AMEAN - Results

August 21, 2016

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

Table 1: Average Rankings of the algorithms

Algorithm	Ranking
IRS	7.0
EUCLIDEAN	3.0
CHEBYSHEV	5.2
KULLBACKLEIBLER	4.0
HELLINGER	2.2
TOTALVARIATION	1.0
CHISQUARE	5.6000000000000005

Friedman statistic considering reduction performance (distributed according to chi-square with 6 degrees of freedom: 28.114285714285725.
P-value computed by Friedman Test: 8.941845084886602E-5.

Iman and Davenport statistic considering reduction performance (distributed according to F-distribution with 6 and 24 degrees of freedom: 59.63636363636398.

P-value computed by Iman and Daveport Test: 3.071767760140587E-13.

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

i	algorithm	$z = (R_0 - R_i)/SE$	p	Holm/Hochberg/Hommel
6	IRS	4.3915503282684	1.1254527653880945E-5	0.008333333333333333
5	CHISQUARE	3.36685525167244	7.603058428726009E-4	0.01
4	CHEBYSHEV	3.07408522978788	0.0021114910066706385	0.0125
3	KULLBACKLEIBLER	2.1957751641342	0.028108040147151837	0.016666666666666666
2	EUCLIDEAN	1.4638501094227998	0.1432349075246697	0.025
1	HELLINGER	0.8783100656536801	0.379775474840949	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 $\leq 0.016666666666666666$.
Hochberg's procedure rejects those hypotheses that have a p-value ≤ 0.0125.
Hommel's procedure rejects those hypotheses that have a p-value $\leq 0.016666666666666666$.

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

i	algorithm	$z = (R_0 - R_i)/SE$	p	Holm/Hochberg/Hommel
6	IRS	4.3915503282684	1.1254527653880945E-5	0.016666666666666666
5	CHISQUARE	3.36685525167244	7.603058428726009E-4	0.02
4	CHEBYSHEV	3.07408522978788	0.0021114910066706385	0.025
3	KULLBACKLEIBLER	2.1957751641342	0.028108040147151837	0.03333333333333333
2	EUCLIDEAN	1.4638501094227998	0.1432349075246697	0.05
1	HELLINGER	0.8783100656536801	0.379775474840949	0.1

Bonferroni-Dunn's procedure rejects those hypotheses that have a p-value $\leq 0.016666666666666666$.
Holm's procedure rejects those hypotheses that have a p-value ≤ 0.05.
Hochberg's procedure rejects those hypotheses that have a p-value ≤ 0.03333333333333333.
Hommel's procedure rejects those hypotheses that have a p-value ≤ 0.025.
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 $\leq 0.0029411764705882353$.

Table 4: Adjusted p-values

i	algorithm	unadjusted p	p_{Bonf}	p_{Holm}	p_{Hoch}	p_{Homm}
1	IRS	1.1254527653880945E-5	6.752716592328567E-5	6.752716592328567E-5	6.752716592328567E-5	6.7527165923285
2	CHISQUARE	7.603058428726009E-4	0.004561835057235605	0.0038015292143630044	0.0038015292143630044	0.00380152921436
3	CHEBYSHEV	0.0021114910066706385	0.012668946040023832	0.008445964026682554	0.008445964026682554	0.0084459640266
4	KULLBACKLEIBLER	0.028108040147151837	0.16864824088291103	0.08432412044145551	0.08432412044145551	0.0843241204414
5	EUCLIDEAN	0.1432349075246697	0.8594094451480181	0.2864698150493394	0.2864698150493394	0.286469815049
6	HELLINGER	0.379775474840949	2.278652849045694	0.379775474840949	0.379775474840949	0.37977547484

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

i	algorithms	$z = (R_0 - R_i)/SE$	p	Holm	Shaffer
21	IRS vs. TOTALVARIATION	4.39155503282684	1.1254527653880945E-5	0.002380952380952381	0.00238095238095
20	IRS vs. HELLINGER	3.5132402626147194	4.4267698634329765E-4	0.0025	0.0033333333333
19	TOTALVARIATION vs. CHISQUARE	3.36685525167244	7.603058428726009E-4	0.002631578947368421	0.0033333333333
18	CHEBYSHEV vs. TOTALVARIATION	3.07408522978788	0.0021114910066706385	0.002777777777777778	0.0033333333333
17	IRS vs. EUCLIDEAN	2.9277002188455996	0.003414791178117856	0.0029411764705882353	0.0033333333333
16	HELLINGER vs. CHISQUARE	2.48854518601876	0.012826693645485394	0.003125	0.0033333333333
15	IRS vs. KULLBACKLEIBLER	2.1957751641342	0.028108040147151837	0.0033333333333333335	0.0033333333333
14	CHEBYSHEV vs. HELLINGER	2.1957751641342	0.028108040147151837	0.0035714285714285718	0.003571428571428
13	KULLBACKLEIBLER vs. TOTALVARIATION	2.1957751641342	0.028108040147151837	0.0038461538461538464	0.003846153846153
12	EUCLIDEAN vs. CHISQUARE	1.9030051422496401	0.05703987424905552	0.004166666666666667	0.004166666666666
11	EUCLIDEAN vs. CHEBYSHEV	1.61023512036508	0.10734653699381097	0.004545454545454546	0.004545454545454
10	EUCLIDEAN vs. TOTALVARIATION	1.4638501094227998	0.1432349075246697	0.005	0.005
9	IRS vs. CHEBYSHEV	1.3174650984805198	0.18768277253339644	0.005555555555555556	0.005555555555555
8	KULLBACKLEIBLER vs. HELLINGER	1.3174650984805198	0.18768277253339644	0.00625	0.00625
7	KULLBACKLEIBLER vs. CHISQUARE	1.1710800875382403	0.24156658696897265	0.007142857142857143	0.007142857142857
6	IRS vs. CHISQUARE	1.0246950765959595	0.30550708686125405	0.008333333333333333	0.008333333333333
5	CHEBYSHEV vs. KULLBACKLEIBLER	0.8783100656536801	0.379775474840949	0.01	0.01
4	HELLINGER vs. TOTALVARIATION	0.8783100656536801	0.379775474840949	0.0125	0.0125
3	EUCLIDEAN vs. KULLBACKLEIBLER	0.7319250547113999	0.46421431277103165	0.016666666666666666	0.016666666666666
2	EUCLIDEAN vs. HELLINGER	0.5855400437691198	0.5581846494226573	0.025	0.025
1	CHEBYSHEV vs. CHISQUARE	0.29277002188456025	0.7696979437812894	0.05	0.05

Shaffer's procedure rejects those hypotheses that have a p-value $\leq 0.002380952380952381$.
Bergmann's procedure rejects these hypotheses:

- IRS vs. EUCLIDEAN
- IRS vs. HELLINGER
- IRS vs. TOTALVARIATION
- CHEBYSHEV vs. TOTALVARIATION
- TOTALVARIATION vs. CHISQUARE

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

i	algorithms	$z = (R_0 - R_i)/SE$	p	Holm	Shaffer
21	IRS vs. TOTALVARIATION	4.3915503282684	1.1254527653880945E-5	0.004761904761904762	0.004761904761904762
20	IRS vs. HELLINGER	3.5132402626147194	4.4267698634329765E-4	0.005	0.006666666666666667
19	TOTALVARIATION vs. CHISQUARE	3.36685525167244	7.603058428726009E-4	0.005263157894736842	0.006666666666666667
18	CHEBYSHEV vs. TOTALVARIATION	3.07408522978788	0.0021114910066706385	0.005555555555555556	0.006666666666666667
17	IRS vs. EUCLIDEAN	2.9277002188455996	0.003414791178117856	0.005882352941176471	0.006666666666666667
16	HELLINGER vs. CHISQUARE	2.48854518601876	0.012826693645485394	0.00625	0.006666666666666667
15	IRS vs. KULLBACKLEIBLER	2.1957751641342	0.028108040147151837	0.006666666666666667	0.006666666666666667
14	CHEBYSHEV vs. HELLINGER	2.1957751641342	0.028108040147151837	0.007142857142857143	0.007142857142857143
13	KULLBACKLEIBLER vs. TOTALVARIATION	2.1957751641342	0.028108040147151837	0.007692307692307693	0.007692307692307693
12	EUCLIDEAN vs. CHISQUARE	1.9030051422496401	0.05703987424905552	0.008333333333333333	0.008333333333333333
11	EUCLIDEAN vs. CHEBYSHEV	1.61023512036508	0.10734653699381097	0.009090909090909092	0.009090909090909092
10	EUCLIDEAN vs. TOTALVARIATION	1.4638501094227998	0.1432349075246697	0.01	0.01
9	IRS vs. CHEBYSHEV	1.3174650984805198	0.18768277253339644	0.011111111111111112	0.011111111111111112
8	KULLBACKLEIBLER vs. HELLINGER	1.3174650984805198	0.18768277253339644	0.0125	0.0125
7	KULLBACKLEIBLER vs. CHISQUARE	1.1710800875382403	0.24156658696897265	0.014285714285714287	0.014285714285714287
6	IRS vs. CHISQUARE	1.0246950765959595	0.30550708686125405	0.016666666666666666	0.016666666666666666
5	CHEBYSHEV vs. KULLBACKLEIBLER	0.8783100656536801	0.379775474840949	0.02	0.02
4	HELLINGER vs. TOTALVARIATION	0.8783100656536801	0.379775474840949	0.025	0.025
3	EUCLIDEAN vs. KULLBACKLEIBLER	0.7319250547113999	0.46421431277103165	0.03333333333333333	0.03333333333333333
2	EUCLIDEAN vs. HELLINGER	0.5855400437691198	0.5581846494226573	0.05	0.05
1	CHEBYSHEV vs. CHISQUARE	0.29277002188456025	0.7696979437812894	0.1	0.1

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 ≤ 0.00625.
Shaffer's procedure rejects those hypotheses that have a p-value $\leq 0.004761904761904762$.
Bergmann's procedure rejects these hypotheses:

- IRS vs. EUCLIDEAN
- IRS vs. HELLINGER
- IRS vs. TOTALVARIATION
- CHEBYSHEV vs. TOTALVARIATION
- TOTALVARIATION vs. CHISQUARE

Table 7: Adjusted p-values

i	hypothesis	unadjusted p	p_{Neme}	p_{Holm}	p_{Shaf}	p_{Berg}
1	IRS vs .TOTALVARIATION	1.1254527653880945E-5	2.3634508073149986E-4	2.3634508073149986E-4	2.3634508073149986E-4	2.3634508073149986E-4
2	IRS vs .HELLINGER	4.4267698634329765E-4	0.00929621671320925	0.008853539726865953	0.006640154795149465	0.00664015479514946 5
3	TOTALVARIATION vs .CHISQUARE	7.603058428726009E-4	0.01596642270032462	0.014445811014579417	0.011404587643089013	0.011404587643089013
4	CHEBYSHEV vs .TOTALVARIATION	0.0021114910066706385	0.04434131114008341	0.038006838120071496	0.03167236510005958	0.023226401073377024
5	IRS vs .EUCLIDEAN	0.003414791178117856	0.07171061474047498	0.05805145002800355	0.05122186767176784	0.037562702959296417
6	HELLINGER vs .CHISQUARE	0.012826693645485394	0.2693605665551933	0.2052270983277663	0.19240040468228092	0.12826693645485393
7	IRS vs .KULLBACKLEIBLER	0.028108040147151837	0.5902688430901886	0.42162060220727754	0.42162060220727754	0.2529723613243665
8	CHEBYSHEV vs .HELLINGER	0.028108040147151837	0.5902688430901886	0.42162060220727754	0.42162060220727754	0.2529723613243665
9	KULLBACKLEIBLER vs .TOTALVARIATION	0.028108040147151837	0.5902688430901886	0.42162060220727754	0.42162060220727754	0.2529723613243665
10	EUCLIDEAN vs .CHISQUARE	0.05703987424905552	1.1978373592301659	0.6844784909886662	0.6274386167396107	0.3992791197433886
11	EUCLIDEAN vs .CHEBYSHEV	0.10734653699381097	2.2542772768700305	1.1808119069319207	1.1808119069319207	0.5367326849690548
12	EUCLIDEAN vs .TOTALVARIATION	0.1432349075246697	3.0079330580180637	1.432349075246697	1.432349075246697	0.8594094451480181
13	IRS vs .CHEBYSHEV	0.18768277253339644	3.941338223201325	1.689144952800568	1.689144952800568	1.1260966352003785
14	KULLBACKLEIBLER vs .HELLINGER	0.18768277253339644	3.941338223201325	1.689144952800568	1.689144952800568	1.1260966352003785
15	KULLBACKLEIBLER vs .CHISQUARE	0.24156658696897265	5.072898326348426	1.6909661087828085	1.6909661087828085	1.1260966352003785
16	IRS vs .CHISQUARE	0.30550708686125405	6.415648824086335	1.8330425211675243	1.8330425211675243	1.1260966352003785
17	CHEBYSHEV vs .KULLBACKLEIBLER	0.379775474840949	7.975284971659929	1.898877374204745	1.898877374204745	1.1260966352003785
18	HELLINGER vs .TOTALVARIATION	0.379775474840949	7.975284971659929	1.898877374204745	1.898877374204745	1.139326424522847
19	EUCLIDEAN vs .KULLBACKLEIBLER	0.46421431277103165	9.748500568191664	1.898877374204745	1.898877374204745	1.139326424522847
20	EUCLIDEAN vs .HELLINGER	0.5581846494226573	11.721877637875805	1.898877374204745	1.898877374204745	1.139326424522847
21	CHEBYSHEV vs .CHISQUARE	0.7696979437812894	16.163656819407077	1.898877374204745	1.898877374204745	1.139326424522847