Shipment Tour formation V1.0

Documentation

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# Introduction

## Scope and objectives

After generation of the shipments from to the logistic firms, the shipment simulator use tour formation module to schedule the tours from the shipments. This module use three set of choice models e.g. time of day choice model, end of tour first, and end of tour later choice models to assign shipmnets to the tours and use 2-opt algorithm to schedule tours.

# Requirements.

## Software requirements

The simulators have been built using Python version 3.8.8.

The following Python libraries need to be installed:

1. pandas==1.3.4
2. pyshp==2.1.3
3. tk==0.1.0
4. numpy==1.19.1
5. scipy==1.5.0
6. shapely==1.7.0
7. numba==0.53.0

## Input/Outputs

### Inputs

The inputs of the Tour formation simulator are described in Table 1.

Table 1 Tour formation– Inputs and description

|  |  |
| --- | --- |
| Inputs | Description |
| skimTijd\_new\_REF.mtx | Travel time skim matrix |
| skimAfstand\_new\_REF.mtx | Distance skim matrix |
| Zones\_v6.shp | study area |
| SEGS2020.csv | Socioeconomic Data |
| distributieCentra.csv | Distribution centers |
| SupCoordinatesID.csv | External Zones |
| CarryingCapacity.csv | Capacity of vehicles |
| Params\_TOD.csv | Parameters of time of day choice model |
| Params\_EndTourFirst.csv | Parameters of the end of tour choice model for the later visited locations |
| Params\_EndTourLater.csv | Paraeters of the end of tour chice model fo the later visited locations |
| Shipments\_REF.csv | Paraeters of the end of tour chice model fo the later visited locations |
| logistic\_segment.txt | Logistics segments |
| nstr.txt | Commodity types |
| vehicle\_type.txt | Vehicle types |
| combustion\_type.txt | Engine types |

### Outputs

The outputs of the Tour formation module are described in Table 2.

Table 2 Tour formation module– Outputs

|  |  |
| --- | --- |
| Outputs | Description |
| Shipments\_AfterScheduling\_REF.csv | Shipment after scheduling |
| Tours\_REF.csv | Generated tours |
| Tours\_REF.shp | Shapefile of the shipments |
| tripmatrix\_REF.txt | Trip Matrix for the reference day |
| tripmatrix\_REF\_TOD0.txt | Trip Matrix for the hour 0:00 |
| tripmatrix\_REF\_TOD1.txt | Trip Matrix for the hour 1:00 |
| tripmatrix\_REF\_TOD2.txt | Trip Matrix for the hour 2:00 |
| tripmatrix\_REF\_TOD3.txt | Trip Matrix for the hour 3:00 |
| tripmatrix\_REF\_TOD4.txt | Trip Matrix for the hour 4:00 |
| tripmatrix\_REF\_TOD5.txt | Trip Matrix for the hour 5:00 |
| tripmatrix\_REF\_TOD6.txt | Trip Matrix for the hour 6:00 |
| tripmatrix\_REF\_TOD7.txt | Trip Matrix for the hour 7:00 |
| tripmatrix\_REF\_TOD8.txt | Trip Matrix for the hour 8:00 |
| tripmatrix\_REF\_TOD9.txt | Trip Matrix for the hour 9:00 |
| tripmatrix\_REF\_TOD10.txt | Trip Matrix for the hour 10:00 |
| tripmatrix\_REF\_TOD11.txt | Trip Matrix for the hour 11:00 |
| tripmatrix\_REF\_TOD12.txt | Trip Matrix for the hour 12:00 |
| tripmatrix\_REF\_TOD13.txt | Trip Matrix for the hour 13:00 |
| tripmatrix\_REF\_TOD14.txt | Trip Matrix for the hour 14:00 |
| tripmatrix\_REF\_TOD15.txt | Trip Matrix for the hour 15:00 |
| tripmatrix\_REF\_TOD16.txt | Trip Matrix for the hour 16:00 |
| tripmatrix\_REF\_TOD17.txt | Trip Matrix for the hour 17:00 |
| tripmatrix\_REF\_TOD18.txt | Trip Matrix for the hour 18:00 |
| tripmatrix\_REF\_TOD19.txt | Trip Matrix for the hour 19:00 |
| tripmatrix\_REF\_TOD20.txt | Trip Matrix for the hour 20:00 |
| tripmatrix\_REF\_TOD21.txt | Trip Matrix for the hour 21:00 |
| tripmatrix\_REF\_TOD22.txt | Trip Matrix for the hour 22:00 |
| tripmatrix\_REF\_TOD23.txt | Trip Matrix for the hour 23:00 |
| Logfile\_TourFormation.log | Log file for the tour formation |

## Paths structure

The directory where the model is located has the following structure:

── Root

├── Input Folder

│

└── Output folder

# Model Description

This section describes the different files and scripts present in the model

|  |  |  |
| --- | --- | --- |
| File name | Location | Description |
| \_\_module\_TOUR\_\_.py | Root | Main script |
| \_\_functions\_\_.py | Root | External functions |
| requirements.txt | Root | Python packages required |

# Instructions to run the model

## Command line execution of the model

### Instructions and commands

The instruction to install the packages needed:

* pip install -r requirements.txt

The instruction to run the model

python3 \_\_module\_TOUR\_\_.py REF Input Output skimTijd\_new\_REF.mtx skimAfstand\_new\_REF.mtx Zones\_v6.shp SEGS2020.csv distributieCentra.csv SupCoordinatesID.csv CarryingCapacity.csv Params\_TOD.csv Params\_EndTourFirst.csv Params\_EndTourLater.csv

### Arguments

The arguments in the instructions to run the model are:

Table 3 Tour model – Input arguments for command line

|  |  |
| --- | --- |
| Arg[0] | Script name |
| Arg[1] | Lable (name of scenario) |
| Arg[2] | Input folder name |
| Arg[3] | Output folder name |
| Arg[4] | Time skim matrx |
| Arg[5] | Distance skim matrix |
| Arg[6] | Zone shapefile |
| Arg[7] | Socioec data |
| Arg[8] | Distribution centers |
| Arg[9] | External zones |
| Arg[10] | Carriying capacity |
| Arg[11] | Params\_TOD |
| Arg[12] | Params\_EndTourFirst |
| Arg[13] | Params\_EndTourLater |

## Requirements

### Testing requirements

pip install -r requirements.txt

### Input folder (Arg[2])

Folder 1( e.g. Input)

Which files are in the folder, what do they do, what type of file (csv, etc) what requirements do they have (table with headers, what each row represent, etC)

Table 4 Tour module– Inputs and requirments

|  |  |  |
| --- | --- | --- |
| Inputs | Type | Requirements |
| skimTijd\_new\_REF | .mtx | Id of areas ordered increasingly |
| skimAfstand\_new\_REF | .mtx | Id of areas ordered increasingly |
| Zones\_v6 |  | .dbf with the same name |
| SEGS2020 | .csv | Required cols:  “zone”;  "1: woningen";  "9: arbeidspl\_totaal" |
| distributieCentra.csv | .csv | Distribution centers  "colnames": [{  "oppervlak":"float",  "WP": "int",  "Xcoor": "float",  "Ycoor": "float",  "AREANR": "int"  }] |
| SupCoordinatesID | .csv | Required cols:  “COROP”;  " Xcoor ";  “Ycoor”;  " AREANR "; |
| CarryingCapacity | .csv | carrying capacity  "columns":[{  "Vehicle Type":"str",  "Tonnes": "float"  }] |
| Params\_TOD | .csv | parameters of time of day choice model |
| Params\_EndTourFirst | .csv | Parameters of end of tour choice model for the first visited location |
| Params\_EndTourLater | .csv | Parameters of the end of tour choice model for the later visited locations |
| logistic\_segment | .txt | Logistic segment  "columns":[{  "ID":"Int",  "comment": "str"  }] |
| nstr | .txt | Commodity types  "columns":[{  "ID":"Int",  "comment": "str"  }] |
| vehicle\_type | .txt | Vehicle type  "columns":[{  "ID":"Int",  "IsRefTypeFreight": "boolean",  "IsAvailableInParcelModule":" boolean",  " Comment ":"str",  }] |
| combustion\_type | .txt | Combustion type  "columns":[{  "ID":"Int",  "comment": "str"  }] |