**DATA SET - D-CFLP & D-CFLP-NR**

Tores-Soto, J. E. and Uster, H., “Dynamic Demand Capacitated Facility Location Problems with and without Relocation,” *International Journal of Production Research*, Vol. 49/13, pp. 3979-4005, 2011.

**Computation of Random Data:** Details about generating random test instances.

* Total Demand of Customers
	+ **Coordinates:** For each customer , we generate a pair of coordinates from a discrete uniform distribution,  from  and  from .
	+ **Regions:** Each customer is assigned to a region according to its *x*-coordinate, i.e., region A in , region B in , and region C in .
	+ **Total Demand Patterns:** To generate each demand structure, first we define a non-negative base value, , for each region,  . We define and  for . The demand in the first period for each customer location is randomly generated from a discrete uniform distribution , truncating the value towards zero.

For  and , we define non-negative scalars  and  to generate a random number, , from a uniform distribution ; then for , the demand for each customer location is randomly generated from a discrete uniform distribution , truncating the value towards zero.

For , we evenly divide the length of the time horizon in three intervals, say ; ; and . We define the values of  and  to generate the random number, , in each interval. For , the demand for each customer location is randomly generated from a discrete uniform distribution ; for , from a discrete uniform distribution ; and for , from a discrete uniform distribution .

The following are the values used to generate the demand of customers:



* **Test Instances:**
	+ Data sets for D-CFLP:

|  |  |
| --- | --- |
|  |  D-CFLP Increasing Demand |
|  | *Parameters* |  |  | *Parameters* |
| Cluster |  |  | *p* % | *f* |  | Cluster |  |  | *p* % | *f* |
| [1](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cincreasing%5Ccluster%201.zip) | 50 | 5 | 5 | *U*[100000, | 150000] |  | [7](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cincreasing%5Ccluster%207.zip) | 100 | 5 | 5 | *U*[100000, | 150000] |
| 50 | 5 | 10 | *U*[100000, | 150000] |  | 100 | 5 | 10 | *U*[100000, | 150000] |
| 50 | 5 | 15 | *U*[100000, | 150000] |  | 100 | 5 | 15 | *U*[100000, | 150000] |
| [2](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cincreasing%5Ccluster%202.zip) | 50 | 5 | 5 | *U*[200000, | 250000] |  | [8](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cincreasing%5Ccluster%208.zip) | 100 | 5 | 5 | *U*[200000, | 250000] |
| 50 | 5 | 10 | *U*[200000, | 250000] |  | 100 | 5 | 10 | *U*[200000, | 250000] |
| 50 | 5 | 15 | *U*[200000, | 250000] |  | 100 | 5 | 15 | *U*[200000, | 250000] |
| [3](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cincreasing%5Ccluster%203.zip) | 50 | 5 | 5 | *U*[300000, | 350000] |  | [9](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cincreasing%5Ccluster%209.zip) | 100 | 5 | 5 | *U*[300000, | 350000] |
| 50 | 5 | 10 | *U*[300000, | 350000] |  | 100 | 5 | 10 | *U*[300000, | 350000] |
| 50 | 5 | 15 | *U*[300000, | 350000] |  | 100 | 5 | 15 | *U*[300000, | 350000] |
| [4](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cincreasing%5Ccluster%204.zip) | 50 | 10 | 5 | *U*[100000, | 150000] |  | [10](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cincreasing%5Ccluster%2010.zip) | 100 | 10 | 5 | *U*[100000, | 150000] |
| 50 | 10 | 10 | *U*[100000, | 150000] |  | 100 | 10 | 10 | *U*[100000, | 150000] |
| 50 | 10 | 15 | *U*[100000, | 150000] |  | 100 | 10 | 15 | *U*[100000, | 150000] |
| [5](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cincreasing%5Ccluster%205.zip) | 50 | 10 | 5 | *U*[200000, | 250000] |  | [11](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cincreasing%5Ccluster%2011.zip) | 100 | 10 | 5 | *U*[200000, | 250000] |
| 50 | 10 | 10 | *U*[200000, | 250000] |  | 100 | 10 | 10 | *U*[200000, | 250000] |
| 50 | 10 | 15 | *U*[200000, | 250000] |  | 100 | 10 | 15 | *U*[200000, | 250000] |
| [6](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cincreasing%5Ccluster%206.zip) | 50 | 10 | 5 | *U*[300000, | 350000] |  | [12](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cincreasing%5Ccluster%2012.zip) | 100 | 10 | 5 | *U*[300000, | 350000] |
| 50 | 10 | 10 | *U*[300000, | 350000] |  | 100 | 10 | 10 | *U*[300000, | 350000] |
| 50 | 10 | 15 | *U*[300000, | 350000] |  | 100 | 10 | 15 | *U*[300000, | 350000] |

|  |  |
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|  |  D-CFLP Decreasing Demand |
|  | *Parameters* |  |  | *Parameters* |
| Cluster |  |  | *p* % | *f* |  | Cluster |  |  | *p* % | *f* |
| [1](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cdecreasing%5Ccluster%201.zip) | 50 | 5 | 5 | *U*[100000, | 150000] |  | [7](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cdecreasing%5Ccluster%207.zip) | 100 | 5 | 5 | *U*[100000, | 150000] |
| 50 | 5 | 10 | *U*[100000, | 150000] |  | 100 | 5 | 10 | *U*[100000, | 150000] |
| 50 | 5 | 15 | *U*[100000, | 150000] |  | 100 | 5 | 15 | *U*[100000, | 150000] |
| [2](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cdecreasing%5Ccluster%202.zip) | 50 | 5 | 5 | *U*[200000, | 250000] |  | [8](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cdecreasing%5Ccluster%208.zip) | 100 | 5 | 5 | *U*[200000, | 250000] |
| 50 | 5 | 10 | *U*[200000, | 250000] |  | 100 | 5 | 10 | *U*[200000, | 250000] |
| 50 | 5 | 15 | *U*[200000, | 250000] |  | 100 | 5 | 15 | *U*[200000, | 250000] |
| [3](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cdecreasing%5Ccluster%203.zip) | 50 | 5 | 5 | *U*[300000, | 350000] |  | [9](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cdecreasing%5Ccluster%209.zip) | 100 | 5 | 5 | *U*[300000, | 350000] |
| 50 | 5 | 10 | *U*[300000, | 350000] |  | 100 | 5 | 10 | *U*[300000, | 350000] |
| 50 | 5 | 15 | *U*[300000, | 350000] |  | 100 | 5 | 15 | *U*[300000, | 350000] |
| [4](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cdecreasing%5Ccluster%204.zip) | 50 | 10 | 5 | *U*[100000, | 150000] |  | [10](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cdecreasing%5Ccluster%2010.zip) | 100 | 10 | 5 | *U*[100000, | 150000] |
| 50 | 10 | 10 | *U*[100000, | 150000] |  | 100 | 10 | 10 | *U*[100000, | 150000] |
| 50 | 10 | 15 | *U*[100000, | 150000] |  | 100 | 10 | 15 | *U*[100000, | 150000] |
| [5](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cdecreasing%5Ccluster%205.zip) | 50 | 10 | 5 | *U*[200000, | 250000] |  | [11](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cdecreasing%5Ccluster%2011.zip) | 100 | 10 | 5 | *U*[200000, | 250000] |
| 50 | 10 | 10 | *U*[200000, | 250000] |  | 100 | 10 | 10 | *U*[200000, | 250000] |
| 50 | 10 | 15 | *U*[200000, | 250000] |  | 100 | 10 | 15 | *U*[200000, | 250000] |
| [6](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cdecreasing%5Ccluster%206.zip) | 50 | 10 | 5 | *U*[300000, | 350000] |  | [12](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Cdecreasing%5Ccluster%2012.zip) | 100 | 10 | 5 | *U*[300000, | 350000] |
| 50 | 10 | 10 | *U*[300000, | 350000] |  | 100 | 10 | 10 | *U*[300000, | 350000] |
| 50 | 10 | 15 | *U*[300000, | 350000] |  | 100 | 10 | 15 | *U*[300000, | 350000] |

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| --- | --- |
|  |  D-CFLP Steady Demand |
|  | *Parameters* |  |  | *Parameters* |
| Cluster |  |  | *p* % | *f* |  | Cluster |  |  | *p* % | *f* |
| [1](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Csteady%5Ccluster%201.zip) | 50 | 5 | 5 | *U*[100000, | 150000] |  | [7](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Csteady%5Ccluster%207.zip) | 100 | 5 | 5 | *U*[100000, | 150000] |
| 50 | 5 | 10 | *U*[100000, | 150000] |  | 100 | 5 | 10 | *U*[100000, | 150000] |
| 50 | 5 | 15 | *U*[100000, | 150000] |  | 100 | 5 | 15 | *U*[100000, | 150000] |
| [2](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Csteady%5Ccluster%202.zip) | 50 | 5 | 5 | *U*[200000, | 250000] |  | [8](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Csteady%5Ccluster%208.zip) | 100 | 5 | 5 | *U*[200000, | 250000] |
| 50 | 5 | 10 | *U*[200000, | 250000] |  | 100 | 5 | 10 | *U*[200000, | 250000] |
| 50 | 5 | 15 | *U*[200000, | 250000] |  | 100 | 5 | 15 | *U*[200000, | 250000] |
| [3](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Csteady%5Ccluster%203.zip) | 50 | 5 | 5 | *U*[300000, | 350000] |  | [9](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Csteady%5Ccluster%209.zip) | 100 | 5 | 5 | *U*[300000, | 350000] |
| 50 | 5 | 10 | *U*[300000, | 350000] |  | 100 | 5 | 10 | *U*[300000, | 350000] |
| 50 | 5 | 15 | *U*[300000, | 350000] |  | 100 | 5 | 15 | *U*[300000, | 350000] |
| [4](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Csteady%5Ccluster%204.zip) | 50 | 10 | 5 | *U*[100000, | 150000] |  | [10](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Csteady%5Ccluster%2010.zip) | 100 | 10 | 5 | *U*[100000, | 150000] |
| 50 | 10 | 10 | *U*[100000, | 150000] |  | 100 | 10 | 10 | *U*[100000, | 150000] |
| 50 | 10 | 15 | *U*[100000, | 150000] |  | 100 | 10 | 15 | *U*[100000, | 150000] |
| [5](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Csteady%5Ccluster%205.zip) | 50 | 10 | 5 | *U*[200000, | 250000] |  | [11](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Csteady%5Ccluster%2011.zip) | 100 | 10 | 5 | *U*[200000, | 250000] |
| 50 | 10 | 10 | *U*[200000, | 250000] |  | 100 | 10 | 10 | *U*[200000, | 250000] |
| 50 | 10 | 15 | *U*[200000, | 250000] |  | 100 | 10 | 15 | *U*[200000, | 250000] |
| [6](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Csteady%5Ccluster%206.zip) | 50 | 10 | 5 | *U*[300000, | 350000] |  | [12](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp%5Csteady%5Ccluster%2012.zip) | 100 | 10 | 5 | *U*[300000, | 350000] |
| 50 | 10 | 10 | *U*[300000, | 350000] |  | 100 | 10 | 10 | *U*[300000, | 350000] |
| 50 | 10 | 15 | *U*[300000, | 350000] |  | 100 | 10 | 15 | *U*[300000, | 350000] |

Each data set has 360 files arranged into 12 zip files, one for each cluster. Each cluster contains 3 classes, and each class contains 10 instances.

* + Data set for D-CFLP-NR:

|  |  |
| --- | --- |
|  |  D-CFLP-NR Increasing Demand |
|  | *Parameters* |  |  | *Parameters* |
| Cluster |  |  | *p* % | *f* |  | Cluster |  |  | *p* % | *f* |
| [1](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Cincreasing%5Ccluster%201.zip) | 50 | 5 | 15 | *U*[100000, | 150000] |  | [5](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Cincreasing%5Ccluster%205.zip) | 150 | 5 | 15 | *U*[100000, | 150000] |
| 50 | 5 | 15 | *U*[200000, | 250000] |  | 150 | 5 | 15 | *U*[200000, | 250000] |
| 50 | 5 | 15 | *U*[300000, | 350000] |  | 150 | 5 | 15 | *U*[300000, | 350000] |
| [2](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Cincreasing%5Ccluster%202.zip) | 50 | 10 | 15 | *U*[100000, | 150000] |  | [6](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Cincreasing%5Ccluster%206.zip) | 150 | 10 | 15 | *U*[100000, | 150000] |
| 50 | 10 | 15 | *U*[200000, | 250000] |  | 150 | 10 | 15 | *U*[200000, | 250000] |
| 50 | 10 | 15 | *U*[300000, | 350000] |  | 150 | 10 | 15 | *U*[300000, | 350000] |
| [3](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Cincreasing%5Ccluster%203.zip) | 100 | 5 | 15 | *U*[100000, | 150000] |  | [7](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Cincreasing%5Ccluster%207.zip) | 200 | 5 | 15 | *U*[100000, | 150000] |
| 100 | 5 | 15 | *U*[200000, | 250000] |  | 200 | 5 | 15 | *U*[200000, | 250000] |
| 100 | 5 | 15 | *U*[300000, | 350000] |  | 200 | 5 | 15 | *U*[300000, | 350000] |
| [4](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Cincreasing%5Ccluster%204.zip) | 100 | 10 | 15 | *U*[100000, | 150000] |  | [8](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Cincreasing%5Ccluster%208.zip) | 200 | 10 | 15 | *U*[100000, | 150000] |
| 100 | 10 | 15 | *U*[200000, | 250000] |  | 200 | 10 | 15 | *U*[200000, | 250000] |
| 100 | 10 | 15 | *U*[300000, | 350000] |  | 200 | 10 | 15 | *U*[300000, | 350000] |

|  |  |
| --- | --- |
|  |  D-CFLP-NR Decreasing Demand |
|  | *Parameters* |  |  | *Parameters* |
| Cluster |  |  | *p* % | *f* |  | Cluster |  |  | *p* % | *f* |
| [1](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Cdecreasing%5Ccluster%201.zip) | 50 | 5 | 15 | *U*[100000, | 150000] |  | [5](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Cdecreasing%5Ccluster%205.zip) | 150 | 5 | 15 | *U*[100000, | 150000] |
| 50 | 5 | 15 | *U*[200000, | 250000] |  | 150 | 5 | 15 | *U*[200000, | 250000] |
| 50 | 5 | 15 | *U*[300000, | 350000] |  | 150 | 5 | 15 | *U*[300000, | 350000] |
| [2](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Cdecreasing%5Ccluster%202.zip) | 50 | 10 | 15 | *U*[100000, | 150000] |  | [6](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Cdecreasing%5Ccluster%206.zip) | 150 | 10 | 15 | *U*[100000, | 150000] |
| 50 | 10 | 15 | *U*[200000, | 250000] |  | 150 | 10 | 15 | *U*[200000, | 250000] |
| 50 | 10 | 15 | *U*[300000, | 350000] |  | 150 | 10 | 15 | *U*[300000, | 350000] |
| [3](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Cdecreasing%5Ccluster%203.zip) | 100 | 5 | 15 | *U*[100000, | 150000] |  | [7](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Cdecreasing%5Ccluster%207.zip) | 200 | 5 | 15 | *U*[100000, | 150000] |
| 100 | 5 | 15 | *U*[200000, | 250000] |  | 200 | 5 | 15 | *U*[200000, | 250000] |
| 100 | 5 | 15 | *U*[300000, | 350000] |  | 200 | 5 | 15 | *U*[300000, | 350000] |
| [4](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Cdecreasing%5Ccluster%204.zip) | 100 | 10 | 15 | *U*[100000, | 150000] |  | [8](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Cdecreasing%5Ccluster%208.zip) | 200 | 10 | 15 | *U*[100000, | 150000] |
| 100 | 10 | 15 | *U*[200000, | 250000] |  | 200 | 10 | 15 | *U*[200000, | 250000] |
| 100 | 10 | 15 | *U*[300000, | 350000] |  | 200 | 10 | 15 | *U*[300000, | 350000] |

|  |  |
| --- | --- |
|  |  D-CFLP-NR Steady Demand |
|  | *Parameters* |  |  | *Parameters* |
| Cluster |  |  | *p* % | *f* |  | Cluster |  |  | *p* % | *f* |
| [1](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Csteady%5Ccluster%201.zip) | 50 | 5 | 15 | *U*[100000, | 150000] |  | [5](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Csteady%5Ccluster%205.zip) | 150 | 5 | 15 | *U*[100000, | 150000] |
| 50 | 5 | 15 | *U*[200000, | 250000] |  | 150 | 5 | 15 | *U*[200000, | 250000] |
| 50 | 5 | 15 | *U*[300000, | 350000] |  | 150 | 5 | 15 | *U*[300000, | 350000] |
| [2](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Csteady%5Ccluster%202.zip) | 50 | 10 | 15 | *U*[100000, | 150000] |  | [6](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Csteady%5Ccluster%206.zip) | 150 | 10 | 15 | *U*[100000, | 150000] |
| 50 | 10 | 15 | *U*[200000, | 250000] |  | 150 | 10 | 15 | *U*[200000, | 250000] |
| 50 | 10 | 15 | *U*[300000, | 350000] |  | 150 | 10 | 15 | *U*[300000, | 350000] |
| [3](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Csteady%5Ccluster%203.zip) | 100 | 5 | 15 | *U*[100000, | 150000] |  | [7](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Csteady%5Ccluster%207.zip) | 200 | 5 | 15 | *U*[100000, | 150000] |
| 100 | 5 | 15 | *U*[200000, | 250000] |  | 200 | 5 | 15 | *U*[200000, | 250000] |
| 100 | 5 | 15 | *U*[300000, | 350000] |  | 200 | 5 | 15 | *U*[300000, | 350000] |
| [4](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Csteady%5Ccluster%204.zip) | 100 | 10 | 15 | *U*[100000, | 150000] |  | [8](file:///%5C%5Cjungle%5CLNS%24%5Cdcflp_nr%5Csteady%5Ccluster%208.zip) | 200 | 10 | 15 | *U*[100000, | 150000] |
| 100 | 10 | 15 | *U*[200000, | 250000] |  | 200 | 10 | 15 | *U*[200000, | 250000] |
| 100 | 10 | 15 | *U*[300000, | 350000] |  | 200 | 10 | 15 | *U*[300000, | 350000] |

Each data set has 240 files arranged into 8 zip files, one for each cluster. Each cluster contains 3 classes, and each class contains 10 instances.

* **Data Files and Format:**
	+ All data files are “\*.txt” format.
	+ For each instance, the file contains the following data:
		- Number of customer locations .
		- Number of facility locations .
		- Number of periods .
		- Expected number of facilities *p* %.
		- Coordinates: arranged in  rows and 2 columns; each row corresponds to a customer location; the first and second columns correspond to the  and  coordinates respectively.
		- Capacity: arranged in  rows and 1 column; each row corresponds to the capacity available at each facility location.
		- Demand: arranged in  rows and  columns; each row corresponds to a customer location; each column corresponds to the customer’s demand in each time period.
		- Transportation cost: arranged in  blocks, one for each customer location; each block has  rows and  columns.
		- Fixed operating, opening, and closing (only for D-CFLP) costs: each file has  rows and  columns (for D-CFLP-NR the opening cost is arranged in  rows and 1 column); each row corresponds to a facility location and each column to the fixed cost in each time period.