

data/UCS.csv

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

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Table 1: Average Rankings of the algorithms (Friedman)

Algorithm	Ranking
continuous $M_{tst}$	3.5238095238095233
CADD $_G M_{tst}$	7.785714285714292
CAIM $_G M_{tst}$	4.023809523809523
Chi2Merge $_G M_{tst}$	4.690476190476189
ChiMerge $_G M_{tst}$	4.142857142857142
Fayyad $_G M_{tst}$	4.428571428571426
ID3 $_G M_{tst}$	3.7857142857142856
USD $_G M_{tst}$	3.619047619047618

Friedman statistic (distributed according to chi-square with 7 degrees of freedom: 94.01587301587352. P-value computed by Friedman

Test: 8.345413249344347E-11.

Iman and Davenport statistic (distributed according to F-distribution with 7 and 287 degrees of freedom: 19.274783712993248. P-value computed by Iman and Davenport Test: 4.434879676200424E-21.

Table 2: Average Rankings of the algorithms (Aligned Friedman)

Algorithm	Ranking
<i>continuos<sub>G</sub>M<sub>tst</sub></i>	134.95238095238093
<i>CADD<sub>G</sub>M<sub>tst</sub></i>	308.3809523809524
<i>CAIM<sub>G</sub>M<sub>tst</sub></i>	142.30952380952382
<i>Chi2Merge<sub>G</sub>M<sub>tst</sub></i>	173.11904761904765
<i>ChiMerge<sub>G</sub>M<sub>tst</sub></i>	145.11904761904762
<i>Fayyad<sub>G</sub>M<sub>tst</sub></i>	172.30952380952385
<i>ID3<sub>G</sub>M<sub>tst</sub></i>	140.49999999999991
<i>USD<sub>G</sub>M<sub>tst</sub></i>	131.30952380952382

Aligned Friedman statistic (distributed according to chi-square with 7 degrees of freedom: 36.105999286177635. P-value computed by Aligned Friedman Test: 6.922956021226945E-6.

Table 3: Average Rankings of the algorithms (Quade)

Algorithm	Ranking
$\text{continuos}_G M_{tst}$	3.4928017718715405
$CADD_G M_{tst}$	7.920265780730896
$CAIM_G M_{tst}$	3.933554817275748
$\text{Chi2Merge}_G M_{tst}$	4.663344407530452
$\text{ChiMerge}_G M_{tst}$	3.831672203765227
$\text{Fayyad}_G M_{tst}$	4.8327796234772995
$ID3_G M_{tst}$	3.6766334440753052
$USD_G M_{tst}$	3.648947951273532

Quade statistic (distributed according to F-distribution with 7 and 287 degrees of freedom: 18.205879320840648. P-value computed by Quade Test: 1.110748341469932E-16.

Table 4: Contrast Estimation

continuous $M_{f, st}$	continuous $M_{f, st}$	CADD $M_{f, st}$	CAIM $M_{f, st}$	Chi2Merge $M_{f, st}$	ChiMerge $M_{f, st}$	Fayyad $M_{f, st}$	ID3 $M_{f, st}$	USD $M_{f, st}$
0,00000000	0,00000000	0,25161125	0,00592500	0,01595812	0,00802625	0,01098250	0,00236500	0,00052687
-0,25161125	-0,25161125	0,00000000	-0,24568625	-0,23565313	-0,24358500	-0,24062875	-0,24924625	-0,25108438
-0,00592500	-0,01595812	0,24568625	0,00000000	0,01003312	0,00210125	0,00507500	-0,00356000	-0,00539813
0,00802625	0,00802625	0,23565313	-0,01003312	0,00000000	-0,00793187	-0,00497562	-0,01359313	-0,01543125
-0,01098250	-0,00802625	0,24358500	-0,00210125	0,00793187	0,00000000	0,00395625	-0,00566125	-0,00749938
0,00236500	0,00236500	0,24924625	-0,00507500	0,00497562	-0,00295625	0,00000000	-0,00861750	-0,01045563
-0,00052687	-0,00052687	0,25108438	0,00539813	0,01543125	0,00749938	0,01045563	0,00183812	0,00000000

Table 5: Holm / Hochberg / Holland / Rom / Finner / Li Table for  $\alpha = 0.05$  (FRIEDMAN)

$i$	algorithm	$z = (R_0 - R_i) / SE$	$p$	Holm/Hochberg/Hommel	Holland	Rom	Finner	Li
7	CADD $_G M_t st$	7.9732937170540055	1.5450039510483651E-15	0.0071428571428571435	0.007300831979014655	0.0075128293213784685	0.007300831979014655	0.007442831508
6	Chi2Merge $_G M_t st$	2.1826334756181303	0.02906281250878199	0.008512444610847103	0.008764162596519848	0.01454836181044361	0.01454836181044361	0.007442831508
5	Fayyad $_G M_t st$	1.6926545321120174	0.09052124460534867	0.010206218313011495	0.010515350115740741	0.021742978644310407	0.021742978644310407	0.007442831508
4	ChiMerge $_G M_t st$	1.1581320482871724	0.24681015326181155	0.012741455098566168	0.013109375000000001	0.028885068789519686	0.028885068789519686	0.007442831508
3	CAIM $_G M_t st$	0.9354143466934844	0.3495748061232987	0.016666666666666666	0.016952427508441503	0.035975015734599824	0.035975015734599824	0.007442831508
2	ID3 $_G M_t st$	0.4899789435061121	0.6241487990076813	0.025	0.025320365519103666	0.0430132001682938	0.0430132001682938	0.007442831508
1	USD $_G M_t st$	0.17817416127494895	0.8585862013366395	0.05	0.0500000000000000044	0.05	0.0500000000000000044	0.05

Bonferroni-Dunn's procedure rejects those hypotheses that have a p-value  $\leq 0.0071428571428571435$ .

Holm's procedure rejects those hypotheses that have a p-value  $\leq 0.008333333333333333$ .

Hochberg's procedure rejects those hypotheses that have a p-value  $\leq 0.0071428571428571435$ .

Hommel's procedure rejects those hypotheses that have a p-value  $\leq 0.008333333333333333$ .

Holland's procedure rejects those hypotheses that have a p-value  $\leq 0.008512444610847103$ .

Rom's procedure rejects those hypotheses that have a p-value  $\leq 0.0075128293213784685$ .

Finner's procedure rejects those hypotheses that have a p-value  $\leq 0.01454836181044361$ .

Li's procedure rejects those hypotheses that have a p-value  $\leq 0.0074428315085979194$ .

Table 6: Holm / Hochberg / Holland / Rom / Finner / Li Table for  $\alpha = 0.05$  (ALIGNED FRIEDMAN)

$i$	algorithm	$z = (R_0 - R_i)/SE$	$p$	Holm/Hochberg/Hommel	Holland	Rom	Finner	Li
7	CADD $_G M_t, st$	8.353417203042461	6.631590199970849E-17	0.0071428571428571435	0.007300831979014655	0.0075128293213784685	0.007300831979014655	0.0071814274537
6	Chi2Merge $_G M_t, st$	1.9723814183867914	0.04856608143222091	0.0083333333333333333	0.008512444610847103	0.008764162596519848	0.01454836181044361	0.0071814274537
5	Fayyad $_G M_t, st$	1.9341918009465011	0.05308959010311197	0.01	0.010206218313011495	0.010515350115740741	0.021742978644310407	0.0071814274537
4	ChiMerge $_G M_t, st$	0.6514699445696683	0.5147431724844153	0.0125	0.012741455098566168	0.013109375000000001	0.028885068789519686	0.0071814274537
3	CAIM $_G M_t, st$	0.5189295075710122	0.6038098998481727	0.016666666666666666	0.016952427508441503	0.016666666666666666	0.035975015734599824	0.0071814274537
2	ID3 $_G M_t, st$	0.43356448035153355	0.6646047327995221	0.025	0.025320565519103666	0.025	0.0430132001682938	0.0071814274537
1	continuous $_G M_t, st$	0.1718532784813077	0.8635528783796832	0.05	0.0500000000000000044	0.05	0.0500000000000000044	0.05

Bonferroni-Dunn's procedure rejects those hypotheses that have a p-value  $\leq 0.0071428571428571435$ .

Holm's procedure rejects those hypotheses that have a p-value  $\leq 0.0083333333333333333$ .

Hochberg's procedure rejects those hypotheses that have a p-value  $\leq 0.0071428571428571435$ .

Hommel's procedure rejects those hypotheses that have a p-value  $\leq 0.0083333333333333333$ .

Holland's procedure rejects those hypotheses that have a p-value  $\leq 0.008512444610847103$ .

Rom's procedure rejects those hypotheses that have a p-value  $\leq 0.0075128293213784685$ .

Finner's procedure rejects those hypotheses that have a p-value  $\leq 0.01454836181044361$ .

Li's procedure rejects those hypotheses that have a p-value  $\leq 0.007181427453700886$ .

Table 7: Holm / Hochberg / Holland / Rom / Finner / Li Table for  $\alpha = 0.05$  (QUADE)

$i$	algorithm	$z = (R_0 - R_i)/SE$	$p$	Holm/Hochberg/Hommel	Holland	Rom	Finner	Li
7	CADD $_G M_t.st$	3.8567850402337918	1.1488811029464104E-4	0.0071428571428571435	0.007300831979014655	0.0075128293213784685	0.007300831979014655	0.0056944357273
6	Fayyad $_G M_t.st$	1.1672611052233348	0.24310494080344305	0.0083333333333333333	0.008512444610847103	0.008764162596519848	0.01454836181044361	0.0056944357273
5	Chi2Merge $_G M_t.st$	1.0196652795215384	0.3078872336856264		0.010206218313011495	0.010515350115740741	0.021742978644310407	0.0056944357273
4	CAIM $_G M_t.st$	0.38394208254453416	0.7010213749097749	0.0125	0.012741455098566168	0.013109375000000001	0.028885068789519686	0.0056944357273
3	ChiMerge $_G M_t.st$	0.2951916514035861	0.7678474792112479	0.016666666666666666	0.016952427508441503	0.016666666666666666	0.035975015734599824	0.0056944357273
2	ID3 $_G M_t.st$	0.16013664749344875	0.8727734331454698	0.025	0.025320565519103666	0.025	0.0430132001682938	0.0056944357273
1	USD $_G M_t.st$	0.13601968250949448	0.8918057211795845	0.05	0.0500000000000000044	0.05	0.0500000000000000044	0.05

Bonferroni-Dunn's procedure rejects those hypotheses that have a p-value  $\leq 0.0071428571428571435$ .

Holm's procedure rejects those hypotheses that have a p-value  $\leq 0.0083333333333333333$ .

Hochberg's procedure rejects those hypotheses that have a p-value  $\leq 0.0071428571428571435$ .

Hommel's procedure rejects those hypotheses that have a p-value  $\leq 0.0083333333333333333$ .

Holland's procedure rejects those hypotheses that have a p-value  $\leq 0.008512444610847103$ .

Rom's procedure rejects those hypotheses that have a p-value  $\leq 0.0075128293213784685$ .

Finner's procedure rejects those hypotheses that have a p-value  $\leq 0.01454836181044361$ .

Li's procedure rejects those hypotheses that have a p-value  $\leq 0.005694435727390292$ .



Table 8: Adjusted  $p$ -values (FRIEDMAN)

$i$	algorithm	unadjusted $p$	$p_{Bonf}$	$p_{Holm}$	$p_{Hoch}$	$p_{Hommel}$
1	CADD $_G M_t st$	1.5450039510483651E-15	1.0815027657338556E-14	1.0815027657338556E-14	1.0815027657338556E-14	1.0815027657338556E-14
2	Chi2Merge $_G M_t st$	0.02906281250878199	0.20343968756147393	0.17437687505269195	0.17437687505269195	0.17437687505269195
3	Fayyad $_G M_t st$	0.09052124460534867	0.6336487122374407	0.45260622302674336	0.45260622302674336	0.45260622302674336
4	ChiMerge $_G M_t st$	0.24681015326181155	1.72767107283268807	0.9872406130472462	0.8585862013366395	0.7404304597854346
5	CAlM $_G M_t st$	0.3495748061232987	2.447023642863091	1.048724418369896	0.8585862013366395	0.8585862013366395
6	ID3 $_G M_t st$	0.6241487990076813	4.369041593053769	1.2482975980153626	0.8585862013366395	0.8585862013366395
7	USD $_G M_t st$	0.8585862013366395	6.010103409356477	1.2482975980153626	0.8585862013366395	0.8585862013366395

Table 9: Adjusted  $p$ -values (FRIEDMAN)

$i$	algorithm	unadjusted $p$	$p_{Hall}$	$p_{Rom}$	$p_{Finn}$	$p_{Li}$
1	CADD $_G M_t st$	1.5450039510483651E-15	1.0880185641326534E-14	1.0282437447713007E-14	1.0880185641326534E-14	1.0925411562744834E-14
2	Chi2Merge $_G M_t st$	0.02906281250878199	0.1621875477507988	0.165804845521251	0.09807801555125639	0.1704797644026088
3	Fayyad $_G M_t st$	0.09052124460534867	0.3777530250747807	0.4304243016589848	0.19860006320878965	0.39028705334741054
4	ChiMerge $_G M_t st$	0.24681015326181155	0.6781764451170633	0.8585862013366395	0.39104836670304943	0.6357416950651792
5	CAlM $_G M_t st$	0.3495748061232987	0.724835714142365	0.8585862013366395	0.4523837876066866	0.7119815057111727
6	ID3 $_G M_t st$	0.6241487990076813	0.8587358747126317	0.8585862013366395	0.6807100373652837	0.8152812074498378
7	USD $_G M_t st$	0.8585862013366395	0.8587358747126317	0.8585862013366395	0.8585862013366395	0.8585862013366395

Table 10: Adjusted  $p$ -values (ALIGNED FRIEDMAN)

$i$	algorithm	unadjusted $p$	$p_{Bonf}$	$p_{Holm}$	$p_{Hoch}$	$p_{Homn}$
1	CADD $_G M_t st$	6.631590199970849E-17	4.642113139979595E-16	4.642113139979595E-16	4.642113139979595E-16	4.642113139979595E-16
2	Chi2Merge $_G M_t st$	0.0485660814322091	0.3399625700254637	0.2913964885932546	0.26544775051555985	0.24283040716104548
3	Fayyad $_G M_t st$	0.05308955010311197	0.3716268507217838	0.2913964885932546	0.26544775051555985	0.26544775051555985
4	ChiMerge $_G M_t st$	0.5147431724844153	3.6032022073909067	2.058972689937661	0.8635528783796832	0.8635528783796832
5	CAIM $_G M_t st$	0.603809898481727	4.2266692989372086	2.058972689937661	0.8635528783796832	0.8635528783796832
6	ID3 $_G M_t st$	0.6646047327995221	4.652233129596655	2.058972689937661	0.8635528783796832	0.8635528783796832
7	continuous $_G M_t st$	0.8635528783796832	6.04448701486577825	2.058972689937661	0.8635528783796832	0.8635528783796832

Table 11: Adjusted  $p$ -values (ALIGNED FRIEDMAN)

$i$	algorithm	unadjusted $p$	$p_{Hol}$	$p_{Rom}$	$p_{Finn}$	$p_{Li}$
1	CADD $_G M_t st$	6.631590199970849E-17	7.771561172376096E-16	4.4135104873872424E-16	7.771561172376096E-16	4.860190615397645E-16
2	Chi2Merge $_G M_t st$	0.0485660814322091	0.2582257047705423	0.25243833785258674	0.15991118064634124	0.2625006249874017
3	Fayyad $_G M_t st$	0.05308955010311197	0.2582257047705423	0.25243833785258674	0.15991118064634124	0.28010173240026115
4	ChiMerge $_G M_t st$	0.5147431724844153	0.9445519064793935	0.8635528783796832	0.717869268089443	0.7904650562891039
5	CAIM $_G M_t st$	0.603809898481727	0.9445519064793935	0.8635528783796832	0.7264321438144308	0.815676018378537
6	ID3 $_G M_t st$	0.6646047327995221	0.9445519064793935	0.8635528783796832	0.7264321438144308	0.8296650574273515
7	continuous $_G M_t st$	0.8635528783796832	0.9445519064793935	0.8635528783796832	0.8635528783796832	0.8635528783796832

Table 12: Adjusted  $p$ -values (QUADE)

i	algorithm	unadjusted $p$	$p_{Bonf}$	$p_{Holm}$	$p_{Hoch}$	$p_{Hommel}$
1	CADD $_G M_t st$	1.1488811029464104E-4	8.042167720624873E-4	8.042167720624873E-4	8.042167720624873E-4	8.042167720624873E-4
2	Fayyad $_G M_t st$	0.24310494080344305	1.7017345856241013	1.4586296448206584	0.8918057211795845	0.8918057211795846
3	Chi2Merge $_G M_t st$	0.30788723368556264	2.1552106357989387	1.5394361684278133	0.8918057211795845	0.8918057211795846
4	CAIM $_G M_t st$	0.7010213749097749	4.907149624368424	2.8040854996390996	0.8918057211795845	0.8918057211795846
5	ChiMerge $_G M_t st$	0.7678474792112479	5.374932354478735	2.8040854996390996	0.8918057211795845	0.8918057211795846
6	ID3 $_G M_t st$	0.8727734331454698	6.109414032018289	2.8040854996390996	0.8918057211795845	0.8918057211795846
7	USD $_G M_t st$	0.8918057211795845	6.242640048257091	2.8040854996390996	0.8918057211795845	0.8918057211795846

Table 13: Adjusted  $p$ -values (QUADE)

i	algorithm	unadjusted $p$	$p_{Hol}$	$p_{Rom}$	$p_{Finn}$	$p_{Li}$
1	CADD $_G M_t st$	1.1488811029464104E-4	8.039396402957921E-4	7.646128068404006E-4	8.039396402957921E-4	0.0010607422580227188
2	Fayyad $_G M_t st$	0.24310494080344305	0.8119756821458821	0.8918057211795845	0.6227538241511456	0.6920167402129135
3	Chi2Merge $_G M_t st$	0.30788723368556264	0.8411876397219015	0.8918057211795845	0.6227538241511456	0.7399685504679541
4	CAIM $_G M_t st$	0.7010213749097749	0.9920097464361521	0.8918057211795845	0.8791156037835743	0.8662973481522765
5	ChiMerge $_G M_t st$	0.7678474792112479	0.9920097464361521	0.8918057211795845	0.8791156037835743	0.8764964365813885
6	ID3 $_G M_t st$	0.8727734331454698	0.9920097464361521	0.8918057211795845	0.9097721152506231	0.8897065851396971
7	USD $_G M_t st$	0.8918057211795845	0.9920097464361521	0.8918057211795845	0.9097721152506231	0.8918057211795845