

# 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): 340.340686.

P-value computed by Friedman Test: 0.

Iman and Davenport statistic (distributed according to F-distribution with 15 and 525 degrees of freedom): 59.661249.

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

Algorithm	Ranking
BestCyclicAssignment	12.75
BestNearest	7.125
CLARA	10
CoefficientPropagation	12.1111
CyclicAssignment	14.0556
Farthest-First	3.4722
KMEANS	4.5694
NearestByCustomer	6.9167
NearestByDepot	10.8889
PAM	8.9722
Parallel	6.9167
RandomByElement	15.9722
Simplified	6.1111
Sweep	6.1806
ThreeCriteriaClustering	3.4306
UPGMC	6.5278

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	11.17629	0	0.003333			0.003414	0.003507	0.003414	0.001559
14	CyclicAssignment	9.468286	0	0.003571			0.003657	0.003757	0.006816	0.001559
13	BestCyclicAssignment	8.304863	0	0.003846			0.003938	0.004046	0.010206	0.001559
12	CoefficientPropagation	7.735528	0	0.004167			0.004265	0.004383	0.013585	0.001559
11	NearestByDepot	6.646365	0	0.004545			0.004652	0.004782	0.016952	0.001559
10	CLARA	5.854247	0	0.005			0.005116	0.00526	0.020308	0.001559
9	PAM	4.938361	0.000001	0.005556			0.005683	0.005844	0.023653	0.001559
8	BestNearest	3.292241	0.000994	0.00625			0.006391	0.006574	0.026986	0.001559
7	NearestByCustomer	3.106588	0.001893	0.007143			0.007301	0.007513	0.030307	0.001559
6	Parallel	3.106588	0.001893	0.008333			0.008512	0.008764	0.033617	0.001559
5	UPGMC	2.760036	0.005779	0.01			0.010206	0.010515	0.036916	0.001559
4	Sweep	2.450615	0.014261	0.0125			0.012741	0.013109	0.040204	0.001559
3	Simplified	2.388731	0.016907	0.016667			0.016952	0.016667	0.043481	0.001559
2	KMEANS	1.014901	0.310153	0.025			0.025321	0.025	0.046746	0.001559
1	Farthest-First	0.037131	0.970381	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  $\leq 0.0125$ .  
Hochberg's procedure rejects those hypotheses that have an unadjusted p-value  $\leq 0.01$ .  
Hommel's procedure rejects those hypotheses that have an unadjusted p-value  $\leq 0.016667$ .  
Holland's procedure rejects those hypotheses that have an unadjusted p-value  $\leq 0.012741$ .  
Rom's procedure rejects those hypotheses that have an unadjusted p-value  $\leq 0.010515$ .  
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  $\leq 0.001559$ .

### 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	0.000001	0.000012	0.000007	0.000007	0.000007
8	BestNearest	0.000994	0.014909	0.007951	0.007951	0.006624
9	NearestByCustomer	0.001893	0.028389	0.013248	0.011356	0.011356
10	Parallel	0.001893	0.028389	0.013248	0.011356	0.011356
11	UPGMC	0.005779	0.086692	0.028897	0.028897	0.028178
12	Sweep	0.014261	0.213918	0.057045	0.05072	0.042784
13	Simplified	0.016907	0.2536	0.057045	0.05072	0.05072
14	KMEANS	0.310153	4.652294	0.620306	0.620306	0.620306
15	Farthest-First	0.970381	14.555714	0.970381	0.970381	0.970381

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	0.000001	0.000007	0.000007	0.000002	0.0000
8	BestNearest	0.000994	0.007924	0.007559	0.001863	0.0324
9	NearestByCustomer	0.001893	0.013173	0.010797	0.003152	0.0600
10	Parallel	0.001893	0.013173	0.010797	0.003152	0.0600
11	UPGMC	0.005779	0.028565	0.027481	0.007873	0.1632
12	Sweep	0.014261	0.055836	0.05072	0.017795	0.3250
13	Simplified	0.016907	0.055836	0.05072	0.019482	0.3633
14	KMEANS	0.310153	0.524111	0.620306	0.328207	0.9128
15	Farthest-First	0.970381	0.970381	0.970381	0.970381	0.9703

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