

# Output tables for 1xN statistical comparisons.

June 12, 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 15 degrees of freedom): 319.223039.

P-value computed by Friedman Test: 0.

Iman and Davenport statistic (distributed according to F-distribution with 15 and 525 degrees of freedom): 50.606759.

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

Algorithm	Ranking
BestCyclicAssignment	12.2778
BestNearest	6.9306
CLARA	10.8333
CoefficientPropagation	11.25
CyclicAssignment	13.8333
Farthest-First	3.1944
KMEANS	4.4028
NearestByCustomer	6.8056
NearestByDepot	10.8889
PAM	8.4167
Parallel	6.8056
RandomByElement	15.9722
Simplified	6.1389
Sweep	6.3194
ThreeCriteriaClustering	4.0417
UPGMC	7.8889

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
15	RandomByElement	11.386697	0		0.003333		0.003414	0.003507	0.003414	0.028934
14	CyclicAssignment	9.480663	0		0.003571		0.003657	0.003757	0.006816	0.028934
13	BestCyclicAssignment	8.094456	0		0.003846		0.003938	0.004046	0.010206	0.028934
12	CoefficientPropagation	7.17857	0		0.004167		0.004265	0.004383	0.013585	0.028934
11	NearestByDepot	6.856772	0		0.004545		0.004652	0.004782	0.016952	0.028934
10	CLARA	6.807264	0		0.005		0.005116	0.00526	0.020308	0.028934
9	PAM	4.653693	0.000003		0.005556		0.005683	0.005844	0.023653	0.028934
8	UPGMC	4.183373	0.000029		0.00625		0.006391	0.006574	0.026986	0.028934
7	BestNearest	3.329371	0.00087		0.007143		0.007301	0.007513	0.030307	0.028934
6	NearestByCustomer	3.21798	0.001291		0.008333		0.008512	0.008764	0.033617	0.028934
5	Parallel	3.21798	0.001291		0.01		0.010206	0.010515	0.036916	0.028934
4	Sweep	2.78479	0.005356		0.0125		0.012741	0.013109	0.040204	0.028934
3	Simplified	2.623891	0.008693		0.016667		0.016952	0.016667	0.043481	0.028934
2	KMEANS	1.076785	0.281576		0.025		0.025321	0.025	0.046746	0.028934
1	ThreeCriteriaClustering	0.754988	0.450256		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  $\leq 0.003333$ .

Holm's procedure rejects those hypotheses that have an unadjusted p-value  $\leq 0.025$ .

Hochberg's procedure rejects those hypotheses that have an unadjusted p-value  $\leq 0.016667$ .

Hommel's procedure rejects those hypotheses that have an unadjusted p-value  $\leq 0.025$ .

Holland's procedure rejects those hypotheses that have an unadjusted p-value  $\leq 0.025321$ .

Rom's procedure rejects those hypotheses that have an unadjusted p-value  $\leq 0.016667$ .

Finner's procedure rejects those hypotheses that have an unadjusted p-value  $\leq 0.046746$ .

Li's procedure rejects those hypotheses that have an unadjusted p-value  $\leq 0.028934$ .

### 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	CyclicAssignment	0	0	0	0	0
3	BestCyclicAssignment	0	0	0	0	0
4	CoefficientPropagation	0	0	0	0	0
5	NearestByDepot	0	0	0	0	0
6	CLARA	0	0	0	0	0
7	PAM	0.000003	0.000049	0.000029	0.000029	0.000029
8	UPGMC	0.000029	0.000431	0.00023	0.00023	0.00023
9	BestNearest	0.00087	0.013056	0.006093	0.006093	0.004352
10	NearestByCustomer	0.001291	0.019365	0.007746	0.006455	0.006455
11	Parallel	0.001291	0.019365	0.007746	0.006455	0.006455
12	Sweep	0.005356	0.080344	0.021425	0.021425	0.017386
13	Simplified	0.008693	0.130397	0.026079	0.026079	0.026079
14	KMEANS	0.281576	4.223642	0.563152	0.450256	0.450256
15	ThreeCriteriaClustering	0.450256	6.753847	0.563152	0.450256	0.450256

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

i	algorithm	unadjusted $p$	$p_{Holland}$	$p_{Rom}$	$p_{Finner}$	$p_{Li}$
1	RandomByElement	0	0	0	0	0
2	CyclicAssignment	0	0	0	0	0
3	BestCyclicAssignment	0	0	0	0	0
4	CoefficientPropagation	0	0	0	0	0
5	NearestByDepot	0	0	0	0	0
6	CLARA	0	0	0	0	0
7	PAM	0.000003	0.000029	0.000028	0.000007	0.000000
8	UPGMC	0.000029	0.00023	0.000218	0.000054	0.000000
9	BestNearest	0.00087	0.006077	0.005793	0.00145	0.0015
10	NearestByCustomer	0.001291	0.007721	0.006139	0.001936	0.0023
11	Parallel	0.001291	0.007721	0.006139	0.001936	0.0023
12	Sweep	0.005356	0.021253	0.020429	0.006691	0.0096
13	Simplified	0.008693	0.025853	0.026079	0.010024	0.0155
14	KMEANS	0.281576	0.483867	0.450256	0.298347	0.338
15	ThreeCriteriaClustering	0.450256	0.483867	0.450256	0.450256	0.4502

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