Results

April 9, 2019

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

Table 1: Average Rankings of the algorithms

Algorithm	Ranking
Col09	4.083333333333333
Byk13	1.333333333333333
Ham13	5.916666666666667
Bat17	3.0833333333333335
Lei18	6.25
Lei19	3.2499999999999996
FastTA100	4.083333333333334

Friedman statistic considering reduction performance (distributed according to chi-square with 6 degrees of freedom: 44.39285714285714.
P-value computed by Friedman Test: 6.180354372720132E-8.

Iman and Davenport statistic considering reduction performance (distributed according to F-distribution with 6 and 66 degrees of freedom: 17.6882276843467.

P-value computed by Iman and Daveport Test: 4.286370095923383E-12.

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

i	algorithm	$z = (R_0 - R_i)/SE$	p	Holm/Hochberg/Hommel
6	Lei18	5.574975976886102	2.475640265119869E-8	0.008333333333333333
5	Ham13	5.197011503876875	2.0251783526784238E-7	0.01
4	FastTA100	3.1182069023261256	0.001819550195998104	0.0125
3	Col09	3.1182069023261247	0.0018195501959981089	0.016666666666666666
2	Lei19	2.1732957198030562	0.029758067435199213	0.025
1	Bat17	1.9843134832984435	0.04722090400357716	0.05

Bonferroni-Dunn's procedure rejects those hypotheses that have a p-value $\leq 0.008333333333333333$.
Holm's procedure rejects those hypotheses that have a p-value ≤ 0.025.
Hochberg's procedure rejects those hypotheses that have a p-value ≤ 0.05.
Hommel's procedure rejects all hypotheses.

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

i	algorithm	$z = (R_0 - R_i)/SE$	p	Holm/Hochberg/Hommel
6	Lei18	5.574975976886102	2.475640265119869E-8	0.016666666666666666
5	Ham13	5.197011503876875	2.0251783526784238E-7	0.02
4	FastTA100	3.1182069023261256	0.001819550195998104	0.025
3	Col09	3.1182069023261247	0.0018195501959981089	0.03333333333333333
2	Lei19	2.1732957198030562	0.029758067435199213	0.05
1	Bat17	1.9843134832984435	0.04722090400357716	0.1

Bonferroni-Dunn's procedure rejects those hypotheses that have a p-value $\leq 0.016666666666666666$.
Hochberg's procedure rejects those hypotheses that have a p-value ≤ 0.1.
Hommel's procedure rejects all hypotheses.
Nemenyi's procedure rejects those hypotheses that have a p-value $\leq 0.002380952380952381$.
Holm's procedure rejects those hypotheses that have a p-value $\leq 0.0038461538461538464$.
Shaffer's procedure rejects those hypotheses that have a p-value $\leq 0.002380952380952381$.

Table 4: Adjusted p-values

i	algorithm	unadjusted p	p_{Bonf}	p_{Holm}	p_{Hoch}	p_{Homm}
1	Lei18	2.475640265119869E-8	1.4853841590719214E-7	1.4853841590719214E-7	1.4853841590719214E-7	1.4853841590719214E-7
2	Ham13	2.0251783526784238E-7	1.2151070116070543E-6	1.0125891763392119E-6	1.0125891763392119E-6	1.0125891763392119E-6
3	FastTA100	0.001819550195998104	0.010917301175988624	0.007278200783992416	0.005458650587994327	0.005458650587994312
4	Col09	0.0018195501959981089	0.010917301175988653	0.007278200783992416	0.005458650587994327	0.005458650587994327
5	Lei19	0.029758067435199213	0.17854840461119528	0.059516134870398425	0.04722090400357716	0.04722090400357716
6	Bat17	0.04722090400357716	0.283325424021463	0.059516134870398425	0.04722090400357716	0.04722090400357716

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

i	algorithms	$z = (R_0 - R_i)/SE$	p	Holm	Shaffer
21	Byk13 vs. Lei18	5.574975976886102	2.475640265119869E-8	0.002380952380952381	0.002380952380952381
20	Byk13 vs. Ham13	5.197011503876875	2.0251783526784238E-7	0.0025	0.003333333333333335
19	Bat17 vs. Lei18	3.5906624935876583	3.298385207779531E-4	0.002631578947368421	0.003333333333333335
18	Lei18 vs. Lei19	3.4016802570830453	6.697294490218119E-4	0.002777777777777778	0.003333333333333335
17	Ham13 vs. Bat17	3.2126980205784315	0.0013149446697132393	0.0029411764705882353	0.003333333333333335
16	Byk13 vs. FastTA100	3.1182069023261256	0.001819550195998104	0.003125	0.003333333333333335
15	Col09 vs. Byk13	3.1182069023261247	0.0018195501959981089	0.003333333333333335	0.003333333333333335
14	Ham13 vs. Lei19	3.0237157840738185	0.0024969089151415857	0.003571428571428571	0.004545454545454546
13	Col09 vs. Lei18	2.4567690745599773	0.014019277113959897	0.0038461538461538464	0.004545454545454546
12	Lei18 vs. FastTA100	2.4567690745599764	0.014019277113959934	0.004166666666666667	0.004545454545454546
11	Byk13 vs. Lei19	2.1732957198030562	0.029758067435199213	0.004545454545454546	0.004545454545454546
10	Col09 vs. Ham13	2.0788046015507504	0.03763531378731429	0.005	0.005
9	Ham13 vs. FastTA100	2.0788046015507495	0.03763531378731435	0.005555555555555556	0.005555555555555556
8	Byk13 vs. Bat17	1.9843134832984435	0.04722090400357716	0.00625	0.00625
7	Bat17 vs. FastTA100	1.1338934190276821	0.2568392579578565	0.007142857142857143	0.007142857142857143
6	Col09 vs. Bat17	1.1338934190276813	0.2568392579578568	0.008333333333333333	0.008333333333333333
5	Lei19 vs. FastTA100	0.9449111825230693	0.34470422200695705	0.01	0.01
4	Col09 vs. Lei19	0.9449111825230683	0.34470422200695755	0.0125	0.0125
3	Ham13 vs. Lei18	0.37796447300922686	0.7054569861112736	0.016666666666666666	0.016666666666666666
2	Bat17 vs. Lei19	0.18898223650461293	0.8501067391385262	0.025	0.025
1	Col09 vs. FastTA100	1.0070996650203782E-15	0.9999999999999992	0.05	0.05

Bergmann's procedure rejects these hypotheses:

- Col09 vs. Byk13
- Byk13 vs. Ham13
- Byk13 vs. Lei18
- Byk13 vs. FastTA100
- Ham13 vs. Bat17
- Ham13 vs. Lei19
- Bat17 vs. Lei18
- Lei18 vs. Lei19

Nemenyi's procedure rejects those hypotheses that have a p-value $\leq 0.004761904761904762$.
Holm's procedure rejects those hypotheses that have a p-value $\leq 0.007692307692307693$.
Shaffer's procedure rejects those hypotheses that have a p-value $\leq 0.004761904761904762$.
Bergmann's procedure rejects these hypotheses:

- Col09 vs. Byk13
- Byk13 vs. Ham13
- Byk13 vs. Lei18
- Byk13 vs. FastTA100
- Ham13 vs. Bat17
- Ham13 vs. Lei19

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

i	algorithms	$z = (R_0 - R_i)/SE$	p	Holm	Shaffer
21	Byk13 vs. Lei18	5.574975976886102	2.475640265119869E-8	0.004761904761904762	0.004761904761904762
20	Byk13 vs. Ham13	5.197011503876875	2.0251783526784238E-7	0.005	0.006666666666666667
19	Bat17 vs. Lei18	3.5906624935876583	3.298385207779531E-4	0.005263157894736842	0.006666666666666667
18	Lei18 vs. Lei19	3.4016802570830453	6.697294490218119E-4	0.005555555555555556	0.006666666666666667
17	Ham13 vs. Bat17	3.2126980205784315	0.0013149446697132393	0.005882352941176471	0.006666666666666667
16	Byk13 vs. FastTA100	3.1182069023261256	0.001819550195998104	0.00625	0.006666666666666667
15	Col09 vs. Byk13	3.1182069023261247	0.0018195501959981089	0.006666666666666667	0.006666666666666667
14	Ham13 vs. Lei19	3.0237157840738185	0.0024969089151415857	0.007142857142857143	0.009090909090909092
13	Col09 vs. Lei18	2.4567690745599773	0.014019277113959897	0.007692307692307693	0.009090909090909092
12	Lei18 vs. FastTA100	2.4567690745599764	0.014019277113959934	0.008333333333333333	0.009090909090909092
11	Byk13 vs. Lei19	2.1732957198030562	0.029758067435199213	0.009090909090909092	0.009090909090909092
10	Col09 vs. Ham13	2.0788046015507504	0.03763531378731429	0.01	0.01
9	Ham13 vs. FastTA100	2.0788046015507495	0.03763531378731435	0.011111111111111112	0.011111111111111112
8	Byk13 vs. Bat17	1.9843134832984435	0.04722090400357716	0.0125	0.0125
7	Bat17 vs. FastTA100	1.1338934190276821	0.2568392579578565	0.014285714285714287	0.014285714285714287
6	Col09 vs. Bat17	1.1338934190276813	0.2568392579578568	0.016666666666666666	0.016666666666666666
5	Lei19 vs. FastTA100	0.9449111825230693	0.34470422200695705	0.02	0.02
4	Col09 vs. Lei19	0.9449111825230683	0.34470422200695755	0.025	0.025
3	Ham13 vs. Lei18	0.37796447300922686	0.7054569861112736	0.03333333333333333	0.03333333333333333
2	Bat17 vs. Lei19	0.18898223650461293	0.8501067391385262	0.05	0.05
1	Col09 vs. FastTA100	1.0070996650203782E-15	0.9999999999999992	0.1	0.1

- Bat17 vs. Lei18
- Lei18 vs. Lei19

Table 7: Adjusted p-values

i	hypothesis	unadjusted p	p_{Neme}	p_{Holm}	p_{Shaf}	p_{Berg}
1	Byk13 vs .Lei18	2.475640265119869E-8	5.198844556751725E-7	5.198844556751725E-7	5.198844556751725E-7	5.198844556751725E-7
2	Byk13 vs .Ham13	2.0251783526784238E-7	4.25287454062469E-6	4.0503567053568475E-6	3.037767290176354E-6	3.037767290176354E-6
3	Bat17 vs .Lei18	3.298385207779531E-4	0.006926608936337015	0.0062669318947811085	0.004947577811669297	0.004947577811669297
4	Lei18 vs .Lei19	6.697294490218119E-4	0.01406431842945805	0.012055130082392614	0.010045941735327179	0.00736702393923993 1
5	Ham13 vs .Bat17	0.0013149446697132393	0.027613838063978026	0.022354059385125066	0.0197241700456985 9	0.013149446697132392
6	Byk13 vs .FastTA100	0.001819550195998104	0.03821055411596019	0.029112803135969666	0.027293252939971563	0.020015052155979145
7	Col09 vs .Byk13	0.0018195501959981089	0.038210554115960284	0.029112803135969666	0.027293252939971632	0.020015052155979145
8	Ham13 vs .Lei19	0.0024969089151415857	0.0524350872179733	0.0349567248119822	0.027465998066557442	0.020015052155979145
9	Col09 vs .Lei18	0.014019277113959897	0.2944048193931578	0.18225060248147867	0.15421204825355886	0.12617349402563907
10	Lei18 vs .FastTA100	0.014019277113959934	0.2944048193931586	0.18225060248147867	0.15421204825355928	0.12617349402563907
11	Byk13 vs .Lei19	0.029758067435199213	0.6249194161391834	0.32733874178719136	0.32733874178719136	0.17854840461119528
12	Col09 vs .Ham13	0.03763531378731429	0.7903415895336	0.37635313787314284	0.37635313787314284	0.17854840461119528
13	Ham13 vs .FastTA100	0.03763531378731435	0.7903415895336013	0.37635313787314284	0.37635313787314284	0.17854840461119528
14	Byk13 vs .Bat17	0.04722090400357716	0.9916389840751204	0.3777672320286173	0.37635313787314284	0.2361045200178858
15	Bat17 vs .FastTA100	0.2568392579578565	5.393624417114987	1.7978748057049956	1.7978748057049956	1.7978748057049956
16	Col09 vs .Bat17	0.2568392579578568	5.393624417114992	1.7978748057049956	1.7978748057049956	1.7978748057049956
17	Lei19 vs .FastTA100	0.34470422200695705	7.238788662146098	1.7978748057049956	1.7978748057049956	1.7978748057049956
18	Col09 vs .Lei19	0.34470422200695755	7.238788662146108	1.7978748057049956	1.7978748057049956	1.7978748057049956
19	Ham13 vs .Lei18	0.7054569861112736	14.814596708336746	2.116370958333821	2.116370958333821	2.116370958333821
20	Bat17 vs .Lei19	0.8501067391385262	17.85224152190905	2.116370958333821	2.116370958333821	2.116370958333821
21	Col09 vs .FastTA100	0.9999999999999992	20.999999999999982	2.116370958333821	2.116370958333821	2.116370958333821