125
15	Co-Training (SMO) vs. TriTraining (C45)	2.014366	0.043971	0.003333	0.003333
14	Self-Training (C45) vs. Co-Bagging (SMO)	1.81001	0.070294	0.003571	0.003571
13	Co-Training (SMO) vs. TriTraining (SMO)	1.65431	0.098064	0.003846	0.003846
12	Self-Training (C45) vs. TriTraining (SMO)	1.411029	0.158236	0.004167	0.004167
11	TriTraining (C45) vs. Co-Bagging (C45)	1.401298	0.161125	0.004545	0.004545
10	Democratic-Co vs. TriTraining (C45)	1.216405	0.223831	0.005	0.005
9	Self-Training (C45) vs. Democratic-Co	1.041242	0.297763	0.005556	0.005556
8	Self-Training (C45) vs. Co-Bagging (C45)	0.856349	0.391805	0.00625	0.00625
7	Co-Training (SMO) vs. Democratic-Co	0.797961	0.424893	0.007143	0.007143
6	Self-Training (SMO) vs. TriTraining (SMO)	0.700649	0.483522	0.008333	0.008333
5	Co-Training (SMO) vs. Co-Bagging (C45)	0.613068	0.539831	0.01	0.01
4	TriTraining (SMO) vs. Co-Bagging (SMO)	0.398981	0.689907	0.0125	0.0125
3	Self-Training (SMO) vs. Co-Bagging (SMO)	0.301668	0.762905	0.016667	0.016667
2	Self-Training (C45) vs. Co-Training (SMO)	0.243281	0.807788	0.025	0.025
1	Democratic-Co vs. Co-Bagging (C45)	0.184893	0.853313	0.05	0.05

Table 2: P-values Table for $\alpha = 0.05$

Holm's procedure rejects those hypotheses that have a p-value ≤ 0.002083 .
Shaffer's procedure rejects those hypotheses that have a p-value ≤ 0.001786 .
Bergmann's procedure rejects these hypotheses:

- Self-Training (SMO) vs. Democratic-Co
- Self-Training (SMO) vs. TriTraining (C45)
- Self-Training (SMO) vs. Co-Bagging (C45)
- TriTraining (C45) vs. TriTraining (SMO)
- TriTraining (C45) vs. Co-Bagging (SMO)

2.2 P-values for $\alpha = 0.10$

i	algorithms	$z = (R_0 - R_i)/SE$	p	Holm	Shaffer
28	Self-Training (SMO) vs. TriTraining (C45)	4.369325	0.000012	0.003571	0.003571
27	TriTraining (C45) vs. Co-Bagging (SMO)	4.067657	0.000047	0.003704	0.004762
26	TriTraining (C45) vs. TriTraining (SMO)	3.668676	0.000244	0.003846	0.004762
25	Self-Training (SMO) vs. Democratic-Co	3.152921	0.001616	0.004	0.004762
24	Self-Training (SMO) vs. Co-Bagging (C45)	2.968027	0.002997	0.004167	0.004762
23	Democratic-Co vs. Co-Bagging (SMO)	2.851252	0.004355	0.004348	0.004762
22	Co-Bagging (C45) vs. Co-Bagging (SMO)	2.666359	0.007668	0.004545	0.004762
21	Democratic-Co vs. TriTraining (SMO)	2.452272	0.014196	0.004762	0.004762
20	Self-Training (SMO) vs. Co-Training (SMO)	2.354959	0.018525	0.005	0.005
19	TriTraining (SMO) vs. Co-Bagging (C45)	2.267378	0.023367	0.005263	0.005263
18	Self-Training (C45) vs. TriTraining (C45)	2.257647	0.023968	0.005556	0.005556
17	Self-Training (C45) vs. Self-Training (SMO)	2.111678	0.034714	0.005882	0.005882
16	Co-Training (SMO) vs. Co-Bagging (SMO)	2.053291	0.040044	0.00625	0.00625
15	Co-Training (SMO) vs. TriTraining (C45)	2.014366	0.043971	0.006667	0.006667
14	Self-Training (C45) vs. Co-Bagging (SMO)	1.81001	0.070294	0.007143	0.007143
13	Co-Training (SMO) vs. TriTraining (SMO)	1.65431	0.098064	0.007692	0.007692
12	Self-Training (C45) vs. TriTraining (SMO)	1.411029	0.158236	0.008333	0.008333
11	TriTraining (C45) vs. Co-Bagging (C45)	1.401298	0.161125	0.009091	0.009091
10	Democratic-Co vs. TriTraining (C45)	1.216405	0.223831	0.01	0.01
9	Self-Training (C45) vs. Democratic-Co	1.041242	0.297763	0.011111	0.011111
8	Self-Training (C45) vs. Co-Bagging (C45)	0.856349	0.391805	0.0125	0.0125
7	Co-Training (SMO) vs. Democratic-Co	0.797961	0.424893	0.014286	0.014286
6	Self-Training (SMO) vs. TriTraining (SMO)	0.700649	0.483522	0.016667	0.016667
5	Co-Training (SMO) vs. Co-Bagging (C45)	0.613068	0.539831	0.02	0.02
4	TriTraining (SMO) vs. Co-Bagging (SMO)	0.398981	0.689907	0.025	0.025
3	Self-Training (SMO) vs. Co-Bagging (SMO)	0.301668	0.762905	0.033333	0.033333
2	Self-Training (C45) vs. Co-Training (SMO)	0.243281	0.807788	0.05	0.05
1	Democratic-Co vs. Co-Bagging (C45)	0.184893	0.853313	0.1	0.1

Table 3: P-values Table for $\alpha = 0.10$

Holm's procedure rejects those hypotheses that have a p-value ≤ 0.004348 .

Shaffer's procedure rejects those hypotheses that have a p-value ≤ 0.003571 .

Bergmann's procedure rejects these hypotheses:

- Self-Training (SMO) vs. Democratic-Co

- Self-Training (SMO) vs. TriTraining (C45)
- Self-Training (SMO) vs. Co-Bagging (C45)
- Democratic-Co vs. Co-Bagging (SMO)
- TriTraining (C45) vs. TriTraining (SMO)
- TriTraining (C45) vs. Co-Bagging (SMO)
- Co-Bagging (C45) vs. Co-Bagging (SMO)

2.3 Adjusted p-values

i	hypothesis	unadjusted p	p_{Holm}	p_{Shaf}	p_{Berg}
1	Self-Training (SMO) vs .TriTraining (C45)	0.000012	0.000349	0.000349	0.000349
2	TriTraining (C45) vs .Co-Bagging (SMO)	0.000047	0.001282	0.000997	0.000997
3	TriTraining (C45) vs .TriTraining (SMO)	0.000244	0.006339	0.00512	0.003901
4	Self-Training (SMO) vs .Democratic-Co	0.001616	0.040411	0.033946	0.033946
5	Self-Training (SMO) vs .Co-Bagging (C45)	0.002997	0.071932	0.062941	0.047955
6	Democratic-Co vs .Co-Bagging (SMO)	0.004355	0.100159	0.09145	0.065321
7	Co-Bagging (C45) vs .Co-Bagging (SMO)	0.007668	0.168691	0.161023	0.084346
8	Democratic-Co vs .TriTraining (SMO)	0.014196	0.298111	0.298111	0.156153
9	Self-Training (SMO) vs .Co-Training (SMO)	0.018525	0.370495	0.298111	0.240822
10	TriTraining (SMO) vs .Co-Bagging (C45)	0.023367	0.443976	0.373874	0.240822
11	Self-Training (C45) vs .TriTraining (C45)	0.023968	0.443976	0.383483	0.31158
12	Self-Training (C45) vs .Self-Training (SMO)	0.034714	0.590139	0.555425	0.416569
13	Co-Training (SMO) vs .Co-Bagging (SMO)	0.040044	0.64071	0.64071	0.416569
14	Co-Training (SMO) vs .TriTraining (C45)	0.043971	0.659567	0.659567	0.416569
15	Self-Training (C45) vs .Co-Bagging (SMO)	0.070294	0.984119	0.913825	0.421765
16	Co-Training (SMO) vs .TriTraining (SMO)	0.098064	1.274838	1.274838	0.686451
17	Self-Training (C45) vs .TriTraining (SMO)	0.158236	1.898832	1.898832	0.79118
18	TriTraining (C45) vs .Co-Bagging (C45)	0.161125	1.898832	1.898832	1.127875
19	Democratic-Co vs .TriTraining (C45)	0.223831	2.238308	2.238308	1.566816
20	Self-Training (C45) vs .Democratic-Co	0.297763	2.679868	2.679868	2.679868
21	Self-Training (C45) vs .Co-Bagging (C45)	0.391805	3.134439	3.134439	2.679868
22	Co-Training (SMO) vs .Democratic-Co	0.424893	3.134439	3.134439	2.679868
23	Self-Training (SMO) vs .TriTraining (SMO)	0.483522	3.134439	3.134439	2.679868
24	Co-Training (SMO) vs .Co-Bagging (C45)	0.539831	3.134439	3.134439	2.679868
25	TriTraining (SMO) vs .Co-Bagging (SMO)	0.689907	3.134439	3.134439	2.679868
26	Self-Training (SMO) vs .Co-Bagging (SMO)	0.762905	3.134439	3.134439	2.679868
27	Self-Training (C45) vs .Co-Training (SMO)	0.807788	3.134439	3.134439	2.679868
28	Democratic-Co vs .Co-Bagging (C45)	0.853313	3.134439	3.134439	2.679868

Table 4: Adjusted p -values