U.PORTO
FEUP FACULDADE DE ENGENHARIA
UNIVERSIDADE DO PORTO

L.EIC – BSc/First Degree in Informatics and Computing Engineering

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L.EIC016

Analysis and Synthesis of Algorithms
Design of Algorithms (DA)

DA Railway Network

Programming Project I

An Analysis Tool for Railway Network Management

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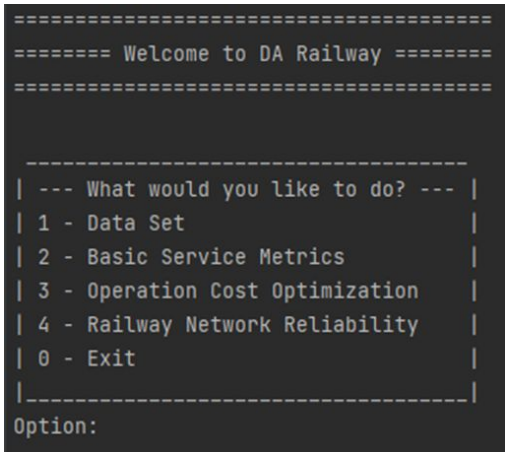
Main Menu



A welcoming menu with all secondary menus available to be chosen next.

There are four secondary menus:

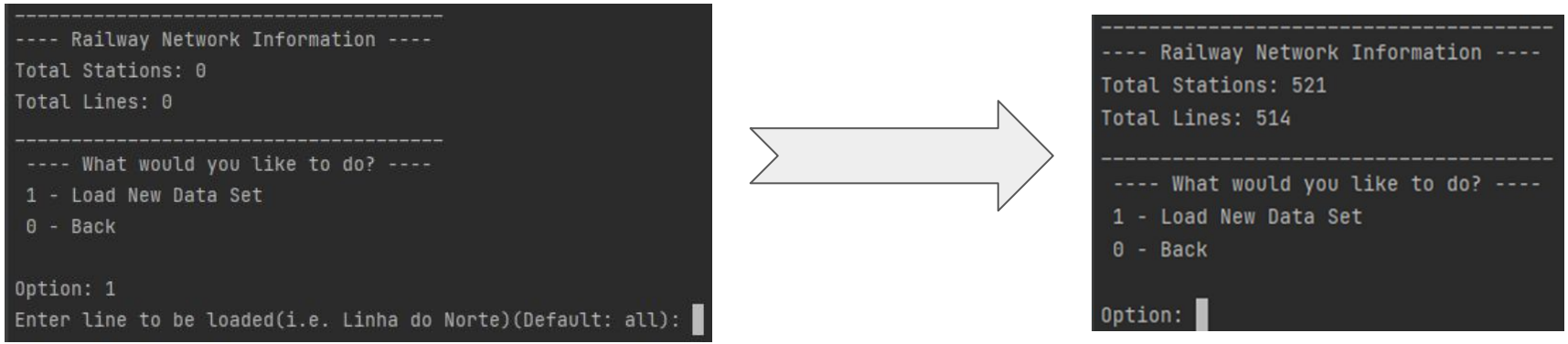
- Data Set Menu - Menu to import the data
- Basic Service Metrics Menu - Menu to observe basic service metrics
- Operation Cost Optimization Menu - Menu with tools to assist with operation cost optimization
- Railway Network Reliability Menu - Menu with tools to assist with railway network reliability and failures

Data Set Menu

A secondary menu to assist in importing the railway data to the analysis tool.

From this menu we can import the railway network data from the file containing the railway data to a graph.

We can import all the data from the file but we can also import the data from specific lines (i.e. Linha do Douro).

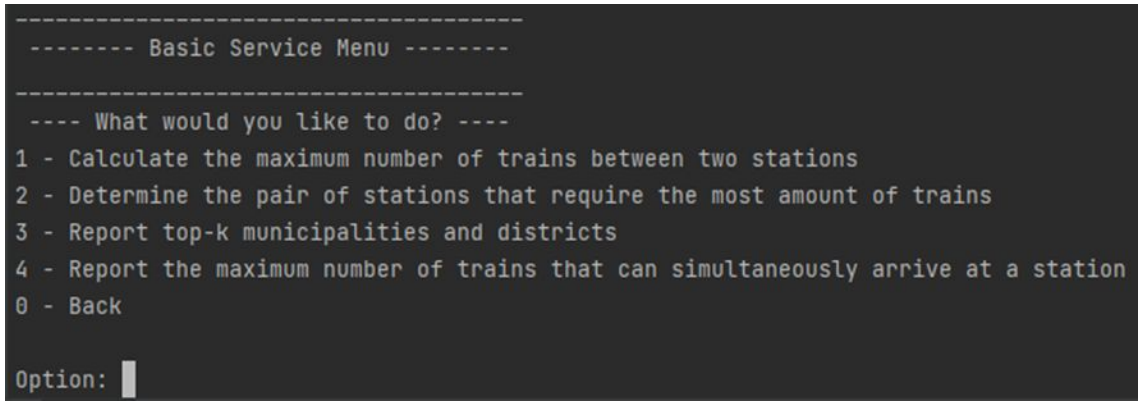


Basic Service Metric Menu

A secondary menu to assist in visualizing basic service metrics.

From this menu we can:

- Calculate the maximum number of trains that can simultaneously travel between two specific stations.
- Determine, from all pairs of stations, the top x stations that require the most amount of trains when taking full advantage of the existing network capacity.



- Report the top-k municipalities and districts, regarding their transportation needs.

- Report the maximum number of trains that can simultaneously arrive at a given station, taking into consideration the entire railway grid.

Basic Service Metric Menu

Calculate the maximum number of trains that can simultaneously travel between two specific stations.

```
Option: 1
Source: Viana do Castelo
Destination: Lisboa Oriente
Maximum number of trains (Max FLow) between Viana do Castelo and Lisboa Oriente is 2.
```

Determine, from all pairs of stations, the top x stations that require the most amount of trains when taking full advantage of the existing network capacity.

```
Option: 2
How many pairs do you want to see? 3
Lisboa Oriente to Entroncamento
Lisboa Oriente to Santar├®m
Entroncamento to Lisboa Oriente
```

```
Option: 3
Do you want to get budget for districts(press 1) ou municipalities(press 2)? 1
: 0
AVEIRO: 25887
BEJA: 2892
BRAGA: 7602
BRAGAN├çA: 42
CASTELO BRANCO: 713
COIMBRA: 11432
FARO: 8442
GUARDA: 5405
LEIRIA: 14681
LISBOA: 27607
PORTALEGRE: 483
PORTO: 11272
SANTAR├ëM: 12796
SET├ÚBAL: 6106
VIANA DO CASTELO: 6723
VILA REAL: 432
VISEU: 4265
├ëVORA: 540
```

Report the top-k municipalities and districts, regarding their transportation needs.

```
Option: 3
Do you want to get budget for districts(press 1) ou municipalities(press 2)? 2
: 0
ABRANTES: 496
ALBERGARIA-A-VELHA: 1390
ALBUFEIRA: 494
ALCOBA├çA: 2004
ALC├ûCER DO SAL: 1434
ALENQUER: 479
ALIJ├ó: 86
ALMADA: 9
ALMEIDA: 1732
ALTER DO CH├ãO: 114
ALVITO: 92
AMADORA: 692
AMARANTE: 86
ANADIA: 1436
ARRONCHES: 43
AVEIRO: 4040
```

Basic Service Metric Menu

Report the maximum number of trains that can simultaneously arrive at a given station, taking into consideration the entire railway grid.

```
Option: 4
Enter station to be tested: Viana do Castelo
A maximum of 2 can arrive simultaneously at Viana do Castelo.
```

Operation Cost Optimization Menu

```
-------------------------------------
 ------ Cost Optimization Menu ------
-------------------------------------
 ---- What would you like to do? ----
1 - Get the minimum cost path between two stations
0 - Back

Option:
```

A secondary menu to assist in operation cost optimization.

From this menu we can:

- Calculate the cost of minimum cost path between two specific stations.

```
Option: 1
Source: Viana do Castelo
Destination: Lisboa Oriente
The minimum cost path between Viana do Castelo and Lisboa Oriente is 98.
```

Reliability Menu

A secondary menu to assist with railway network reliability and eventual failures.

From this menu we can:

- Calculate the maximum number of trains that can simultaneously travel between two specific stations in a network of reduced connectivity.

```
---------------------------------------
 --------- Reliability Menu ---------
---------------------------------------
What would you like to do?
1 - Calculate the maximum number of trains between two stations with reduced connectivity
2 - Report on the stations that are the most affected by each segment failure
0 - Back

Option:
```

```
Option: 1
Source: Viana do Castelo
Destination: Lisboa Oriente
Remove line between station: Lisboa Oriente
And station: Entroncamento
Maximum number of trains (Max FLow) between Viana do Castelo and Lisboa Oriente without connection between Lisboa Oriente and Entroncamento is 0.
```