Output tables for the test of Multiple comparisons.

January 30, 2025

1 Average rankings of Friedman test

Average ranks obtained by applying the Friedman procedure

Friedman statistic considering reduction performance (distributed according to chi-square with 17 degrees of freedom: 422.595906.

P-value computed by Friedman Test: 1.5462087166184801E-10.

Algorithm	Ranking
BCA	14.5333
BN	9.7
CLARA	17.8
CP	13
CA	7.85
FF	16.0667
KM	15.5667
NBC	8.3
NBD	11.35
PAM	12.8
P	9.4833
RBE	3.9333
RSC	3.5667
SC	3.8167
S	3.5667
SW	4.55
3CC	3.6333
UPGMC	11.4833

Table 1: Average Rankings of the algorithms

2 Post hoc comparisons

Results achieved on post hoc comparisons for $\alpha = 0.05$, $\alpha = 0.10$ and adjusted p-values.

2.1 P-values for $\alpha = 0.05$

Holm's procedure rejects those hypotheses that have an unadjusted p-value ≤ 0.000758.

i	algorithms	$z = (R_0 - R_i)/SE$	p	Holm
153	CLARA vs. RSC	10.325945	0	0.000327
152	CLARA vs. S	10.325945	0	0.000329
151	CLARA vs. 3CC	10.27758	0	0.000331
150	CLARA vs. SC	10.144576	0	0.000333
149	CLARA vs. RBE	10.059937	0	0.000336
148	CLARA vs. SW	9.61256	0	0.000338
147	FF vs. RSC	9.068453	0	0.00034
146	FF vs. S	9.068453	0	0.000342
145	FF vs. 3CC	9.020088	0	0.000345
144	FF vs. SC	8.887084	0	0.000347
143	FF vs. RBE	8.802445	0	0.00035
142	KM vs. RSC	8.705715	0	0.000352
141	KM vs. S	8.705715	0	0.000355
140	KM vs. 3CC	8.65735	0	0.000357
139	KM vs. SC	8.524346	0	0.00036
138	KM vs. RBE	8.439707	0	0.000362
137	FF vs. SW	8.355068	0	0.000365
136	KM vs. SW	7.99233	0	0.000368
135	BCA vs. RSC	7.956056	0	0.00037
134	BCA vs. S	7.956056	0	0.000373
133	BCA vs. 3CC	7.907691	0	0.000376
132	BCA vs. SC	7.774687	0	0.000379
131	BCA vs. RBE	7.690048	0	0.000382
130	BCA vs. SW	7.242671	0	0.000385
129	CLARA vs. CA	7.218489	0	0.000388
128	CLARA vs. NBC	6.892024	0	0.000391
127	CP vs. RSC	6.843659	0	0.000394
126	CP vs. S	6.843659	0	0.000397
125	CP vs. 3CC	6.795294	0	0.0004
124	PAM vs. RSC	6.698564	0	0.000403
123	PAM vs. S	6.698564	0	0.000407
122	CP vs. SC	6.66229	0	0.00041
121	PAM vs. 3CC	6.650199	0	0.000413
120	CP vs. RBE	6.577651	0	0.000417
119	PAM vs. SC	6.517195	0	0.00042
118	PAM vs. RBE	6.432556	0	0.000424
117	CP vs. SW	6.130274	0	0.000427
116	CLARA vs. P	6.033544	0	0.000431
115	PAM vs. SW	5.985179	0	0.000435
114	CA vs. FF	5.960997	0	0.000439
113	BN vs. CLARA	5.876358	0	0.000442
112	RSC vs. UPGMC	5.743354	0	0.000446
111	S vs. UPGMC	5.743354	0	0.00045
110	3CC vs. UPGMC	5.694989	0	0.000455
109	NBD vs. RSC	5.646623	0	0.000459
108	NBD vs. S	5.646623	0	0.000463
107	FF vs. NBC	5.634532	0	0.000467
106	NBD vs. 3CC	5.598258	0	0.000472
105	CA vs. KM	5.598258	0	0.000476
104	SC vs. UPGMC	5.561985	0	0.000481
103	RBE vs. UPGMC	5.477346	0	0.000485
102	NBD vs. SC	5.465254	0	0.00049
101	NBD vs. RBE	5.380616	0	0.000495
100	KM vs. NBC	5.271794	0	0.0005
99	SW vs. UPGMC	5.029969	0	0.000505
98	NBD vs. SW	4.933239	0.000001	0.00051
97	BCA vs. CA	4.8486	0.000001	0.000515
96	FF vs. P	4.776052	0.000002	0.000521
95	CLARA vs. NBD	4.679322	0.000003	0.000526
94	BN vs. FF	4.618865	0.000004	0.000532
93	CLARA vs. UPGMC	4.582592	0.000005	0.000538
92	BCA vs. NBC	4.522135	0.000006	0.000543
91	BN vs. RSC	4.449588	0.000009	0.000549
90	BN vs. S	4.449588	0.000009	0.000556
89	KM vs. P	4.413314	0.00001	0.000562
88	BN vs. 3CC	4.401223	0.000011	0.000568
87	P vs. RSC	4.292401	0.000018	0.000575
86	P vs. S	4.292401	0.000018	0.000581
85	BN vs. SC	4.268219	0.00002	0.000588
84	BN vs. KM	4.256127	0.000021	0.000595
83	P vs. 3CC	4.244036	0.000022	0.000602
82	BN vs. RBE	4.18358	0.000029	0.00061
81	P vs. SC	4.111032	0.000039	0.000617
80	P vs. RBE	4.026393	0.000057	0.000625
79	CP vs. CA	3.736203	0.000187	0.000633
78	BN vs. SW	3.736203	0.000187	0.000641
77	BCA vs. P	3.663655	0.000249	0.000649
76	CLARA vs. PAM	3.627381	0.000286	0.000658
75	CA vs. PAM	3.591107	0.000329	0.000667
74	P vs. SW	3.579016	0.000345	0.000676
73	BCA vs. BN	3.506469	0.000454	0.000685
72	CLARA vs. CP	3.482286	0.000497	0.000694
71	NBC vs. RSC	3.433921	0.000595	0.000704
70	NBC vs. S	3.433921	0.000595	0.000714
69	FF vs. NBD	3.42183	0.000622	0.000725
68	CP vs. NBC	3.409738	0.00065	0.000735
67	NBC vs. 3CC	3.385556	0.00071	0.000746
66	FF vs. UPGMC	3.325099	0.000884	0.000758
65	NBC vs. PAM	3.264643	0.001096	0.000769

2.2 P-values for $\alpha = 0.10$

Holm's procedure rejects those hypotheses that have an unadjusted p-value ≤ 0.001613.

i	algorithms	$z = (R_0 - R_i)/SE$	p	Holm
153	CLARA vs. RSC	10.325945	0	0.000654
152	CLARA vs. S	10.325945	0	0.000658
151	CLARA vs. 3CC	10.27758	0	0.000662
150	CLARA vs. SC	10.144576	0	0.000667
149	CLARA vs. RBE	10.059937	0	0.000671
148	CLARA vs. SW	9.61256	0	0.000676
147	FF vs. RSC	9.068453	0	0.00068
146	FF vs. S	9.068453	0	0.000685
145	FF vs. 3CC	9.020088	0	0.00069
144	FF vs. SC	8.887084	0	0.000694
143	FF vs. RBE	8.802445	0	0.000699
142	KM vs. RSC	8.705715	0	0.000704
141	KM vs. S	8.705715	0	0.000709
140	KM vs. 3CC	8.65735	0	0.000714
139	KM vs. SC	8.524346	0	0.000719
138	KM vs. RBE	8.439707	0	0.000725
137	FF vs. SW	8.355068	0	0.00073
136	KM vs. SW	7.99233	0	0.000735
135	BCA vs. RSC	7.956056	0	0.000741
134	BCA vs. S	7.956056	0	0.000746
133	BCA vs. 3CC	7.907691	0	0.000752
132	BCA vs. SC	7.774687	0	0.000758
131	BCA vs. RBE	7.690048	0	0.000763
130	BCA vs. SW	7.242671	0	0.000769
129	CLARA vs. CA	7.218489	0	0.000775
128	CLARA vs. NBC	6.892024	0	0.000781
127	CP vs. RSC	6.843659	0	0.000787
126	CP vs. S	6.843659	0	0.000794
125	CP vs. 3CC	6.795294	0	0.0008
124	PAM vs. RSC	6.698564	0	0.000806
123	PAM vs. S	6.698564	0	0.000813
122	CP vs. SC	6.66229	0	0.00082
121	PAM vs. 3CC	6.650199	0	0.000826
120	CP vs. RBE	6.577651	0	0.000833
119	PAM vs. SC	6.517195	0	0.00084
118	PAM vs. RBE	6.432556	0	0.000847
117	CP vs. SW	6.130274	0	0.000855
116	CLARA vs. P	6.033544	0	0.000862
115	PAM vs. SW	5.985179	0	0.00087
114	CA vs. FF	5.960997	0	0.000877
113	BN vs. CLARA	5.876358	0	0.000885
112	RSC vs. UPGMC	5.743354	0	0.000893
111	S vs. UPGMC	5.743354	0	0.000901
110	3CC vs. UPGMC	5.694989	0	0.000909
109	NBD vs. RSC	5.646623	0	0.000917
108	NBD vs. S	5.646623	0	0.000926
107	FF vs. NBC	5.634532	0	0.000935
106	NBD vs. 3CC	5.598258	0	0.000943
105	CA vs. KM	5.598258	0	0.000952
104	SC vs. UPGMC	5.561985	0	0.000962
103	RBE vs. UPGMC	5.477346	0	0.000971
102	NBD vs. SC	5.465254	0	0.00098
101	NBD vs. RBE	5.380616	0	0.00099
100	KM vs. NBC	5.271794	0	0.001
99	SW vs. UPGMC	5.029969	0	0.00101
98	NBD vs. SW	4.933239	0.000001	0.00102
97	BCA vs. CA	4.8486	0.000001	0.001031
96	FF vs. P	4.776052	0.000002	0.001042
95	CLARA vs. NBD	4.679322	0.000003	0.001053
94	BN vs. FF	4.618865	0.000004	0.001064
93	CLARA vs. UPGMC	4.582592	0.000005	0.001075
92	BCA vs. NBC	4.522135	0.000006	0.001087
91	BN vs. RSC	4.449588	0.000009	0.001099
90	BN vs. S	4.449588	0.000009	0.001111
89	KM vs. P	4.413314	0.00001	0.001124
88	BN vs. 3CC	4.401223	0.000011	0.001136
87	P vs. RSC	4.292401	0.000018	0.001149
86	P vs. S	4.292401	0.000018	0.001163
85	BN vs. SC	4.268219	0.00002	0.001176
84	BN vs. KM	4.256127	0.000021	0.00119
83	P vs. 3CC	4.244036	0.000022	0.001205
82	BN vs. RBE	4.18358	0.000029	0.00122
81	P vs. SC	4.111032	0.000039	0.001235
80	P vs. RBE	4.026393	0.000057	0.00125
79	CP vs. CA	3.736203	0.000187	0.001266
78	BN vs. SW	3.736203	0.000187	0.001282
77	BCA vs. P	3.663655	0.000249	0.001299
76	CLARA vs. PAM	3.627381	0.000286	0.001316
75	CA vs. PAM	3.591107	0.000329	0.001333
74	P vs. SW	3.579016	0.000345	0.001351
73	BCA vs. BN	3.506469	0.000454	0.00137
72	CLARA vs. CP	3.482286	0.000497	0.001389
71	NBC vs. RSC	3.433921	0.000595	0.001408
70	NBC vs. S	3.433921	0.000595	0.001429
69	FF vs. NBD	3.42183	0.000622	0.001449
68	CP vs. NBC	3.409738	0.00065	0.001471
67	NBC vs. 3CC	3.385556	0.00071	0.001493
66	FF vs. UPGMC	3.325099	0.000884	0.001515
65	NBC vs. PAM	3.264643	0.001096	0.001538

2.3 Adjusted p-values

i	hypothesis	unadjusted p	p_{Holm}
1	CLARA vs .RSC	0	0
2	CLARA vs .S	0	0
3	CLARA vs .3CC	0	0
4	CLARA vs .SC	0	0
5	CLARA vs .RBE	0	0
6	CLARA vs .SW	0	0
7	FF vs .RSC	0	0
8	FF vs .S	0	0
9	FF vs .3CC	0	0
10	FF vs .SC	0	0
11	FF vs .RBE	0	0
12	KM vs .RSC	0	0
13	KM vs .S	0	0
14	KM vs .3CC	0	0
15	KM vs .SC	0	0
16	KM vs .RBE	0	0
17	FF vs .SW	0	0
18	KM vs .SW	0	0
19	BCA vs .RSC	0	0
20	BCA vs .S	0	0
21	BCA vs .3CC	0	0
22	BCA vs .SC	0	0
23	BCA vs .RBE	0	0
24	BCA vs .SW	0	0
25	CLARA vs .CA	0	0
26	CLARA vs .NBC	0	0
27	CP vs .RSC	0	0
28	CP vs .S	0	0
29	CP vs .3CC	0	0
30	PAM vs .RSC	0	0
31	PAM vs .S	0	0
32	CP vs .SC	0	0
33	PAM vs .3CC	0	0
34	CP vs .RBE	0	0
35	PAM vs .SC	0	0
36	PAM vs .RBE	0	0
37	CP vs .SW	0	0
38	CLARA vs .P	0	0
39	PAM vs .SW	0	0
40	CA vs .FF	0	0
41	BN vs .CLARA	0	0
42	RSC vs .UPGMC	0	0.000001
43	S vs .UPGMC	0	0.000001
44	3CC vs .UPGMC	0	0.000001
45	NBD vs .RSC	0	0.000002
46	NBD vs .S	0	0.000002
47	FF vs .NBC	0	0.000002
48	NBD vs .3CC	0	0.000002
49	CA vs .KM	0	0.000002
50	SC vs .UPGMC	0	0.000003
51	RBE vs .UPGMC	0	0.000004
52	NBD vs .SC	0	0.000005
53	NBD vs .RBE	0	0.000007
54	KM vs .NBC	0	0.000014
55	SW vs .UPGMC	0	0.000049
56	NBD vs .SW	0.000001	0.000079
57	BCA vs .CA	0.000001	0.000121
58	FF vs .P	0.000002	0.000172
59	CLARA vs .NBD	0.000003	0.000273
60	BN vs .FF	0.000004	0.000363
61	CLARA vs .UPGMC	0.000005	0.000427
62	BCA vs .NBC	0.000006	0.000563
63	BN vs .RSC	0.000009	0.000783
64	BN vs .S	0.000009	0.000783
65	KM vs .P	0.00001	0.000906
66	BN vs .3CC	0.000011	0.000947
67	P vs .RSC	0.000018	0.001538
68	P vs .S	0.000018	0.001538
69	BN vs .SC	0.00002	0.001675
70	BN vs .KM	0.000021	0.001747
71	P vs .3CC	0.000022	0.001822
72	BN vs .RBE	0.000029	0.002353
73	P vs .SC	0.000039	0.003191
74	P vs .RBE	0.000057	0.004531
75	CP vs .CA	0.000187	0.014759
76	BN vs .SW	0.000187	0.014759
77	BCA vs .P	0.000249	0.019145
78	CLARA vs .PAM	0.000286	0.02176
79	CA vs .PAM	0.000329	0.024696
80	P vs .SW	0.000345	0.025522
81	BCA vs .BN	0.000454	0.033149
82	CLARA vs .CP	0.000497	0.035795
83	NBC vs .RSC	0.000595	0.042239
84	NBC vs .S	0.000595	0.042239
85	FF vs .NBD	0.000622	0.042919
86	CP vs .NBC	0.00065	0.044217
87	NBC vs .3CC	0.00071	0.047593
88	FF vs .UPGMC	0.000884	0.058335
89	NBC vs .PAM	0.001096	0.071241