

Output tables for 1xN statistical comparisons.

June 6, 2025

1 Average rankings of Friedman test

Average ranks obtained by each method in the Friedman test.

Friedman statistic (distributed according to chi-square with 17 degrees of freedom): 344.660351.

P-value computed by Friedman Test: 0.

Iman and Davenport statistic (distributed according to F-distribution with 17 and 408 degrees of freedom): 102.960973.

P-value computed by Iman and Davenport Test: 0.

Algorithm	Ranking
BestCyclicAssignment	12.96
BestNearest	5.58
CLARA	11.08
CoefficientPropagation	11.16
CyclicAssignment	14.44
Farthest-First	4.02
KMEANS	4.38
NearestByCustomer	6.4
NearestByDepot	10.16
PAM	16.56
Parallel	6.4
RandomByElement	18
RandomSequentialCyclic	14.96
SequentialCyclic	14.64
Simplified	5.24
Sweep	5.26
ThreeCriteriaClustering	3.68
UPGMC	6.08

Table 1: Average Rankings of the algorithms (Friedman)

2 Post hoc comparison (Friedman)

P-values obtained in by applying post hoc methods over the results of Friedman procedure.

i	algorithm	$z = (R_0 - R_i)/SE$	p	Holm	Hochberg	Hommel	Holland	Rom	Finner	Li
17	RandomByElement	9.483652	0	0.002941			0.003013	0.003094	0.003013	0.009376
16	PAM	8.529988	0	0.003125			0.003201	0.003288	0.006016	0.009376
15	RandomSequentialCyclic	7.470362	0	0.003333			0.003414	0.003507	0.009011	0.009376
14	SequentialCyclic	7.258437	0	0.003571			0.003657	0.003757	0.011996	0.009376
13	CyclicAssignment	7.125984	0	0.003846			0.003938	0.004046	0.014973	0.009376
12	BestCyclicAssignment	6.14583	0	0.004167			0.004265	0.004383	0.017941	0.009376
11	CoefficientPropagation	4.953751	0.000001	0.004545			0.004652	0.004782	0.020899	0.009376
10	CLARA	4.90077	0.000001	0.005			0.005116	0.00526	0.023849	0.009376
9	NearestByDepot	4.291485	0.000018	0.005556			0.005683	0.005844	0.02679	0.009376
8	NearestByCustomer	1.801364	0.071646	0.00625			0.006391	0.006574	0.029722	0.009376
7	Parallel	1.801364	0.071646	0.007143			0.007301	0.007513	0.032645	0.009376
6	UPGMC	1.589439	0.111961	0.008333			0.008512	0.008764	0.035559	0.009376
5	BestNearest	1.258306	0.208281	0.01			0.010206	0.010515	0.038465	0.009376
4	Sweep	1.046381	0.295385	0.0125			0.012741	0.013109	0.041362	0.009376
3	Simplified	1.033135	0.301541	0.016667			0.016952	0.016667	0.04425	0.009376
2	KMEANS	0.463586	0.642944	0.025			0.025321	0.025	0.047129	0.009376
1	Farthest-First	0.225171	0.821847	0.05			0.05	0.05	0.05	0.05

Table 2: Post Hoc comparison Table for $\alpha = 0.05$ (FRIEDMAN)

Bonferroni-Dunn's procedure rejects those hypotheses that have an unadjusted p-value ≤ 0.002941 .

Holm's procedure rejects those hypotheses that have an unadjusted p-value ≤ 0.00625 .

Hochberg's procedure rejects those hypotheses that have an unadjusted p-value ≤ 0.005556 .

Hommel's procedure rejects those hypotheses that have an unadjusted p-value ≤ 0.00625 .

Holland's procedure rejects those hypotheses that have an unadjusted p-value ≤ 0.006391 .

Rom's procedure rejects those hypotheses that have an unadjusted p-value ≤ 0.005844 .

Finner's procedure rejects those hypotheses that have an unadjusted p-value ≤ 0.029722 .

Li's procedure rejects those hypotheses that have an unadjusted p-value ≤ 0.009376 .

3 Adjusted P-Values (Friedman)

Adjusted P-values obtained through the application of the post hoc methods (Friedman).

i	algorithm	unadjusted p	p_{Bonf}	p_{Holm}	$p_{Hochberg}$	p_{Hommel}
1	RandomByElement	0	0	0	0	0
2	PAM	0	0	0	0	0
3	RandomSequentialCyclic	0	0	0	0	0
4	SequentialCyclic	0	0	0	0	0
5	CyclicAssignment	0	0	0	0	0
6	BestCyclicAssignment	0	0	0	0	0
7	CoefficientPropagation	0.000001	0.000012	0.000008	0.000008	0.000007
8	CLARA	0.000001	0.000016	0.00001	0.00001	0.00001
9	NearestByDepot	0.000018	0.000302	0.00016	0.00016	0.00016
10	NearestByCustomer	0.071646	1.217974	0.573164	0.501519	0.429873
11	Parallel	0.071646	1.217974	0.573164	0.501519	0.429873
12	UPGMC	0.111961	1.903343	0.671768	0.671768	0.502568
13	BestNearest	0.208281	3.540781	1.041406	0.821847	0.624844
14	Sweep	0.295385	5.021551	1.181541	0.821847	0.821847
15	Simplified	0.301541	5.12619	1.181541	0.821847	0.821847
16	KMEANS	0.642944	10.930051	1.285888	0.821847	0.821847
17	Farthest-First	0.821847	13.971393	1.285888	0.821847	0.821847

Table 3: Adjusted p -values (FRIEDMAN) (I)

i	algorithm	unadjusted p	$p_{Holland}$	p_{Rom}	p_{Finner}	p_L
1	RandomByElement	0	0	0	0	0
2	PAM	0	0	0	0	0
3	RandomSequentialCyclic	0	0	0	0	0
4	SequentialCyclic	0	0	0	0	0
5	CyclicAssignment	0	0	0	0	0
6	BestCyclicAssignment	0	0	0	0	0
7	CoefficientPropagation	0.000001	0.000008	0.000008	0.000002	0.000001
8	CLARA	0.000001	0.00001	0.000009	0.000002	0.000001
9	NearestByDepot	0.000018	0.00016	0.000152	0.000034	0.000018
10	NearestByCustomer	0.071646	0.44829	0.476821	0.118721	0.286146
11	Parallel	0.071646	0.44829	0.476821	0.118721	0.286146
12	UPGMC	0.111961	0.509554	0.638745	0.154828	0.385196
13	BestNearest	0.208281	0.688932	0.821847	0.263179	0.538281
14	Sweep	0.295385	0.753506	0.821847	0.346313	0.623385
15	Simplified	0.301541	0.753506	0.821847	0.346313	0.623541
16	KMEANS	0.642944	0.872511	0.821847	0.665203	0.783944
17	Farthest-First	0.821847	0.872511	0.821847	0.821847	0.821847

Table 4: Adjusted p -values (FRIEDMAN) (II)