Results

May 1, 2015

1 Tables of Friedman, Bonferroni-Dunn, Holm, Hochberg and Hommel Tests

Table 1: Average Rankings of the algorithms

Algorithm	Ranking
Carter96	2.076923076923077
Burke2008	3.653846153846154
Pillay2010	1.6153846153846154
Demeester2012	3.9230769230769234
Leite2014	4.615384615384616
cMA	5.115384615384617

Friedman statistic considering reduction performance (distributed according to chi-square with 5 degrees of freedom: 35.78021978021988. P-value computed by Friedman Test: 1.050990159456866E-6.

Iman and Davenport statistic considering reduction performance (distributed according to F-distribution with 5 and 60 degrees of freedom: 14.694245957126832.

P-value computed by Iman and Daveport Test: 2.1362155377957492E-9.

Table 2: Holm / Hochberg Table for $\alpha = 0.05$

i	algorithm	$z = (R_0 - R_i)/SE$	p	Holm/Hochberg/Hommel
5	cMA	4.769696007084731	1.8450413963675326E-6	0.01
4	Leite2014	4.088310863215482	4.345256153460218E-5	0.0125
3	Demeester2012	3.1448545101657555	0.0016616944579835413	0.016666666666666666
2	Burke2008	2.777954817313084	0.005470222416491894	0.025
1	Carter96	0.6289709020331512	0.5293681061847978	0.05

Bonferroni-Dunn's procedure rejects those hypotheses that have a p-value ≤ 0.01.
Holm's procedure rejects those hypotheses that have a p-value ≤ 0.05.
Hochberg's procedure rejects those hypotheses that have a p-value ≤ 0.025.
Hommel's procedure rejects those hypotheses that have a p-value ≤ 0.05.

Table 3: Holm / Hochberg Table for $\alpha = 0.10$

i	algorithm	$z = (R_0 - R_i)/SE$	p	Holm/Hochberg/Hommel
5	cMA	4.769696007084731	1.8450413963675326E-6	0.02
4	Leite2014	4.088310863215482	4.345256153460218E-5	0.025
3	Demeester2012	3.1448545101657555	0.0016616944579835413	0.03333333333333333
2	Burke2008	2.777954817313084	0.005470222416491894	0.05
1	Carter96	0.6289709020331512	0.5293681061847978	0.1

Bonferroni-Dunn's procedure rejects those hypotheses that have a p-value ≤ 0.02.
Holm's procedure rejects those hypotheses that have a p-value ≤ 0.1.
Hochberg's procedure rejects those hypotheses that have a p-value ≤ 0.05.
Hommel's procedure rejects those hypotheses that have a p-value ≤ 0.05.
Nemenyi's procedure rejects those hypotheses that have a p-value $\leq 0.0033333333333333335$.
Holm's procedure rejects those hypotheses that have a p-value ≤ 0.005.
Shaffer's procedure rejects those hypotheses that have a p-value $\leq 0.0033333333333333335$.
Bergmann's procedure rejects these hypotheses:

- Carter96 vs. Demeester2012

Table 4: Adjusted p-values

i	algorithm	unadjusted p	p_{Bonf}	p_{Holm}	p_{Hoch}	p_{Homm}
1	cMA	1.8450413963675326E-6	9.225206981837662E-6	9.225206981837662E-6	9.225206981837662E-6	9.225206981837662E-
2	Leite2014	4.345256153460218E-5	2.1726280767301O9E-4	1.7381024613840872E-4	1.7381024613840872E-4	1.7381024613840872E
3	Demeester2012	0.0016616944579835413	0.008308472289917707	0.0049850833739506235	0.0049850833739506235	0.004985083373950625
4	Burke2008	0.005470222416491894	0.02735111208245947	0.010940444832983788	0.010940444832983788	0.010940444832983787
5	Carter96	0.5293681061847978	2.646840530923989	0.5293681061847978	0.5293681061847978	0.5293681061847978

Table 5: Holm / Shaffer Table for $\alpha = 0.05$

i	algorithms	$z = (R_0 - R_i)/SE$	p	Holm	Shaffer
15	Pillay2010 vs. cMA	4.769696007084731	1.8450413963675326E-6	0.0033333333333333335	0.0033333333333333335
14	Carter96 vs. cMA	4.140725105051579	3.462096653738529E-5	0.003571428571428571	0.005
13	Pillay2010 vs. Leite2014	4.088310863215482	4.345256153460218E-5	0.0038461538461538464	0.005
12	Carter96 vs. Leite2014	3.459339961182331	5.415009668765365E-4	0.004166666666666667	0.005
11	Pillay2010 vs. Demeester2012	3.1448545101657555	0.0016616944579835413	0.004545454545454546	0.005
10	Burke2008 vs. Pillay2010	2.777954817313084	0.005470222416491894	0.005	0.005
9	Carter96 vs. Demeester2012	2.5158836081326044	0.011873438666086597	0.005555555555555556	0.005555555555555556
8	Carter96 vs. Burke2008	2.148983915279933	0.03163567500820535	0.00625	0.00625
7	Burke2008 vs. cMA	1.9917411897716464	0.0463994618709045	0.007142857142857143	0.007142857142857143
6	Demeester2012 vs. cMA	1.624841496918975	0.10419633646761332	0.008333333333333333	0.008333333333333333
5	Burke2008 vs. Leite2014	1.3103560459023982	0.1900754156561007	0.01	0.01
4	Demeester2012 vs. Leite2014	0.9434563530497269	0.34544753046922566	0.0125	0.0125
3	Leite2014 vs. cMA	0.6813851438692482	0.4956278206547915	0.016666666666666666	0.016666666666666666
2	Carter96 vs. Pillay2010	0.6289709020331512	0.5293681061847978	0.025	0.025
1	Burke2008 vs. Demeester2012	0.3668996928526713	0.7136938405688268	0.05	0.05

- Carter96 vs. Leite2014
- Carter96 vs. cMA
- Burke2008 vs. Pillay2010
- Pillay2010 vs. Demeester2012
- Pillay2010 vs. Leite2014
- Pillay2010 vs. cMA

Table 6: Holm / Shaffer Table for $\alpha = 0.10$

i	algorithms	$z = (R_0 - R_i)/SE$	p	Holm	Shaffer
15	Pillay2010 vs. cMA	4.769696007084731	1.8450413963675326E-6	0.006666666666666667	0.006666666666666667
14	Carter96 vs. cMA	4.140725105051579	3.462096653738529E-5	0.007142857142857143 5	0.01
13	Pillay2010 vs. Leite2014	4.088310863215482	4.345256153460218E-5	0.007692307692307693	0.01
12	Carter96 vs. Leite2014	3.459339961182331	5.415009668765365E-4	0.008333333333333333	0.01
11	Pillay2010 vs. Demeester2012	3.1448545101657555	0.0016616944579835413	0.009090909090909092	0.01
10	Burke2008 vs. Pillay2010	2.777954817313084	0.005470222416491894	0.01	0.01
9	Carter96 vs. Demeester2012	2.5158836081326044	0.011873438666086597	0.011111111111111112	0.014285714285714287
8	Carter96 vs. Burke2008	2.148983915279933	0.03163567500820535	0.0125	0.014285714285714287
7	Burke2008 vs. cMA	1.9917411897716464	0.0463994618709045	0.014285714285714287	0.014285714285714287
6	Demeester2012 vs. cMA	1.624841496918975	0.10419633646761332	0.016666666666666666	0.016666666666666666
5	Burke2008 vs. Leite2014	1.3103560459023982	0.1900754156561007	0.02	0.02
4	Demeester2012 vs. Leite2014	0.9434563530497269	0.34544753046922566	0.025	0.025
3	Leite2014 vs. cMA	0.6813851438692482	0.4956278206547915	0.03333333333333333	0.03333333333333333
2	Carter96 vs. Pillay2010	0.6289709020331512	0.5293681061847978	0.05	0.05
1	Burke2008 vs. Demeester2012	0.3668996928526713	0.7136938405688268	0.1	0.1

Nemenyi's procedure rejects those hypotheses that have a p-value $\leq 0.006666666666666667$.
Holm's procedure rejects those hypotheses that have a p-value $\leq 0.011111111111111112$.
Shaffer's procedure rejects those hypotheses that have a p-value $\leq 0.006666666666666667$.
Bergmann's procedure rejects these hypotheses:

- Carter96 vs. Demeester2012
- Carter96 vs. Leite2014

- Carter96 vs. cMA
- Burke2008 vs. Pillay2010
- Pillay2010 vs. Demeester2012
- Pillay2010 vs. Leite2014
- Pillay2010 vs. cMA

Table 7: Adjusted p-values

i	hypothesis	unadjusted p	p_{Neme}	p_{Holm}	p_{Shaf}	p_{Berg}
1	Pillay2010 vs .cMA	1.8450413963675326E-6	2.767562094551299E-5	2.767562094551299E-5	2.767562094551299E-5	2.767562094551299E-5
2	Carter96 vs .cMA	3.462096653738529E-5	5.193144980607794E-4	4.84693531523394E-4	3.462096653738529E-4	3.462096653738529E-4
3	Pillay2010 vs .Leite2014	4.345256153460218E-5	6.517884230190327E-4	5.648832999498283E-4	4.345256153460218E-4	4.345256153460218E-4
4	Carter96 vs .Leite2014	5.415009668765365E-4	0.008122514503148048	0.006498011602518438	0.005415009668765365	0.003249005801259219
5	Pillay2010 vs .Demeester2012	0.0016616944579835413	0.02492541686975312	0.018278639037818956	0.016616944579835414	0.011631861205884789
6	Burke2008 vs .Pillay2010	0.005470222416491894	0.08205333624737841	0.05470222416491894	0.05470222416491894	0.03282133449895137
7	Carter96 vs .Demeester2012	0.011873438666086597	0.17810157999129897	0.10686094799477938	0.0831140706626061 8	0.04749375466434639
8	Carter96 vs .Burke2008	0.03163567500820535	0.4745351251230802	0.2530854000656428	0.2214497250574374 3	0.1265427000328214
9	Burke2008 vs .cMA	0.0463994618709045	0.6959919280635675	0.3247962330963315	0.3247962330963315	0.3247962330963315
10	Demeester2012 vs .cMA	0.10419633646761332	1.5629450470142	0.6251780188056799	0.6251780188056799	0.4167853458704533
11	Burke2008 vs .Leite2014	0.1900754156561007	2.8511312348415103	0.9503770782805034	0.7603016626244028	0.7603016626244028
12	Demeester2012 vs .Leite2014	0.34544753046922566	5.181712957038385	1.3817901218769026	1.3817901218769026	0.7603016626244028
13	Leite2014 vs .cMA	0.4956278206547915	7.434417309821873	1.4868834619643745	1.4868834619643745	1.4868834619643745
14	Carter96 vs .Pillay2010	0.5293681061847978	7.940521592771967	1.4868834619643745	1.4868834619643745	1.4868834619643745
15	Burke2008 vs .Demeester2012	0.7136938405688268	10.705407608532402	1.4868834619643745	1.4868834619643745	1.4868834619643745