

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
<i>continuous<sub>G</sub>M<sub>tst</sub></i>	4.857142857142855
<i>CADD<sub>G</sub>M<sub>tst</sub></i>	7.428571428571432
<i>CAIM<sub>G</sub>M<sub>tst</sub></i>	4.119047619047619
<i>Chi2Merge<sub>G</sub>M<sub>tst</sub></i>	3.809523809523809
<i>ChiMerge<sub>G</sub>M<sub>tst</sub></i>	3.5
<i>Fayyad<sub>G</sub>M<sub>tst</sub></i>	3.8333333333333326
<i>ID3<sub>G</sub>M<sub>tst</sub></i>	3.3333333333333344
<i>USD<sub>G</sub>M<sub>tst</sub></i>	5.1190476190476195

Friedman statistic (distributed according to chi-square with 7 degrees of freedom: 87.60317460317478. P-value computed by Friedman

Test: 4.7259640645336276E-11.

Iman and Davenport statistic (distributed according to F-distribution with 7 and 287 degrees of freedom: 17.402061062831702. P-value computed by Iman and Davenport Test: 3.4588575945550723E-19.

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

Algorithm	Ranking
<i>continuous<sub>G</sub>M<sub>tst</sub></i>	190.35714285714297
<i>CADD<sub>G</sub>M<sub>tst</sub></i>	296.0238095238096
<i>CAIM<sub>G</sub>M<sub>tst</sub></i>	141.97619047619048
<i>Chi2Merge<sub>G</sub>M<sub>tst</sub></i>	137.54761904761904
<i>ChiMerge<sub>G</sub>M<sub>tst</sub></i>	133.88095238095238
<i>Fayyad<sub>G</sub>M<sub>tst</sub></i>	145.66666666666669
<i>ID3<sub>G</sub>M<sub>tst</sub></i>	116.28571428571426
<i>USD<sub>G</sub>M<sub>tst</sub></i>	186.26190476190476

Aligned Friedman statistic (distributed according to chi-square with 7 degrees of freedom: 37.48242873989504. P-value computed by Aligned Friedman Test: 3.79993445120963E-6.

Table 3: Average Rankings of the algorithms (Quade)

Algorithm	Ranking
$\text{continuous}_G M_{tst}$	4.864894795127354
$\text{CADD}_G M_{tst}$	7.37984496124031
$\text{CAIM}_G M_{tst}$	4.017718715393133
$\text{Chi2Merge}_G M_{tst}$	3.9977851605758588
$\text{ChiMerge}_G M_{tst}$	3.433001107419713
$\text{Fayyad}_G M_{tst}$	3.8571428571428577
$\text{ID3}_G M_{tst}$	3.4795127353266886
$\text{USD}_G M_{tst}$	4.970099667774085

Quade statistic (distributed according to F-distribution with 7 and 287 degrees of freedom: 13.520095696063702. P-value computed by Quade Test: 4.278046860756451E-15.

Table 4: Contrast Estimation

continuous $M_{f, st}$	continuous $G_{M_{f, st}}$	CADD $G_{M_{f, st}}$	CAIM $G_{M_{f, st}}$	Chi2Merge $G_{M_{f, st}}$	ChiMerge $G_{M_{f, st}}$	Fayyad $G_{M_{f, st}}$	ID3 $G_{M_{f, st}}$	USD $G_{M_{f, st}}$
0.00000000	0.00000000	0.20824188	-0.05133437	-0.05734625	-0.06203500	-0.05270375	-0.06198937	-0.02024312
-0.20824188	-0.20824188	0.00000000	-0.25957625	-0.26558812	-0.27027687	-0.26094562	-0.27023125	-0.22848500
0.05133437	0.05133437	0.25957625	0.00000000	-0.00601187	-0.01070063	-0.00136938	-0.01065500	0.03109125
0.05734625	0.05734625	0.26558812	0.00601187	0.00000000	-0.00468875	0.00464250	-0.00464313	0.03710312
0.06203500	0.06203500	0.27027687	0.01070063	0.00468875	0.00000000	0.00933125	0.00004563	0.04179188
0.05270375	0.05270375	0.26094562	0.00136938	-0.00464250	-0.00933125	0.00000000	-0.00928562	0.03246063
0.06198937	0.06198937	0.27023125	0.01065500	-0.00464313	-0.00004563	0.00928562	0.00000000	0.04174625
0.02024312	0.02024312	0.22848500	-0.03109125	-0.03710312	-0.04179188	-0.03246063	-0.04174625	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 $_G M_t st$	7.661488934822838	1.837897142799595E-14	0.0071428571428571435	0.007300831979014655	0.0075128293213784685	0.007300831979014655	0.01288479529354
6	USD $_G M_t st$	3.340765523905304	8.354774920441664E-4	0.008333333333333333	0.008512444610847103	0.008764162596519848	0.01454836181044361	0.01288479529354
5	continuous $_G M_t st$	2.850786580399187	0.004361123053640745	0.01	0.010206218313011495	0.010515350115740741	0.021742978644310407	0.01288479529354
4	CAIM $_G M_t st$	1.4699368305183313	0.1415788633524458	0.0125	0.012741455098566168	0.013109375000000001	0.028885068789519686	0.01288479529354
3	Fayyad $_G M_t st$	0.935414346693482	0.3495748061232999	0.016666666666666666	0.016952427508441503	0.016666666666666666	0.035975015734599824	0.01288479529354
2	Chi2Merge $_G M_t st$	0.8908708063747447	0.3729984836134889	0.025	0.025320565519103666	0.025	0.0430132001682938	0.01288479529354
1	ChiMerge $_G M_t st$	0.3118047822311598	0.75518888942268	0.05	0.050000000000000044	0.05	0.050000000000000044	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  $\leq 0.0125$ .

Hochberg's procedure rejects those hypotheses that have a p-value  $\leq 0.01$ .

Hommel's procedure rejects those hypotheses that have a p-value  $\leq 0.0125$ .

Holland's procedure rejects those hypotheses that have a p-value  $\leq 0.012741455098566168$ .

Rom's procedure rejects those hypotheses that have a p-value  $\leq 0.010515350115740741$ .

Finner's procedure rejects those hypotheses that have a p-value  $\leq 0.028885068789519686$ .

Li's procedure rejects those hypotheses that have a p-value  $\leq 0.01288479529354316$ .

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 $_G M_t st$	8.479218295786952	2.267119601996749E-17	0.0071428571428571435	0.007300831979014655	0.0075128293213784685	0.007300831979014655	0.03123666264679
6	continuos $_G M_t st$	3.4943499957866275	4.752175764241617E-4	0.008333333333333333	0.008512444610847103	0.008764162596519848	0.01454836181044361	0.03123666264679
5	USD $_G M_t st$	3.301155460500444	9.628751445604196E-4	0.01	0.010206218313011495	0.010515350115740741	0.021742978644310407	0.03123666264679
4	Fayyad $_G M_t st$	1.3860584682740906	0.16572905079625794	0.0125	0.012741455098566168	0.013109375000000001	0.028885068789519686	0.03123666264679
3	CAIM $_G M_t st$	1.2119587417080577	0.22552817437590836	0.016666666666666666	0.016952427508441503	0.016666666666666666	0.035975015734599824	0.03123666264679
2	Chi2Merge $_G M_t st$	1.0030390698288183	0.31584201083111951	0.025	0.025320565519103666	0.025	0.0430132001682938	0.03123666264679
1	ChiMerge $_G M_t st$	0.8300625673051482	0.4065034097108228	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  $\leq 0.0125$ .

Hochberg's procedure rejects those hypotheses that have a p-value  $\leq 0.01$ .

Hommel's procedure rejects those hypotheses that have a p-value  $\leq 0.0125$ .

Holland's procedure rejects those hypotheses that have a p-value  $\leq 0.012741455098566168$ .

Rom's procedure rejects those hypotheses that have a p-value  $\leq 0.010515350115740741$ .

Finner's procedure rejects those hypotheses that have a p-value  $\leq 0.028885068789519686$ .

Li's procedure rejects those hypotheses that have a p-value  $\leq 0.031236662646798797$ .

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 $_G M_t st$	3.438114528112366	5.857798877821348E-4	0.0071428571428571435	0.007300831979014655	0.0075128293213784685	0.007300831979014655	0.00170098148371
6	USD $_G M_t st$	1.3389738959090791	0.18057917113417632	0.008333333333333333	0.008512444610847103	0.008764162596519848	0.01454836181044361	0.00170098148371
5	continuous $_G M_t st$	1.2473294289700585	0.21227673100185926	0.01	0.010206218313011495	0.010515350115740741	0.021742978644310407	0.00170098148371
4	CAIM $_G M_t st$	0.5093503004610893	0.6105067061247249	0.0125	0.012741455098566168	0.013109375000000001	0.028885068789519686	0.00170098148371
3	Chi2Merge $_G M_t st$	0.4919860856726446	0.6227291800331771	0.016666666666666666	0.016952427508441503	0.016666666666666666	0.035975015734599824	0.00170098148371
2	Fayyad $_G M_t st$	0.36947190355416243	0.7117760117122481	0.025	0.025320565519103666	0.025	0.0430132001682938	0.00170098148371
1	ID3 $_G M_t st$	0.04051650117304027	0.9676813518095061	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  $\leq 0.0017009814837102056$ .



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

i	algorithm	unadjusted $p$	$p_{Bonf}$	$p_{Holm}$	$p_{Hoch}$	$p_{Hommel}$
1	CADD $_G M_{i,st}$	1.837897142799595E-14	1.286527999597165E-13	1.286527999597165E-13	1.286527999597165E-13	1.286527999597165E-13
2	USD $_G M_{i,st}$	8.354774920441664E-4	0.005848342444309165	0.005012864952264998	0.005012864952264998	0.005012864952264998
3	continuous $_G M_{i,st}$	0.004361123053640745	0.030527861375485216	0.021805615268203727	0.021805615268203727	0.021805615268203727
4	CALM $_G M_{i,st}$	0.14157886335524458	0.991052043486712	0.5663154534209783	0.5663154534209783	0.4973313114846519
5	Fayyad $_G M_{i,st}$	0.3495748061232999	2.4470236428630994	1.0487244183698996	0.7459969672269778	0.6991496122465998
6	Chi2Merge $_G M_{i,st}$	0.3729984836134889	2.6109893852944226	1.0487244183698996	0.7459969672269778	0.7459969672269778
7	ChiMerge $_G M_{i,st}$	0.75518888942268	5.28632222595876	1.0487244183698996	0.75518888942268	0.75518888942268

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

i	algorithm	unadjusted $p$	$p_{Rom}$	$p_{Finn}$	$p_{Li}$	
1	CADD $_G M_{i,st}$	1.837897142799595E-14	1.290079154614432E-13	1.2231724322351398E-13	1.290079154614432E-13	7.507409032479284E-14
2	USD $_G M_{i,st}$	8.354774920441664E-4	0.005002406269007276	0.004766442217627987	0.002921118648683607	0.0034011361550368826
3	continuous $_G M_{i,st}$	0.004361123053640745	0.02161624897739367	0.02073693698088307	0.010146382414146227	0.017502443952482426
4	CALM $_G M_{i,st}$	0.14157886335524458	0.456997773482678	0.5399908971832927	0.23444622118315406	0.3664144333619637
5	Fayyad $_G M_{i,st}$	0.3495748061232999	0.7248357141442381	0.7459969672269778	0.45238378760668807	0.5881276731180924
6	Chi2Merge $_G M_{i,st}$	0.3729984836134889	0.7248357141442381	0.7459969672269778	0.45238378760668807	0.6037434302101324
7	ChiMerge $_G M_{i,st}$	0.75518888942268	0.75518888942268	0.75518888942268	0.75518888942268	0.7551888894226801

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

i	algorithm	unadjusted $p$	$p_{Bonf}$	$p_{Holm}$	$p_{Hoch}$	$p_{Homn}$
1	CADD $_G M_t st$	2.267119601996749E-17	1.5869837213977243E-16	1.5869837213977243E-16	1.5869837213977243E-16	1.5869837213977243E-16
2	continuous $_G M_t st$	4.752175764241617E-4	0.003326523034969132	0.0028513054585449704	0.0028513054585449704	0.0028513054585449704
3	USD $_G M_t st$	9.628751445604196E-4	0.006740126011922937	0.004814375722802098	0.004814375722802098	0.004814375722802098
4	Fayyad $_G M_t st$	0.16572905079625794	1.1601033555738056	0.6629162031850317	0.4065034097108228	0.4065034097108228
5	CAlM $_G M_t st$	0.22552817437590836	1.5786972206313585	0.6765845231277251	0.4065034097108228	0.4065034097108228
6	Chi2Merge $_G M_t st$	0.3158420108311951	2.210894075818366	0.6765845231277251	0.4065034097108228	0.4065034097108228
7	ChiMerge $_G M_t st$	0.4065034097108228	2.8455238679757597	0.6765845231277251	0.4065034097108228	0.4065034097108228

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

i	algorithm	unadjusted $p$	$p_{Holl}$	$p_{Rom}$	$p_{Finn}$	$p_{Li}$
1	CADD $_G M_t st$	2.267119601996749E-17	0.0	1.508832095749497E-16	0.0	3.819937029279495E-17
2	continuous $_G M_t st$	4.752175764241617E-4	0.002847920127990622	0.0027111408031890312	0.0016622737383474862	8.000675623508544E-4
3	USD $_G M_t st$	9.628751445604196E-4	0.0048051133601551	0.004578426462087378	0.0022452666250036835	0.0016197490334481821
4	Fayyad $_G M_t st$	0.16572905079625794	0.5155728407097773	0.4065034097108228	0.2717383149780177	0.21828695163577674
5	CAlM $_G M_t st$	0.22552817437590836	0.5354666807499353	0.4065034097108228	0.3007896109048819	0.27536184997791985
6	Chi2Merge $_G M_t st$	0.3158420108311951	0.5354666807499353	0.4065034097108228	0.35778200573607544	0.3473315775246476
7	ChiMerge $_G M_t st$	0.4065034097108228	0.5354666807499353	0.4065034097108228	0.4065034097108229	0.4065034097108228

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

$i$	algorithm	unadjusted $p$	$p_{Bonf}$	$p_{Holm}$	$p_{Hoch}$	$p_{Hommel}$
1	CADD $_G M_t st$	5.857798877821348E-4	0.004100459214474944	0.004100459214474944	0.004100459214474944	0.004100459214474944
2	USD $_G M_t st$	0.18057917113417632	1.2640541979392341	1.083475026805058	0.9676813518095061	0.8897200146403101
3	continuous $_G M_t st$	0.21227673100185926	1.485937117013015	1.083475026805058	0.9676813518095061	0.8897200146403101
4	CAIM $_G M_t st$	0.6105067061247249	4.273546942873074	2.4420268244988996	0.9676813518095061	0.9676813518095061
5	Chi2Merge $_G M_t st$	0.6227291800331771	4.35910426023224	2.4420268244988996	0.9676813518095061	0.9676813518095061
6	Fayyad $_G M_t st$	0.7117760117122481	4.9824320819885737	2.4420268244988996	0.9676813518095061	0.9676813518095061
7	ID3 $_G M_t st$	0.9676813518095061	6.773769462666543	2.4420268244988996	0.9676813518095061	0.9676813518095061

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

$i$	algorithm	unadjusted $p$	$p_{Holl}$	$p_{Rom}$	$p_{Finn}$	$p_{Li}$
1	CADD $_G M_t st$	5.857798877821348E-4	0.0040932603458586625	0.0038985305184242817	0.0040932603458586625	0.017802463741008582
2	USD $_G M_t st$	0.18057917113417632	0.6972793867196074	0.9676813518095061	0.5019482197110527	0.848196433890157
3	continuous $_G M_t st$	0.21227673100185926	0.6972793867196074	0.9676813518095061	0.5019482197110527	0.8678689340035406
4	CAIM $_G M_t st$	0.6105067061247249	0.9769855850942852	0.9676813518095061	0.8079673951410641	0.9497240611722263
5	Chi2Merge $_G M_t st$	0.6227291800331771	0.9769855850942852	0.9676813518095061	0.8079673951410641	0.9506621550396799
6	Fayyad $_G M_t st$	0.7117760117122481	0.9769855850942852	0.9676813518095061	0.8079673951410641	0.9565664828252927
7	ID3 $_G M_t st$	0.9676813518095061	0.9769855850942852	0.9676813518095061	0.9676813518095061	0.9676813518095061