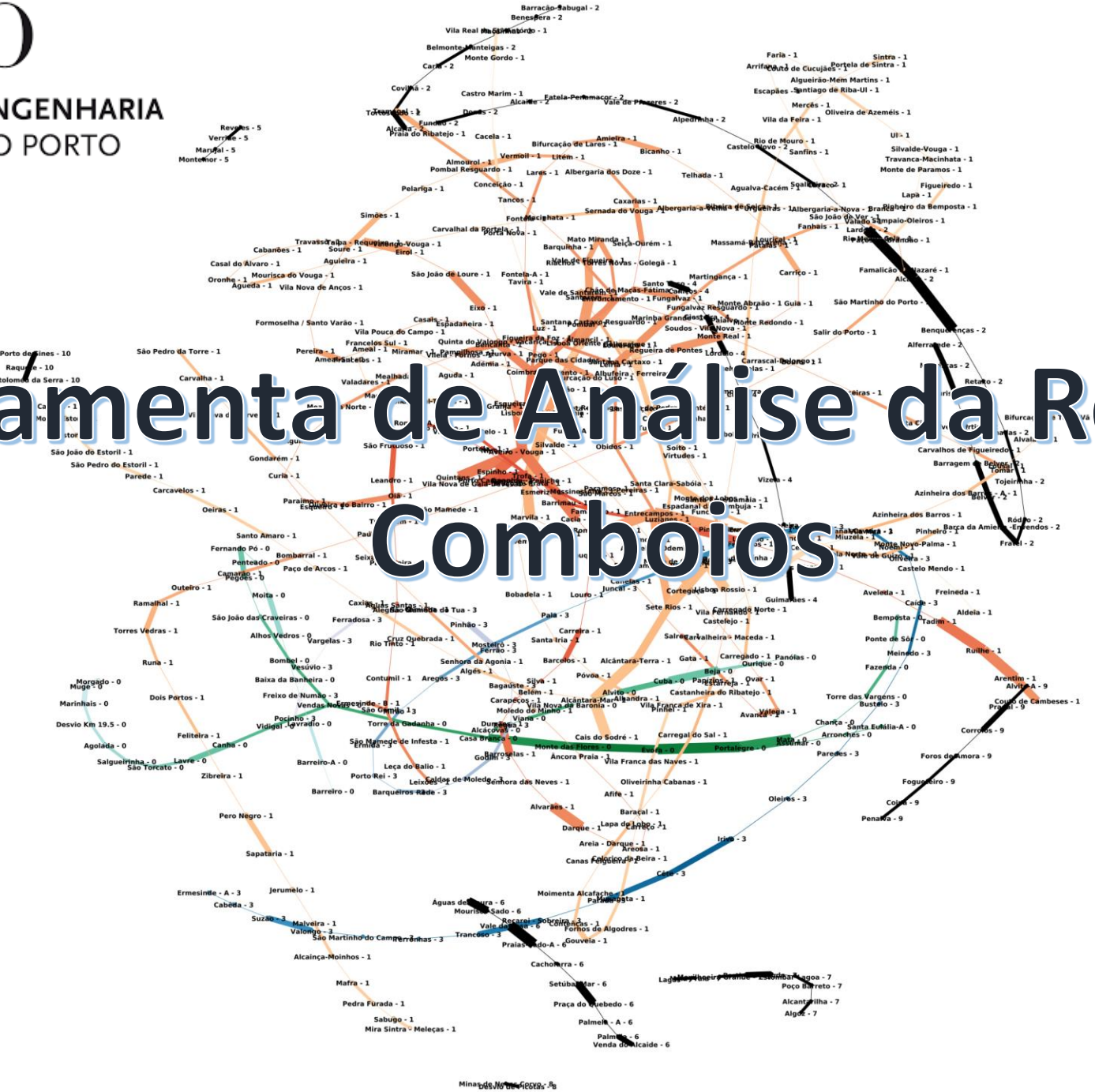
U.PORTO

FEUP FACULDADE DE ENGENHARIA
UNIVERSIDADE DO PORTO



Ferramenta de Análise da Rede de Comboios

Trabalho Prático 1 – Desenho de Algoritmos

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Objetivo

Este projeto, tem como objetivo conceber uma ferramenta para analisar uma rede de comboios, de forma a encontrar os problemas e assim melhorá-la;

Dados

Name	District	Municipality	Township	Line
Porto Campanhã	PORTO	PORTO	Porto	Linha do Norte
Viana do Castelo	VIANA DO CASTELO	VIANA DO CASTELO	Viana do Castelo	Linha do Minho
Ermidas-Sado	SETÚBAL	SANTIAGO DO CACÉM	Ermidas-Sado	Linha do Sul
Faro	FARO	FARO	Faro	Linha do Algarve
Funcheira	BEJA	OURIQUE	Funcheira	Linha do Sul
Lisboa Oriente	LISBOA	LISBOA	Parque das Nações	Linha do Norte
Nine	BRAGA	FAMALICÃO	Nine	Linha do Minho
Pinhal Novo	SETÚBAL	PALMELA	Pinhal Novo	Linha do Sul
Pombal	LEIRIA	POMBAL	Pombal	Linha do Norte
Tunes	FARO	SILVES	Tunes	Linha do Sul
Vila Nova de Gaia-Devesas	PORTO	VILA NOVA DE GAIA	Vila Nova de Gaia	Linha do Norte
Silva	BRAGA	BARCELOS	Silva	Linha do Minho
São Pedro da Torre	VIANA DO CASTELO	VALENÇA	São Pedro da Torre	Linha do Minho
Vila Nova da Raínha	LISBOA	AZAMBUJA	Vila Nova da Raínha	Linha do Norte
Estarreja	AVEIRO	ESTARREJA	Beduído e Veiros	Linha do Norte
Branca	AVEIRO	ALBERGARIA-A-VELHA	Branca	Linha do Vouga
Valongo-Vouga	AVEIRO	ÁGUEDA	Valongo do Vouga	Linha do Vouga
Mirão	PORTO	BAIÃO	Santa Cruz do Douro e São Tomé de Covelas	Linha do Douro
Oliveira	PORTO	AMARANTE	Vila Meã	Linha do Douro

Station_A	Station_B	Capacity	Service
Casa Branca	Monte das Flores	8	STANDARD
Monte das Flores	Évora	8	STANDARD
Évora	Portalegre	10	STANDARD
Funcheira	Santa Clara-Sabóia	4	ALFA PENDULAR
Alferrarede	Mouriscas	6	STANDARD
Mouriscas	Mouriscas-A	6	STANDARD
Mouriscas-A	Alvega-Ortiga	2	STANDARD
Alvega-Ortiga	Barragem de Belver	2	STANDARD
Barragem de Belver	Belver	6	STANDARD
Belver	Barca da Amieira -Envendos	6	STANDARD
Barca da Amieira -Envendos	Fratel	6	STANDARD
Fratel	Ródão	4	STANDARD
Ródão	Tojeirinha	2	STANDARD
Tojeirinha	Sarnadas	4	STANDARD
Sarnadas	Retaxo	2	STANDARD
Retaxo	Benquerenças	2	STANDARD
Benquerenças	Alcains	10	STANDARD
Alcains	Lardosa	10	STANDARD
Lardosa	Soalheira	2	STANDARD

Interface

- Menu;
- Inputs do utilizador;
- Algoritmos relevante;

Classes

- Menu;
- Graph;
- Station;
- Trip;
- ReadData;

Funcionamento

```
---------------------------------> MENU <-----------------------------------
1. Specific Station Information
2. Maximum number of trains that can simultaneously travel between two stations
3. Shortest path between two stations
4. Display the pair of stations that needs trains
5. Top-k municipalities/districts with highest budget needs
6. Max number of trains that can arrive at a train simultaneously
7. Maximum concurrent trains with minimal cost for the company between two stations
Station: Viana do Castelo
District: VIANA DO CASTELO
Municipality: VIANA DO CASTELO
Township: Viana do Castelo
Line: Linha do Minho
  ==> Connects to: Nine
      Capacity: 4
      Service: STANDARD
```

Funcionamento

```
1. Display station information within a given name
2. Display all stations in a specific district, municipality, or line
3. Back
4. Quit
Enter your choice: 2


Enter the letter corresponding to the category of stations you want to display: (d for district, m for municipality, or l for line): d

Enter the District: PORTO

All stations from District: PORTO
1:Travagem
2:Aregos
3:Bustelo
4:Francelos Norte
5:Miramar
6:Ca├¡de
7:Valongo
8:Palmilheira
9:Francelos Sul
10:Trofa
11:Coimbr├Áes
```

```
1. Display station information within a given name
2. Display all stations in a specific district, municipality, or line
3. Back
4. Quit
Enter your choice: 2


Enter the letter corresponding to the category of stations you want to display: (d for district, m for municipality, or l for line): l

Enter the Line: Linha do Minho

All stations from Line: Linha do Minho
1:Caminha
2:Travagem
3:Louro
4:Esqueiro
5:Alvar├úes
6:Palmilheira
7:Barcelos
8:Trofa
9:Carreira
10:Moledo do Minho
11:├éncora Praia
12:Areia - Darque
```

```
1. Display station information within a given name
2. Display all stations in a specific district, municipality, or line
3. Back
4. Quit
Enter your choice: 2


Enter the letter corresponding to the category of stations you want to display: (d for district, m for municipality, or l for line): m

Enter the Municipality: PORTO

All stations from Municipality: PORTO
1:Porto Campanh├ú
2:Contumil
3:Porto S├úo Bento
```

Funcionamento

```
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7. Maximum concurrent trains with minimal cost for the company between two stations
8. Quit
Enter your choice: 2


Insert Source Station Name:Lisboa Oriente
Insert Destination Station Name:Entroncamento
22 trains have the capacity to travel concurrently between Lisboa Oriente and Entroncamento.
```

```
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4. Display the pair of stations that needs trains
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6. Max number of trains that can arrive at a train simultaneously
7. Maximum concurrent trains with minimal cost for the company between two stations
8. Quit
Enter your choice: 3

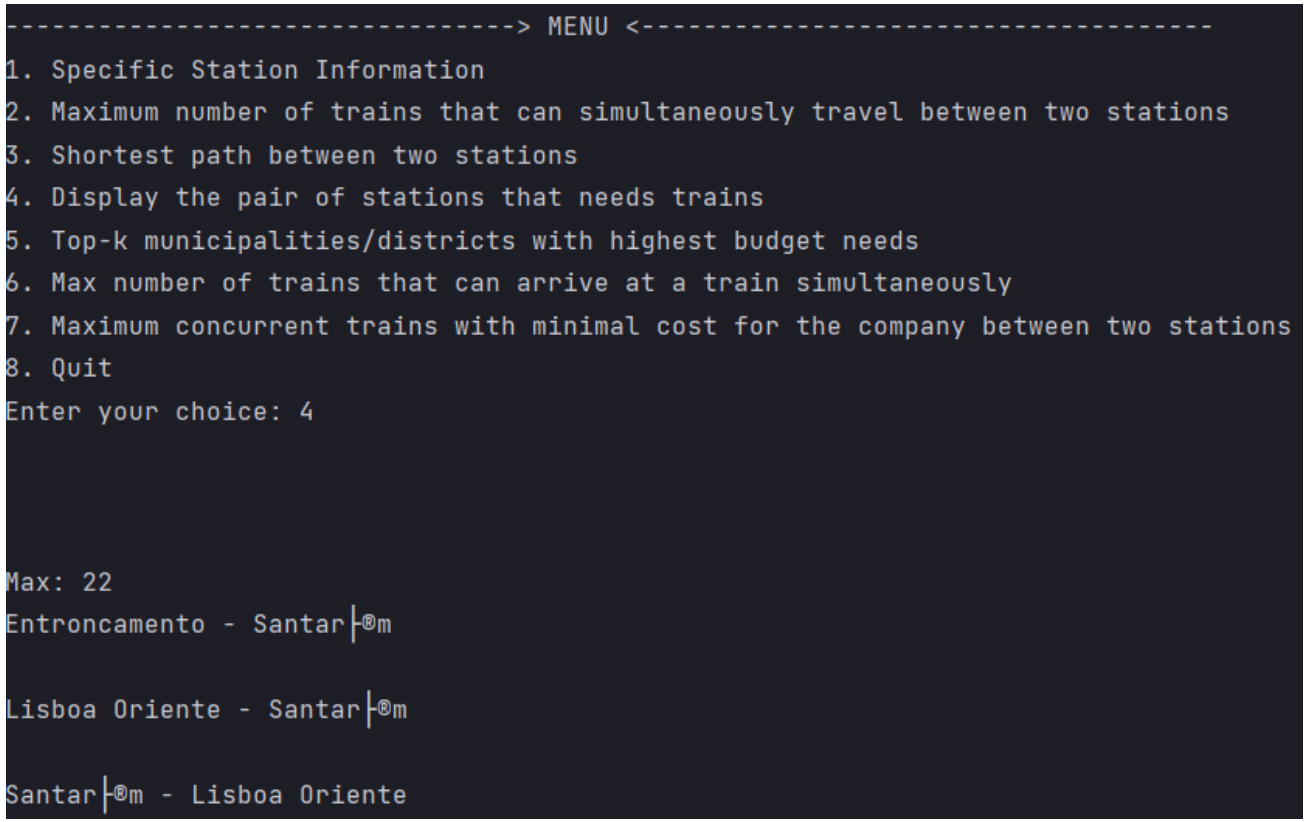

Insert Source Station Name:Coimbra B
Insert Destination Station Name:Lisboa Oriente

Shortest path between Coimbra B and Lisboa Oriente:

Coimbra B ==> Pombal ==> Entroncamento ==> Lisboa Oriente

Total distance: 4
```

Funcionamento



Funcionamento

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6. Max number of trains that can arrive at a train simultaneously
7. Maximum concurrent trains with minimal cost for the company between two stations
8. Quit
Enter your choice: 5


District or Municipality? (d/m):
d
Amount to be displayed:
10
LISBOA requires 5414 trains.
AVEIRO requires 4866 trains.
LEIRIA requires 1674 trains.
PORTO requires 1526 trains.
SANTAR├ëM requires 1298 trains.
COIMBRA requires 1082 trains.
FARO requires 650 trains.
CASTELO BRANCO requires 506 trains.
BRAGA requires 506 trains.
SET├ÚBAL requires 506 trains.
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6. Max number of trains that can arrive at a train simultaneously
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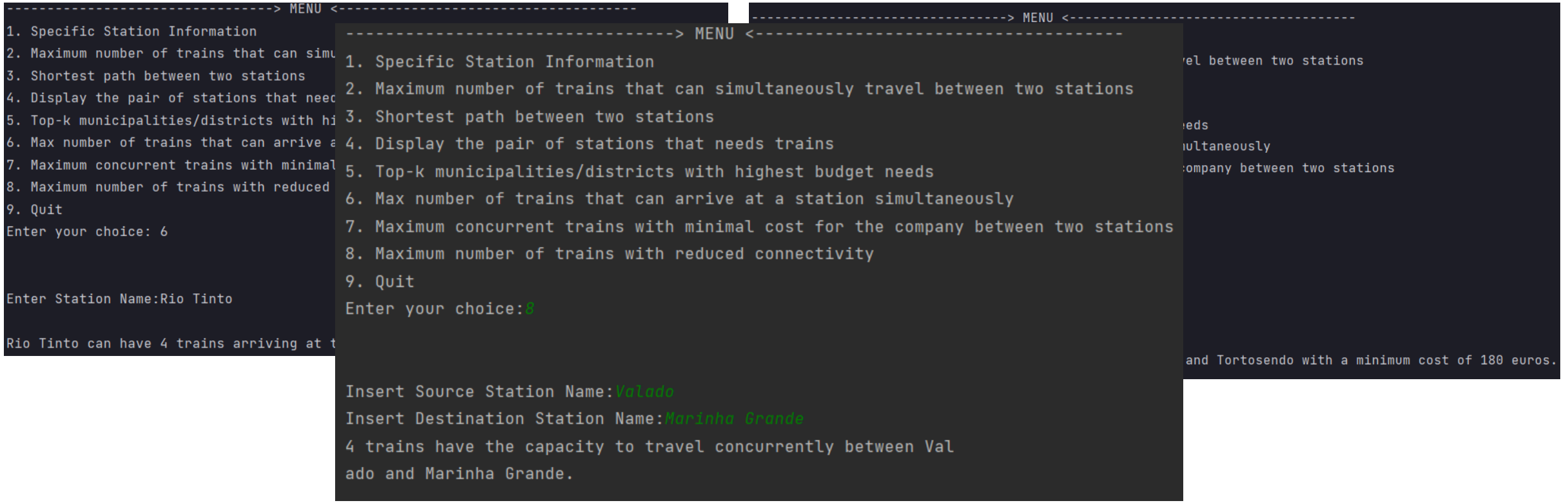
8. Quit
Enter your choice: 5


District or Municipality? (d/m):
m
Amount to be displayed:
5
LISBOA requires 678 trains.
POMBAL requires 156 trains.
AVEIRO requires 134 trains.
COIMBRA requires 126 trains.
SINTRA requires 118 trains.
```

Funcionamento



Dificuldades Encontradas

- Utilizar a pontuação portuguesa;
- Gestão do tempo;
- Esforço de cada elemento;