Multi-Objective Vehicle Routing Problem with Time Windows Dataset

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1 Dataset Generator

A Dataset Generator has been developed to assist the creation of instances. This generator takes a number of parameters in order to create the instances:

- **size: integer** that corresponds to the number of costumers who must be served in this instance.
- **timeWindowsFile: string**. Parameter that correspond to the path to a file that specifies a time windows profile. This file must be in XML format, and times must be specified in seconds. Example:

Listing 1: timewindows.xml

```
<?xml version="1.0" ?>
<time-windows-specification>
       <depot opens="0" closes="36000" />
       <time-windows>
              <time-window opens="0" closes="36000" probability="0.25" />
              <time-window opens="0" closes="14400" probability="0.25" />
              <time-window opens="10800" closes="25200" probability="0.25" />
              <time-window opens="21600" closes="36000" probability="0.25" />
       </time-windows>
</time-windows-specification>
```

This file specifies the opening and closing times of different time windows in seconds. The first field contains the time window of the depot (opens at 0 and closes at 36000 seconds). Moreover, this file contains four types of time window, each of them with a certain probability associated. These probabilities will be used to

assign each costumer with a type of time window, and their sum should be 1. If the probabilities does not sum up 100, the probabilities will be re-scaled.

- **demandsFile: string** is the path to a file containing the demands specifications. This file must have an XML format. Example:

Listing 2: demands.xml

```
<?xml version="1.0" ?>
<demands-specifications>
	<delta value="50" />
	<demands>
		<demand type="10" probability="0.25" />
		<demand type="20" probability="0.25" />
		<demand type="30" probability="0.50" />
	</demands>
</demands-specifications>
```

This associates a demand to each costumer, and the size of the fleet and its capacity. To this purpose, a parameter "delta" is defined at the top of the file. This parameter will modulate how constrained the instance will be according to the capacity restrictions. Furthermore, as in the time windows specifications file, a number of demands are defined to work in a similar fashion.

- **serviceTimeFile: string** that represents the path to a file that contains the specification to create the service times. That is, the time that takes to actually serve a costumer once the vehicle has arrived at its location. This file must be in XML format with the following structure:

Listing 3: serviceTimes.xml

```
<?xml version="1.0" ?>
<service-times-specifications>
	<service-times>
		<service-time type="600" probability="0.25" />
		<service-time type="1200" probability="0.25" />
		<service-time type="1800" probability="0.50" />
	</service-times>
</service-times-specifications>
```

This file has three type of service times (specified in seconds), each of them with certain probability.

- **seedMatrix: integer** sets the seed to select which costumers will be used.
- **seedTimeWindows: integer** sets the seed to assign a type of time window to each costumer.
- **seedDemands: integer** sets the seed to assign a type of demand to each costumer.

- **seedServiceTime: integer** sets the seed to assign a type of service time to each costumer.
- **outputPrefix: string** is the prefix of the output files containing the information of the instance. Three files will generated: a file containing the distance matrix, a file with time matrix and another file with Solomon-type information. In the following example, we show the three output files using the prefix 'test100'.

```
test100.distanceMatrix
test100.timeMatrix
test100.Solomon
```