# Output tables for 1xN statistical comparisons.

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## 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): 307.053922.
P-value computed by Friedman Test: 0.

Iman and Davenport statistic (distributed according to F-distribution with 15 and 525 degrees of freedom): 46.134656.
P-value computed by Iman and Daveport Test: -0.

| Algorithm | Ranking |
|---|---|
| BestCyclicAssignment | 12.5278 |
| BestNearest | 6.625 |
| CLARA | 11.0278 |
| CoefficientPropagation | 9.8333 |
| CyclicAssignment | 14.3611 |
| Farthest-First | 5.1944 |
| KMEANS | 5.5694 |
| NearestByCustomer | 6.3333 |
| NearestByDepot | 11.2222 |
| PAM | 9.1111 |
| Parallel | 6.3333 |
| RandomByElement | 15.9722 |
| Simplified | 5.3889 |
| Sweep | 5.5694 |
| ThreeCriteriaClustering | 6.4306 |
| UPGMC | 4.5 |

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 | 10.223273 | 0 | 0.003333 | 0.003414 | 0.003507 | 0.003414 | 0.02442 |
| 14 | CyclicAssignment | 8.787559 | 0 | 0.003571 | 0.003657 | 0.003757 | 0.006816 | 0.02442 |
| 13 | BestCyclicAssignment | 7.153816 | 0 | 0.003846 | 0.003938 | 0.004046 | 0.010206 | 0.02442 |
| 12 | NearestByDepot | 5.990393 | 0 | 0.004167 | 0.004265 | 0.004383 | 0.013585 | 0.02442 |
| 11 | CLARA | 5.817117 | 0 | 0.004545 | 0.004652 | 0.004782 | 0.016952 | 0.02442 |
| 10 | CoefficientPropagation | 4.752708 | 0.000002 | 0.005 | 0.005116 | 0.00526 | 0.020308 | 0.02442 |
| 9 | PAM | 4.109112 | 0.00004 | 0.005556 | 0.005683 | 0.005844 | 0.023653 | 0.02442 |
| 8 | BestNearest | 1.893657 | 0.058271 | 0.00625 | 0.006391 | 0.006574 | 0.026986 | 0.02442 |
| 7 | ThreeCriteriaClustering | 1.720381 | 0.085363 | 0.007143 | 0.007301 | 0.007513 | 0.030307 | 0.02442 |
| 6 | NearestByCustomer | 1.633743 | 0.102313 | 0.008333 | 0.008512 | 0.008764 | 0.033617 | 0.02442 |
| 5 | Parallel | 1.633743 | 0.102313 | 0.01 | 0.010206 | 0.010515 | 0.036916 | 0.02442 |
| 4 | KMEANS | 0.953017 | 0.340581 | 0.0125 | 0.012741 | 0.013109 | 0.040204 | 0.02442 |
| 3 | Sweep | 0.953017 | 0.340581 | 0.016667 | 0.016952 | 0.016667 | 0.043481 | 0.02442 |
| 2 | Simplified | 0.792118 | 0.428292 | 0.025 | 0.025321 | 0.025 | 0.046746 | 0.02442 |
| 1 | Farthest-First | 0.618842 | 0.53602 | 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 $\leq 0.00625$.
Hochberg's procedure rejects those hypotheses that have an unadjusted p-value $\leq 0.005556$.
Hommel's procedure rejects those hypotheses that have an unadjusted p-value $\leq 0.00625$.
Holland's procedure rejects those hypotheses that have an unadjusted p-value $\leq 0.006391$.
Rom's procedure rejects those hypotheses that have an unadjusted p-value $\leq 0.005844$.
Finner's procedure rejects those hypotheses that have an unadjusted p-value $\leq 0.026986$.
Li's procedure rejects those hypotheses that have an unadjusted p-value $\leq 0.02442$.

# 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 | NearestByDepot | 0 | 0 | 0 | 0 | 0 |
| 5 | CLARA | 0 | 0 | 0 | 0 | 0 |
| 6 | CoefficientPropagation | 0.000002 | 0.00003 | 0.00002 | 0.00002 | 0.00002 |
| 7 | PAM | 0.00004 | 0.000596 | 0.000357 | 0.000357 | 0.000357 |
| 8 | BestNearest | 0.058271 | 0.874058 | 0.466164 | 0.466164 | 0.306938 |
| 9 | ThreeCriteriaClustering | 0.085363 | 1.280447 | 0.597542 | 0.511564 | 0.426816 |
| 10 | NearestByCustomer | 0.102313 | 1.534691 | 0.613876 | 0.511564 | 0.511564 |
| 11 | Parallel | 0.102313 | 1.534691 | 0.613876 | 0.511564 | 0.511564 |
| 12 | KMEANS | 0.340581 | 5.108722 | 1.362326 | 0.53602 | 0.53602 |
| 13 | Sweep | 0.340581 | 5.108722 | 1.362326 | 0.53602 | 0.53602 |
| 14 | Simplified | 0.428292 | 6.424378 | 1.362326 | 0.53602 | 0.53602 |
| 15 | Farthest-First | 0.53602 | 8.040305 | 1.362326 | 0.53602 | 0.53602 |

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 | NearestByDepot | 0 | 0 | 0 | 0 | 0 |
| 5 | CLARA | 0 | 0 | 0 | 0 | 0 |
| 6 | CoefficientPropagation | 0.000002 | 0.00002 | 0.000019 | 0.000005 | 0.0000 |
| 7 | PAM | 0.00004 | 0.000357 | 0.00034 | 0.000085 | 0.0000 |
| 8 | BestNearest | 0.058271 | 0.381401 | 0.443181 | 0.106465 | 0.1115 |
| 9 | ThreeCriteriaClustering | 0.085363 | 0.464523 | 0.486492 | 0.138184 | 0.1553 |
| 10 | NearestByCustomer | 0.102313 | 0.4767 | 0.486492 | 0.149474 | 0.1806 |
| 11 | Parallel | 0.102313 | 0.4767 | 0.486492 | 0.149474 | 0.1806 |
| 12 | KMEANS | 0.340581 | 0.81092 | 0.53602 | 0.405774 | 0.4233 |
| 13 | Sweep | 0.340581 | 0.81092 | 0.53602 | 0.405774 | 0.4233 |
| 14 | Simplified | 0.428292 | 0.81092 | 0.53602 | 0.450675 | 0.4800 |
| 15 | Farthest-First | 0.53602 | 0.81092 | 0.53602 | 0.53602 | 0.536 |

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