School of Computer Engineering & Technology
T.Y. B.Tech. (CSE) Trimester 9 (2019-2020)

# BDA Mini-Project Report

*--- Summary ---*

**Faculty: Prof Sheetal Girase**

**Submission Date: 19th June, 2021**

## Group - 08

**Group members**

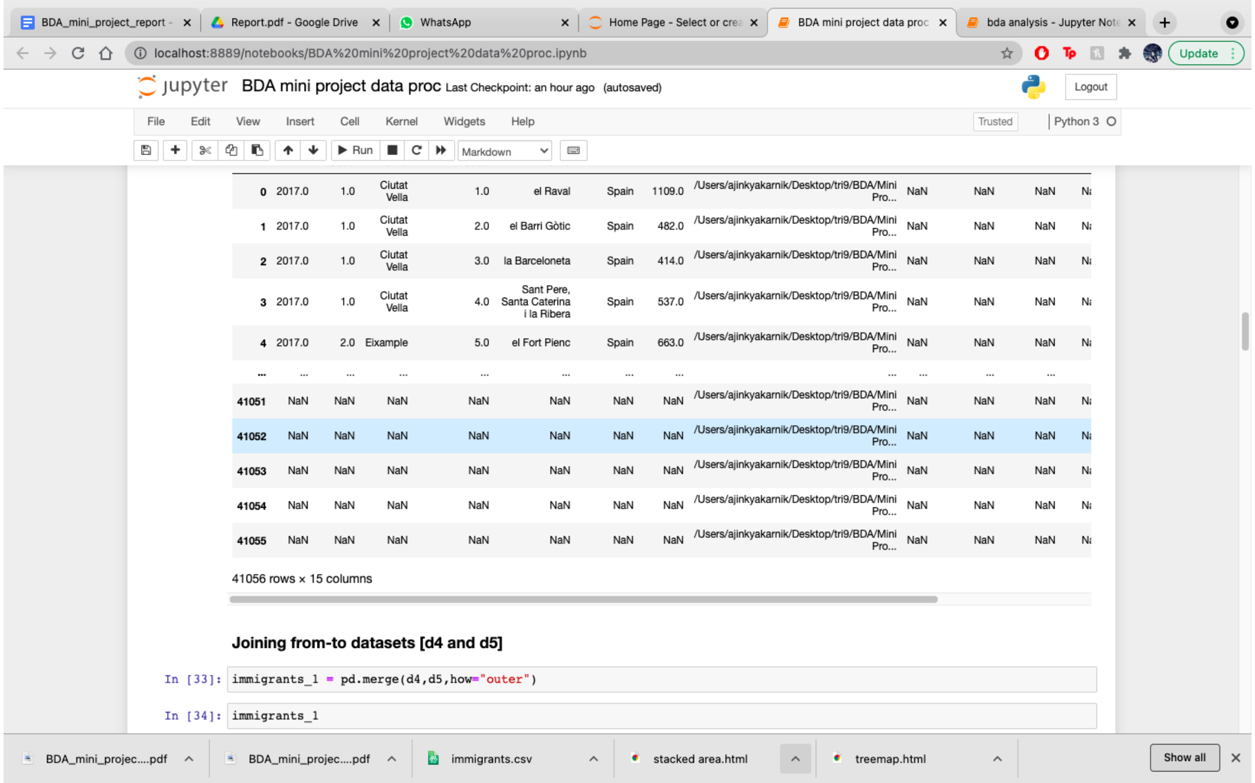
PE25 Ajinkya Karnik - 1032180678
PD05 Rushikesh Kothawade - 1032180122
PD Shreyash Shinde - 1032170009

*Topic*

**Immigrants data set preprocessing, cleaning and making appropriate data visualizations with D3.js**

**This report is a short summary of the project and will primarily include a few screenshots from the Notebook and from D3.js viz :**

# Data Preprocessing and cleaning :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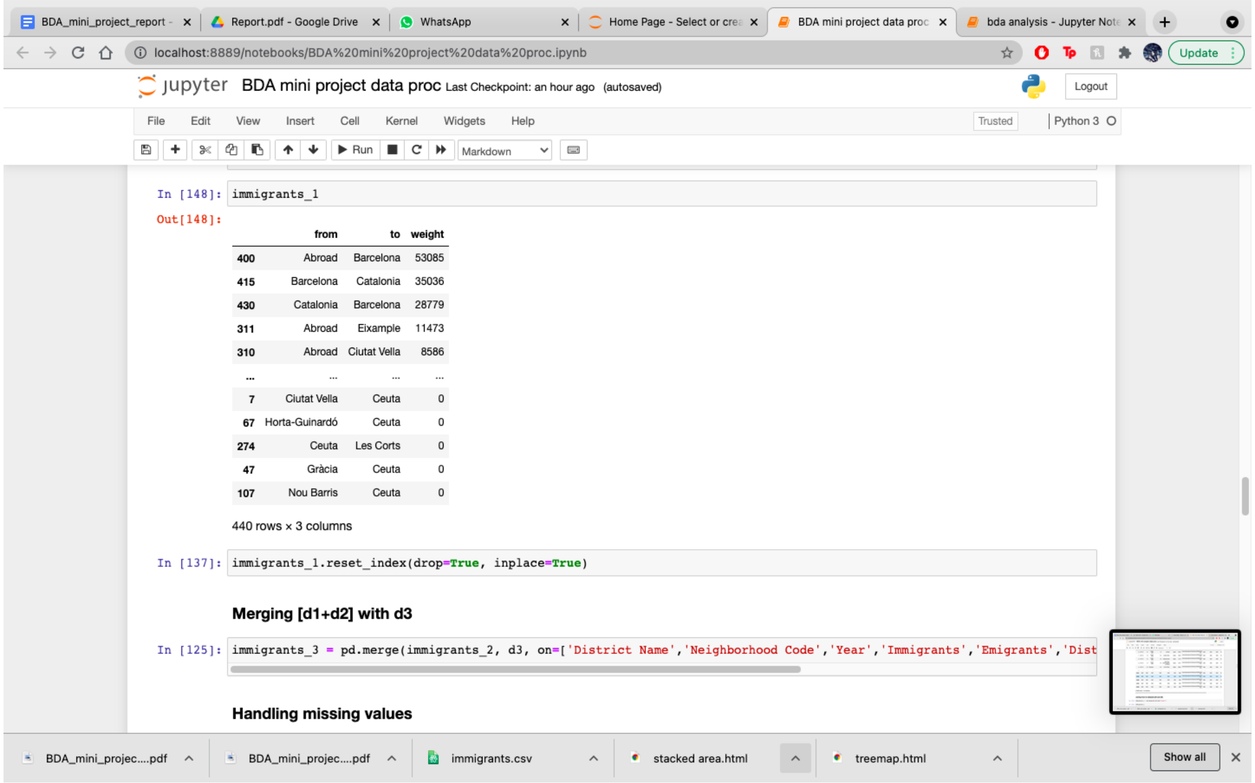
| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 2017.0 | 1.0 | Ciutat Vella | 1.0 | el Raval | Spain | 1109.0 | /Users/ajinkyakarnik/Desktop/tri9/BDA/Mini Pro... | NaN | NaN | NaN | Na |
| **1** | 2017.0 | 1.0 | Ciutat Vella | 2.0 | el Barri Gòtic | Spain | 482.0 | /Users/ajinkyakarnik/Desktop/tri9/BDA/Mini Pro... | NaN | NaN | NaN | Na |
| **2** | 2017.0 | 1.0 | Ciutat Vella | 3.0 | la Barceloneta | Spain | 414.0 | /Users/ajinkyakarnik/Desktop/tri9/BDA/Mini Pro... | NaN | NaN | NaN | Na |
| **3** | 2017.0 | 1.0 | Ciutat Vella | 4.0 | Sant Pere, Santa Caterina i la Ribera | Spain | 537.0 | /Users/ajinkyakarnik/Desktop/tri9/BDA/Mini Pro... | NaN | NaN | NaN | Na |
| **4** | 2017.0 | 2.0 | Eixample | 5.0 | el Fort Pienc | Spain | 663.0 | /Users/ajinkyakarnik/Desktop/tri9/BDA/Mini Pro... | NaN | NaN | NaN | Na |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| **41051** | NaN | NaN | NaN | NaN | NaN | NaN | NaN | /Users/ajinkyakarnik/Desktop/tri9/BDA/Mini Pro... | NaN | NaN | NaN | Na |
| **41052** | NaN | NaN | NaN | NaN | NaN | NaN | NaN | /Users/ajinkyakarnik/Desktop/tri9/BDA/Mini Pro... | NaN | NaN | NaN | Na |
| **41053** | NaN | NaN | NaN | NaN | NaN | NaN | NaN | /Users/ajinkyakarnik/Desktop/tri9/BDA/Mini Pro... | NaN | NaN | NaN | Na |
| **41054** | NaN | NaN | NaN | NaN | NaN | NaN | NaN | /Users/ajinkyakarnik/Desktop/tri9/BDA/Mini Pro... | NaN | NaN | NaN | Na |
| **41055** | NaN | NaN | NaN | NaN | NaN | NaN | NaN | /Users/ajinkyakarnik/Desktop/tri9/BDA/Mini Pro... | NaN | NaN | NaN | Na |

41056 rows × 15 columns

### Joining from-to datasets [d4 and d5]

```
In [33]: immigrants_1 = pd.merge(d4,d5,how="outer")

In [34]: immigrants_1
```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stacked area.html
treemap.html
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```
In [148]: immigrants_1
Out[148]:
```

| | from | to | weight |
|---|---|---|---|
| **400** | Abroad | Barcelona | 53085 |
| **415** | Barcelona | Catalonia | 35036 |
| **430** | Catalonia | Barcelona | 28779 |
| **311** | Abroad | Eixample | 11473 |
| **310** | Abroad | Ciutat Vella | 8586 |
| **...** | ... | ... | ... |
| **7** | Ciutat Vella | Ceuta | 0 |
| **67** | Horta-Guinardó | Ceuta | 0 |
| **274** | Ceuta | Les Corts | 0 |
| **47** | Gràcia | Ceuta | 0 |
| **107** | Nou Barris | Ceuta | 0 |

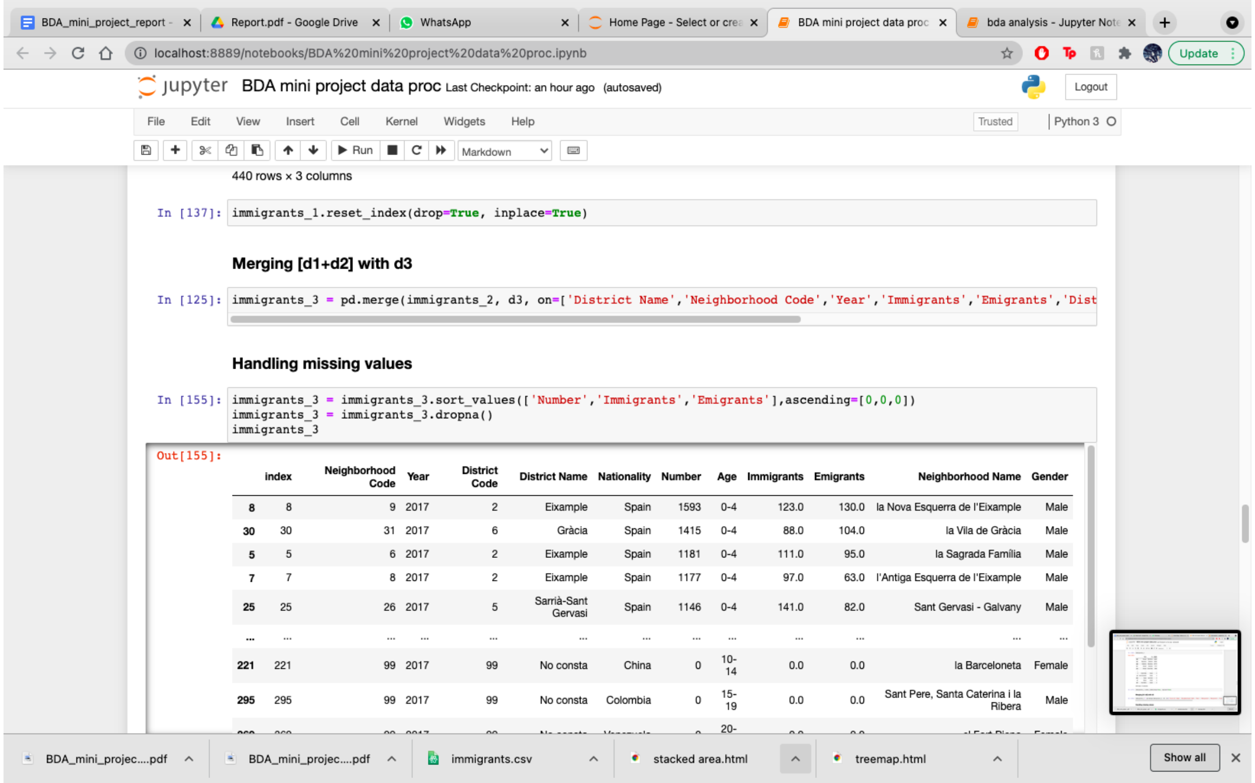
440 rows × 3 columns

```
In [137]: immigrants_1.reset_index(drop=True, inplace=True)
```

### Merging [d1+d2] with d3

```
In [125]: immigrants_3 = pd.merge(immigrants_2, d3, on=['District Name','Neighborhood Code','Year','Immigrants','Emigrants','Dist
```

### Handling missing values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immigrants.csv
stacked area.html
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Show all

440 rows × 3 columns

```
In [137]: immigrants_1.reset_index(drop=True, inplace=True)
```

### Merging [d1+d2] with d3

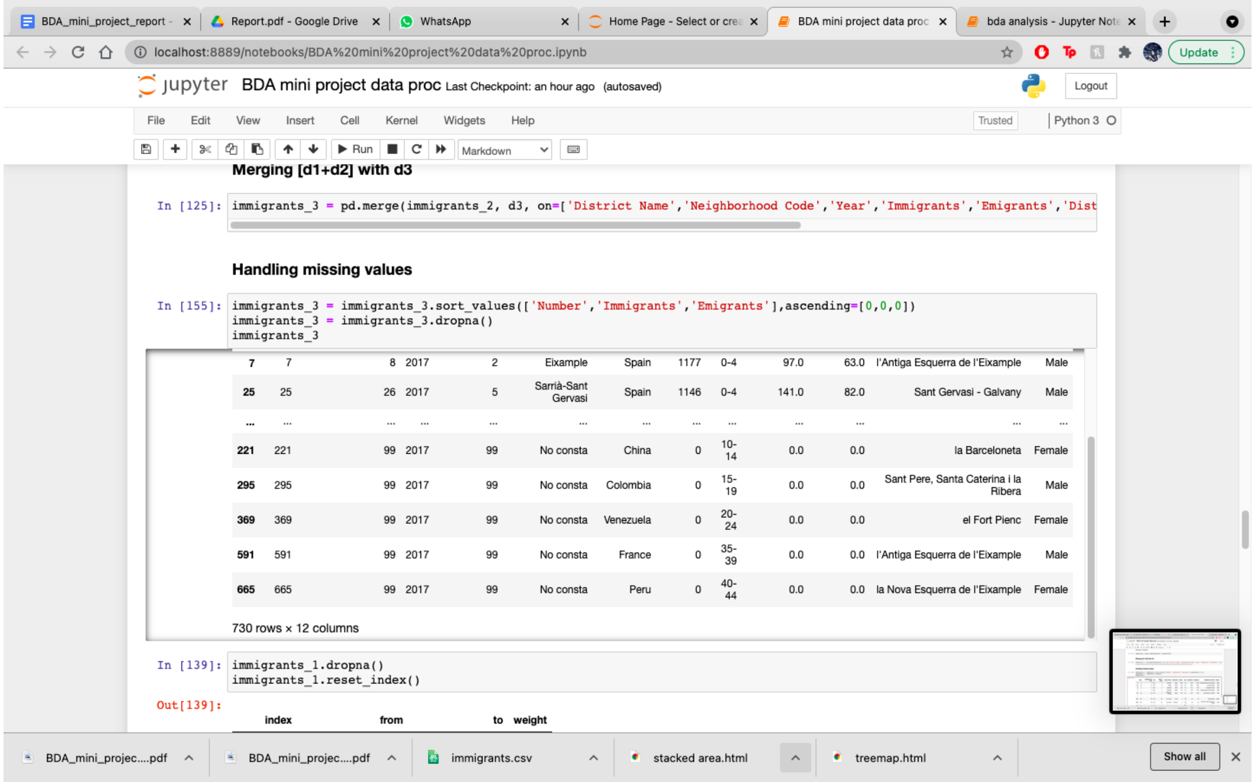
```
In [125]: immigrants_3 = pd.merge(immigrants_2, d3, on=['District Name','Neighborhood Code','Year','Immigrants','Emigrants','Dist
```

### Handling missing values

```
In [155]: immigrants_3 = immigrants_3.sort_values(['Number','Immigrants','Emigrants'],ascending=[0,0,0])
          immigrants_3 = immigrants_3.dropna()
          immigrants_3
```

Out[155]:

| | index | Neighborhood Code | Year | District Code | District Name | Nationality | Number | Age | Immigrants | Emigrants | Neighborhood Name | Gender |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **8** | 8 | 9 | 2017 | 2 | Eixample | Spain | 1593 | 0-4 | 123.0 | 130.0 | la Nova Esquerra de l'Eixample | Male |
| **30** | 30 | 31 | 2017 | 6 | Gràcia | Spain | 1415 | 0-4 | 88.0 | 104.0 | la Vila de Gràcia | Male |
| **5** | 5 | 6 | 2017 | 2 | Eixample | Spain | 1181 | 0-4 | 111.0 | 95.0 | la Sagrada Família | Male |
| **7** | 7 | 8 | 2017 | 2 | Eixample | Spain | 1177 | 0-4 | 97.0 | 63.0 | l'Antiga Esquerra de l'Eixample | Male |
| **25** | 25 | 26 | 2017 | 5 | Sarrià-Sant Gervasi | Spain | 1146 | 0-4 | 141.0 | 82.0 | Sant Gervasi - Galvany | Male |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **221** | 221 | 99 | 2017 | 99 | No consta | China | 0 | 10-14 | 0.0 | 0.0 | la Barceloneta | Female |
| **295** | 295 | 99 | 2017 | 99 | No consta | Colombia | 0 | 15-19 | 0.0 | 0.0 | Sant Pere, Santa Caterina i la Ribera | Male |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### Merging [d1+d2] with d3

```
In [125]: immigrants_3 = pd.merge(immigrants_2, d3, on=['District Name','Neighborhood Code','Year','Immigrants','Emigrants','Dist
```

### Handling missing values

```
In [155]: immigrants_3 = immigrants_3.sort_values(['Number','Immigrants','Emigrants'],ascending=[0,0,0])
          immigrants_3 = immigrants_3.dropna()
          immigrants_3
```

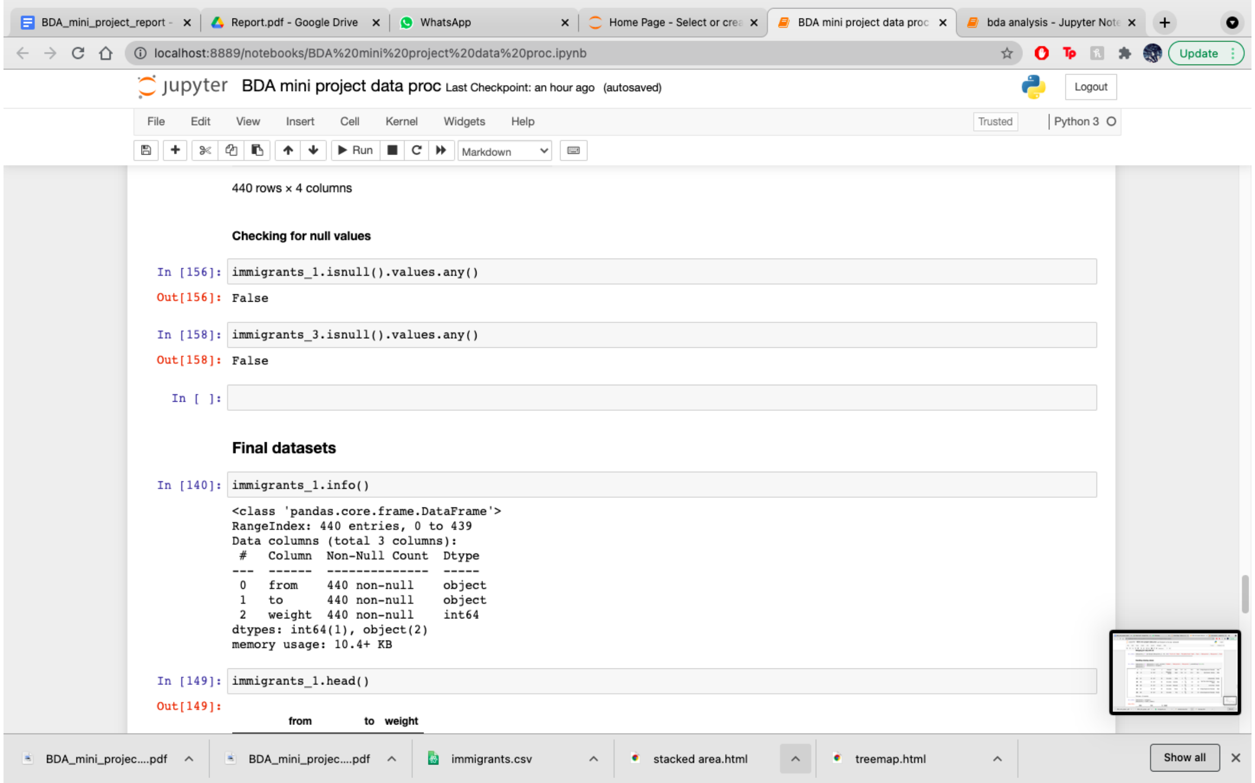
| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **7** | 7 | 8 | 2017 | 2 | Eixample | Spain | 1177 | 0-4 | 97.0 | 63.0 | l'Antiga Esquerra de l'Eixample | Male |
| **25** | 25 | 26 | 2017 | 5 | Sarrià-Sant Gervasi | Spain | 1146 | 0-4 | 141.0 | 82.0 | Sant Gervasi - Galvany | Male |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **221** | 221 | 99 | 2017 | 99 | No consta | China | 0 | 10-14 | 0.0 | 0.0 | la Barceloneta | Female |
| **295** | 295 | 99 | 2017 | 99 | No consta | Colombia | 0 | 15-19 | 0.0 | 0.0 | Sant Pere, Santa Caterina i la Ribera | Male |
| **369** | 369 | 99 | 2017 | 99 | No consta | Venezuela | 0 | 20-24 | 0.0 | 0.0 | el Fort Pienc | Female |
| **591** | 591 | 99 | 2017 | 99 | No consta | France | 0 | 35-39 | 0.0 | 0.0 | l'Antiga Esquerra de l'Eixample | Male |
| **665** | 665 | 99 | 2017 | 99 | No consta | Peru | 0 | 40-44 | 0.0 | 0.0 | la Nova Esquerra de l'Eixample | Female |

730 rows × 12 columns

```
In [139]: immigrants_1.dropna()
          immigrants_1.reset_index()
```

Out[139]:

| index | from | to | weight |
|---|---|---|---|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440 rows × 4 columns

**Checking for null values**

```
In [156]: immigrants_1.isnull().values.any()
Out[156]: False

In [158]: immigrants_3.isnull().values.any()
Out[158]: False

In [ ]:
```

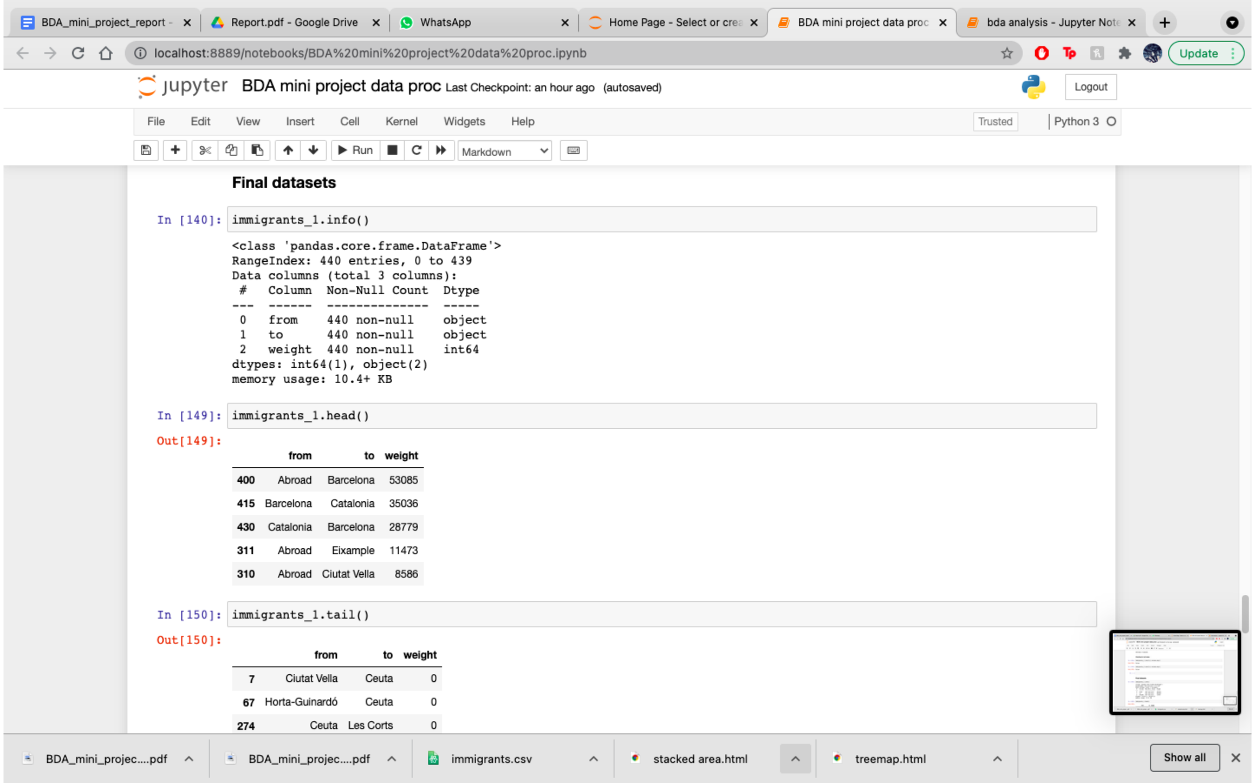
### Final datasets

```
In [140]: immigrants_1.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 440 entries, 0 to 439
Data columns (total 3 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   from    440 non-null    object
 1   to      440 non-null    object
 2   weight  440 non-null    int64
dtypes: int64(1), object(2)
memory usage: 10.4+ KB

In [149]: immigrants_1.head()
Out[149]:
```

| | from | to | weight |
|---|---|---|---|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BDA_mini_projec....pdf
immigrants.csv
stacked area.html
treemap.html
Show all

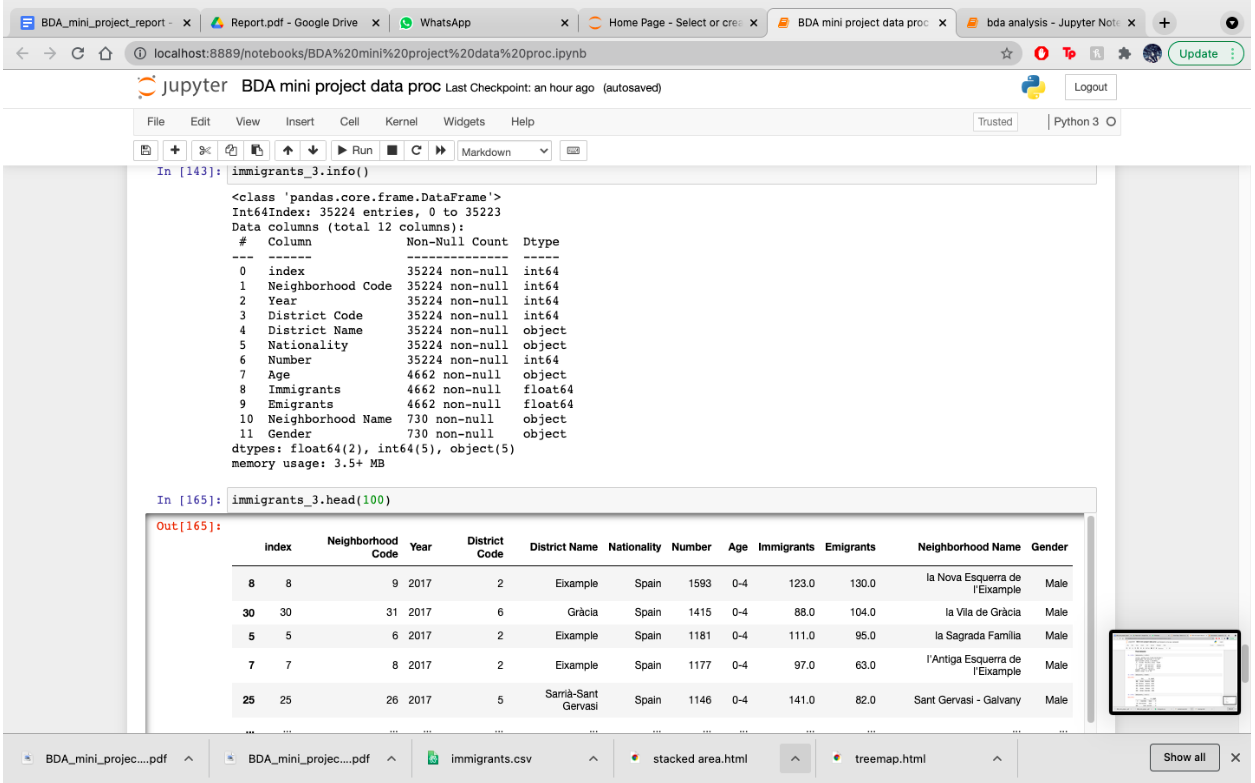
### Final datasets

```
In [140]: immigrants_1.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 440 entries, 0 to 439
Data columns (total 3 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   from    440 non-null    object
 1   to      440 non-null    object
 2   weight  440 non-null    int64
dtypes: int64(1), object(2)
memory usage: 10.4+ KB

In [149]: immigrants_1.head()
Out[149]:
```

| | from | to | weight |
|---|---|---|---|
| 400 | Abroad | Barcelona | 53085 |
| 415 | Barcelona | Catalonia | 35036 |
| 430 | Catalonia | Barcelona | 28779 |
| 311 | Abroad | Eixample | 11473 |
| 310 | Abroad | Ciutat Vella | 8586 |

```
In [150]: immigrants_1.tail()
Out[150]:
```

| | from | to | weight |
|---|---|---|---|
| 7 | Ciutat Vella | Ceuta | 0 |
| 67 | Horta-Guinardó | Ceuta | 0 |
| 274 | Ceuta | Les Corts | 0 |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immigrants.csv
stacked area.html
treemap.html
Show all

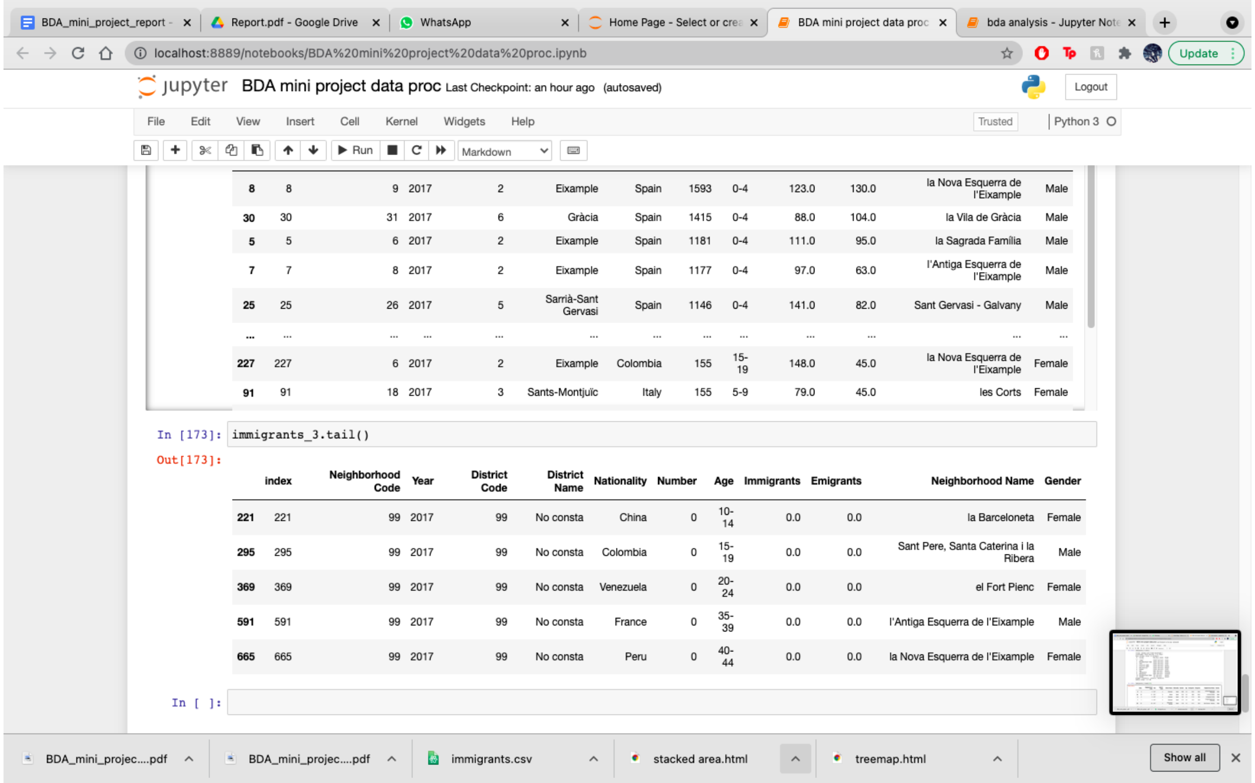
```
In [143]: immigrants_3.info()

<class 'pandas.core.frame.DataFrame'>
Int64Index: 35224 entries, 0 to 35223
Data columns (total 12 columns):
 #   Column             Non-Null Count  Dtype
---  ------             --------------  -----
 0   index              35224 non-null  int64
 1   Neighborhood Code  35224 non-null  int64
 2   Year               35224 non-null  int64
 3   District Code      35224 non-null  int64
 4   District Name      35224 non-null  object
 5   Nationality        35224 non-null  object
 6   Number             35224 non-null  int64
 7   Age                4662 non-null   object
 8   Immigrants         4662 non-null   float64
 9   Emigrants          4662 non-null   float64
 10  Neighborhood Name  730 non-null    object
 11  Gender             730 non-null    object
dtypes: float64(2), int64(5), object(5)
memory usage: 3.5+ MB
```

```
In [165]: immigrants_3.head(100)
```

Out[165]:

| | index | Neighborhood Code | Year | District Code | District Name | Nationality | Number | Age | Immigrants | Emigrants | Neighborhood Name | Gender |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **8** | 8 | 9 | 2017 | 2 | Eixample | Spain | 1593 | 0-4 | 123.0 | 130.0 | la Nova Esquerra de l'Eixample | Male |
| **30** | 30 | 31 | 2017 | 6 | Gràcia | Spain | 1415 | 0-4 | 88.0 | 104.0 | la Vila de Gràcia | Male |
| **5** | 5 | 6 | 2017 | 2 | Eixample | Spain | 1181 | 0-4 | 111.0 | 95.0 | la Sagrada Família | Male |
| **7** | 7 | 8 | 2017 | 2 | Eixample | Spain | 1177 | 0-4 | 97.0 | 63.0 | l'Antiga Esquerra de l'Eixample | Male |
| **25** | 25 | 26 | 2017 | 5 | Sarrià-Sant Gervasi | Spain | 1146 | 0-4 | 141.0 | 82.0 | Sant Gervasi - Galvany | Male |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |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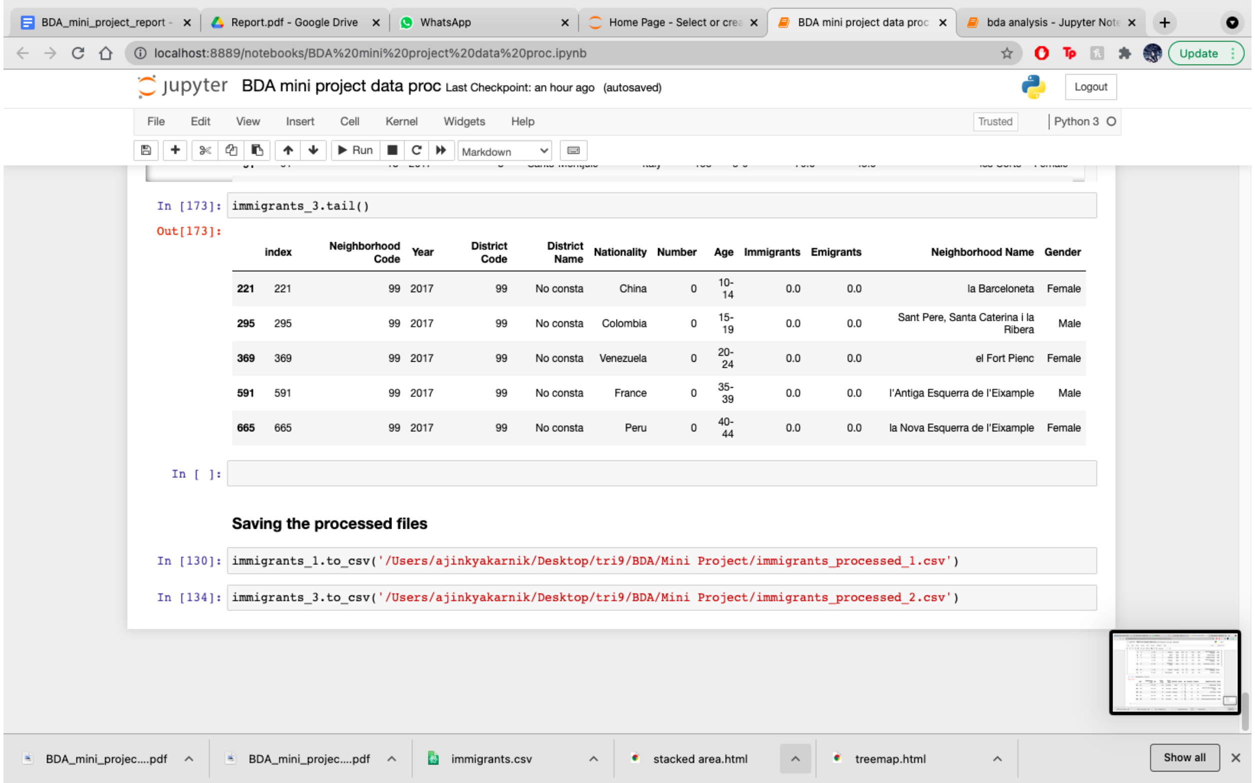
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **8** | 8 | 9 | 2017 | 2 | Eixample | Spain | 1593 | 0-4 | 123.0 | 130.0 | la Nova Esquerra de l'Eixample | Male |
| **30** | 30 | 31 | 2017 | 6 | Gràcia | Spain | 1415 | 0-4 | 88.0 | 104.0 | la Vila de Gràcia | Male |
| **5** | 5 | 6 | 2017 | 2 | Eixample | Spain | 1181 | 0-4 | 111.0 | 95.0 | la Sagrada Família | Male |
| **7** | 7 | 8 | 2017 | 2 | Eixample | Spain | 1177 | 0-4 | 97.0 | 63.0 | l'Antiga Esquerra de l'Eixample | Male |
| **25** | 25 | 26 | 2017 | 5 | Sarrià-Sant Gervasi | Spain | 1146 | 0-4 | 141.0 | 82.0 | Sant Gervasi - Galvany | Male |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **227** | 227 | 6 | 2017 | 2 | Eixample | Colombia | 155 | 15-19 | 148.0 | 45.0 | la Nova Esquerra de l'Eixample | Female |
| **91** | 91 | 18 | 2017 | 3 | Sants-Montjuïc | Italy | 155 | 5-9 | 79.0 | 45.0 | les Corts | Female |

```
In [173]: immigrants_3.tail()
```

Out[173]:

| | index | Neighborhood Code | Year | District Code | District Name | Nationality | Number | Age | Immigrants | Emigrants | Neighborhood Name | Gender |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **221** | 221 | 99 | 2017 | 99 | No consta | China | 0 | 10-14 | 0.0 | 0.0 | la Barceloneta | Female |
| **295** | 295 | 99 | 2017 | 99 | No consta | Colombia | 0 | 15-19 | 0.0 | 0.0 | Sant Pere, Santa Caterina i la Ribera | Male |
| **369** | 369 | 99 | 2017 | 99 | No consta | Venezuela | 0 | 20-24 | 0.0 | 0.0 | el Fort Pienc | Female |
| **591** | 591 | 99 | 2017 | 99 | No consta | France | 0 | 35-39 | 0.0 | 0.0 | l'Antiga Esquerra de l'Eixample | Male |
| **665** | 665 | 99 | 2017 | 99 | No consta | Peru | 0 | 40-44 | 0.0 | 0.0 | la Nova Esquerra de l'Eixample | Female |

```
In [ ]:
```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immigrants.csv
stacked area.html
treemap.html
Show all

```
In [173]: immigrants_3.tail()
Out[173]:
```

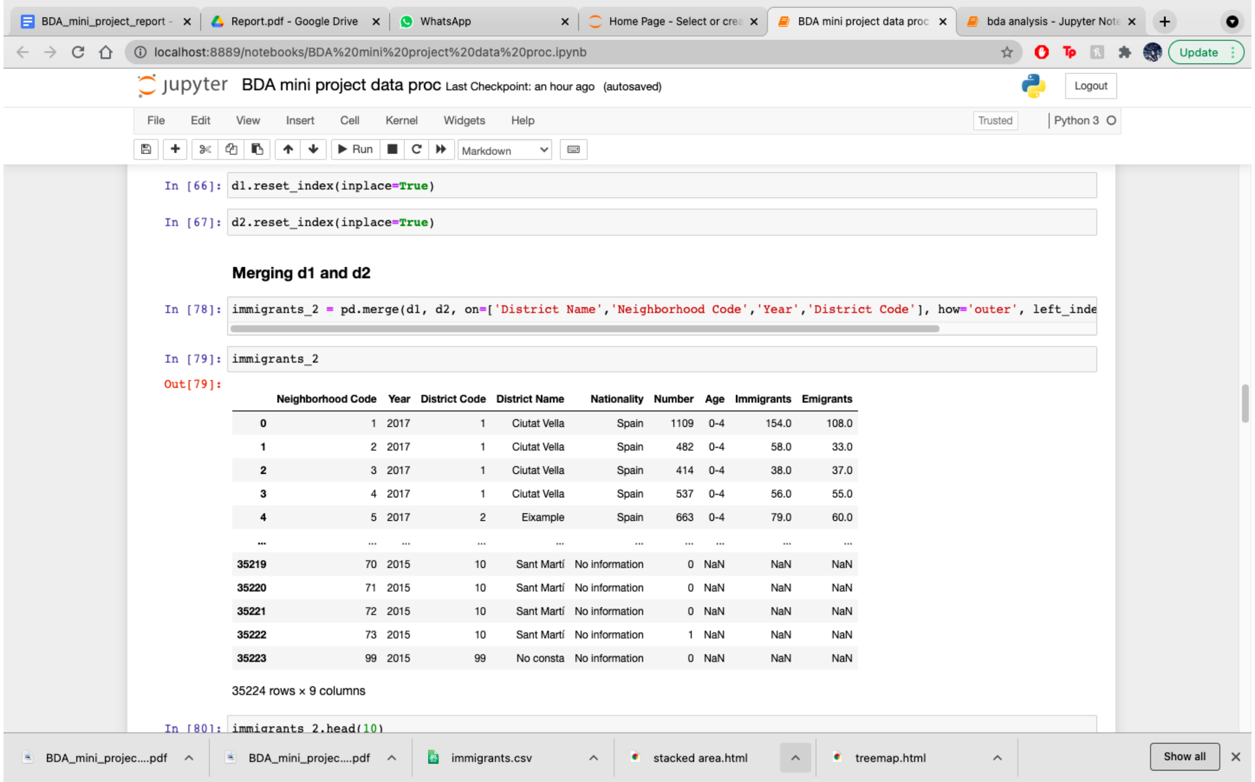
| | index | Neighborhood Code | Year | District Code | District Name | Nationality | Number | Age | Immigrants | Emigrants | Neighborhood Name | Gender |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **221** | 221 | 99 | 2017 | 99 | No consta | China | 0 | 10-14 | 0.0 | 0.0 | la Barceloneta | Female |
| **295** | 295 | 99 | 2017 | 99 | No consta | Colombia | 0 | 15-19 | 0.0 | 0.0 | Sant Pere, Santa Caterina i la Ribera | Male |
| **369** | 369 | 99 | 2017 | 99 | No consta | Venezuela | 0 | 20-24 | 0.0 | 0.0 | el Fort Pienc | Female |
| **591** | 591 | 99 | 2017 | 99 | No consta | France | 0 | 35-39 | 0.0 | 0.0 | l'Antiga Esquerra de l'Eixample | Male |
| **665** | 665 | 99 | 2017 | 99 | No consta | Peru | 0 | 40-44 | 0.0 | 0.0 | la Nova Esquerra de l'Eixample | Female |

```
In [ ]:
```

**Saving the processed files**

```
In [130]: immigrants_1.to_csv('/Users/ajinkyakarnik/Desktop/tri9/BDA/Mini Project/immigrants_processed_1.csv')

In [134]: immigrants_3.to_csv('/Users/ajinkyakarnik/Desktop/tri9/BDA/Mini Project/immigrants_processed_2.csv')
```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```
In [66]: d1.reset_index(inplace=True)

In [67]: d2.reset_index(inplace=True)
```

**Merging d1 and d2**

```
In [78]: immigrants_2 = pd.merge(d1, d2, on=['District Name','Neighborhood Code','Year','District Code'], how='outer', left_inde

In [79]: immigrants_2
Out[79]:
```

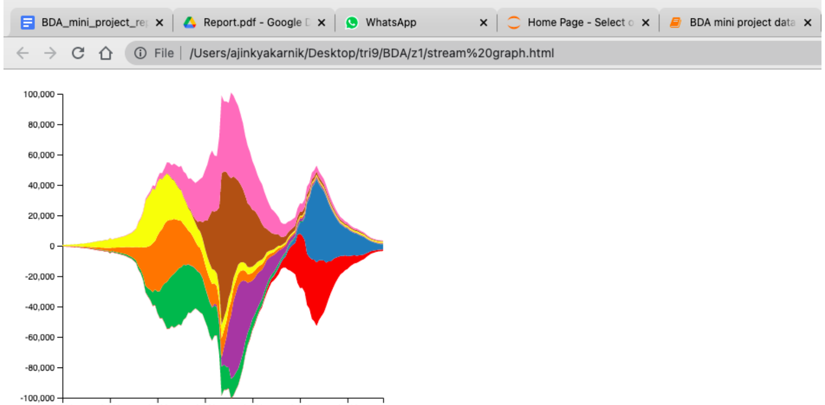
| | Neighborhood Code | Year | District Code | District Name | Nationality | Number | Age | Immigrants | Emigrants |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | 2017 | 1 | Ciutat Vella | Spain | 1109 | 0-4 | 154.0 | 108.0 |
| **1** | 2 | 2017 | 1 | Ciutat Vella | Spain | 482 | 0-4 | 58.0 | 33.0 |
| **2** | 3 | 2017 | 1 | Ciutat Vella | Spain | 414 | 0-4 | 38.0 | 37.0 |
| **3** | 4 | 2017 | 1 | Ciutat Vella | Spain | 537 | 0-4 | 56.0 | 55.0 |
| **4** | 5 | 2017 | 2 | Eixample | Spain | 663 | 0-4 | 79.0 | 60.0 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **35219** | 70 | 2015 | 10 | Sant Martí | No information | 0 | NaN | NaN | NaN |
| **35220** | 71 | 2015 | 10 | Sant Martí | No information | 0 | NaN | NaN | NaN |
| **35221** | 72 | 2015 | 10 | Sant Martí | No information | 0 | NaN | NaN | NaN |
| **35222** | 73 | 2015 | 10 | Sant Martí | No information | 1 | NaN | NaN | NaN |
| **35223** | 99 | 2015 | 99 | No consta | No information | 0 | NaN | NaN | NaN |

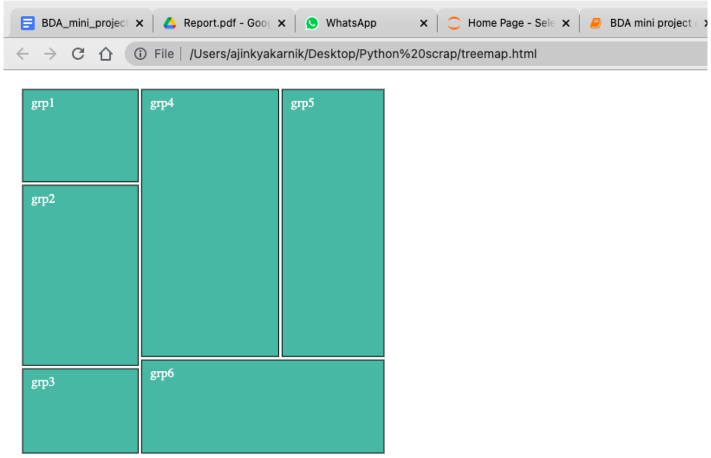
35224 rows × 9 columns

```
In [80]: immigrants_2.head(10)
```

***The code and the Jupytr notebook for the same is included in the project file for further reference.***

# D3 Visualizations :


BDA_mini_project_re
Report.pdf - Google
WhatsApp
Home Page - Select
BDA mini project data
File | /Users/ajinkyakarnik/Desktop/tri9/BDA/z1/stream%20graph.html
100,000
80,000
60,000
40,000
20,000
0
-20,000
-40,000
-60,000
-80,000
-100,000
1,880
1,900
1,920
1,940
1,960
1,980
2,000


BDA_mini_project
Report.pdf - Goo
WhatsApp
Home Page - Sele
BDA mini project
File | /Users/ajinkyakarnik/Desktop/Python%20scrap/treemap.html
grp1
grp4
grp5
grp2
grp3
grp6