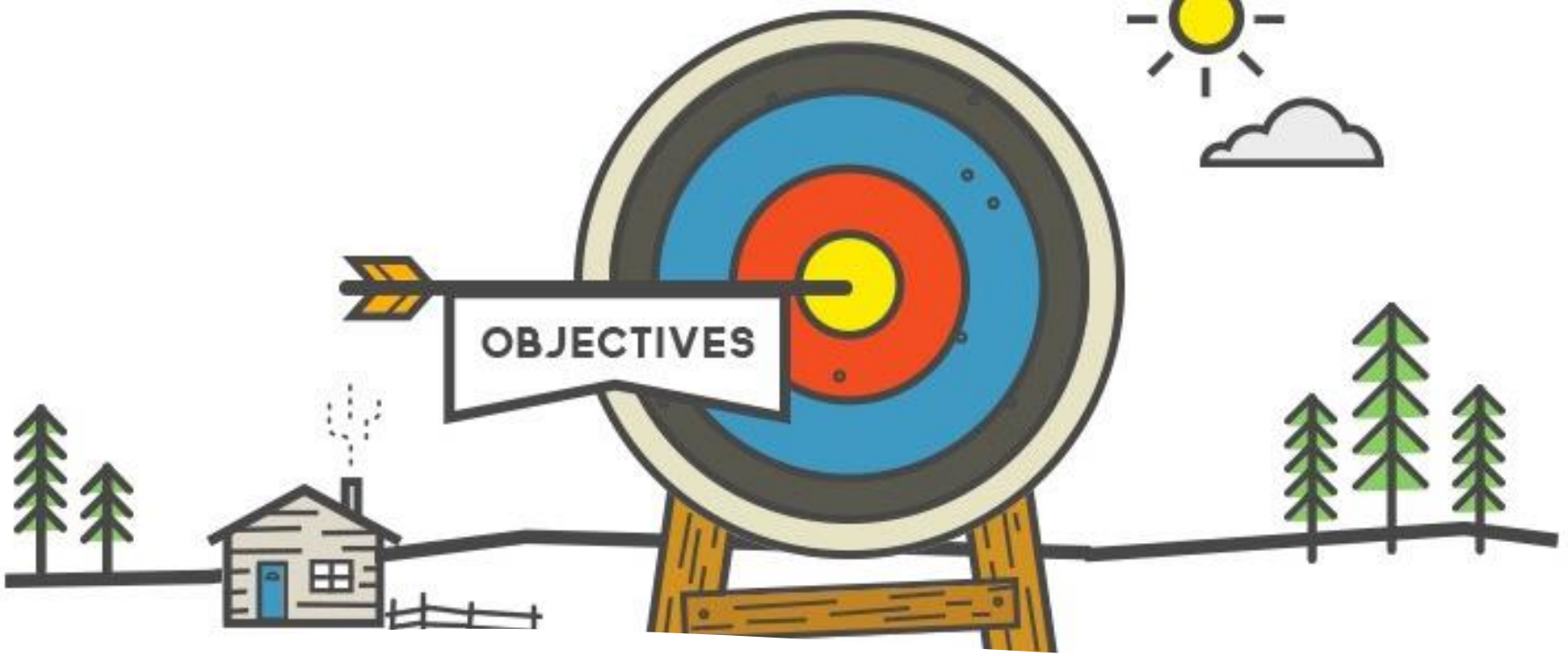
Lisbon School of Economics & Management
Universidade de Lisboa

LISBOA
UNIVERSIDADE DE LISBOA

Exploratory Data Analysis

Carlos J. Costa (2024)



Learning Goals

- Understand main Concepts of Data Analysis
- Verify Variables Distribution
- Understand Granularity
- Perform Multi-Variate Analysis

Summary

- Content identification
- Variables Type and Domain
- Missing values
- Variables Distribution
- Granularity
- Multi-Variate Analysis

Content identification


```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
file='https://raw.githubusercontent.com/isegul/progtech/master/WorldBankPort.csv'
data = pd.read_csv(file,sep=";")
data.shape
```

```
(55, 6)
```

Variables Type and Domain

data.dtypes

```
data.dtypes
```

```
Transports      float64
other           float64
ManAndConst     float64
Electricity     float64
ResidCom        float64
year              int64
dtype: object
```

Missing values

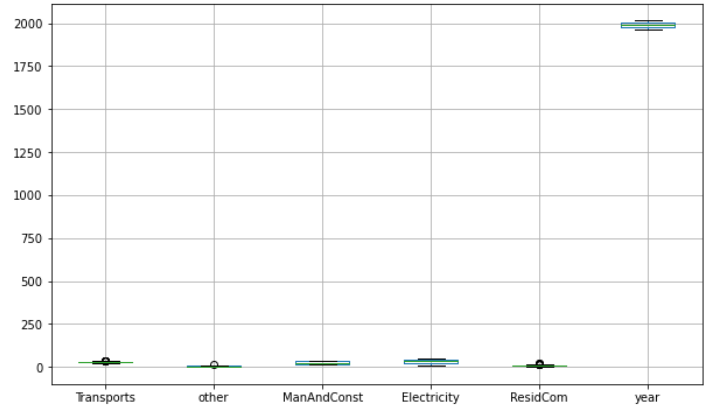
- It is possible analyse the numbers by plotting them through a bar chart.

Variables Distribution

```
data.describe()
```

	Transports	other	ManAndConst	Electricity	ResidCom	year
count	55.000000	55.000000	55.000000	55.000000	55.000000	55.00000
mean	29.897565	5.128321	24.689692	31.509938	8.768899	1987.00000
std	3.280454	2.955396	8.482740	12.383553	3.573663	16.02082
min	24.400754	2.059014	12.193743	7.747489	5.276683	1960.00000
25%	27.820253	2.882284	17.487552	20.912832	6.423182	1973.50000
50%	29.160935	4.212300	25.297297	34.630631	7.554638	1987.00000
75%	30.680251	6.334884	32.625009	42.250330	9.593983	2000.50000
max	38.948475	13.157895	36.354430	46.481779	19.901316	2014.00000

```
data.boxplot(figsize=(10,6))
plt.show()
```



Statistics

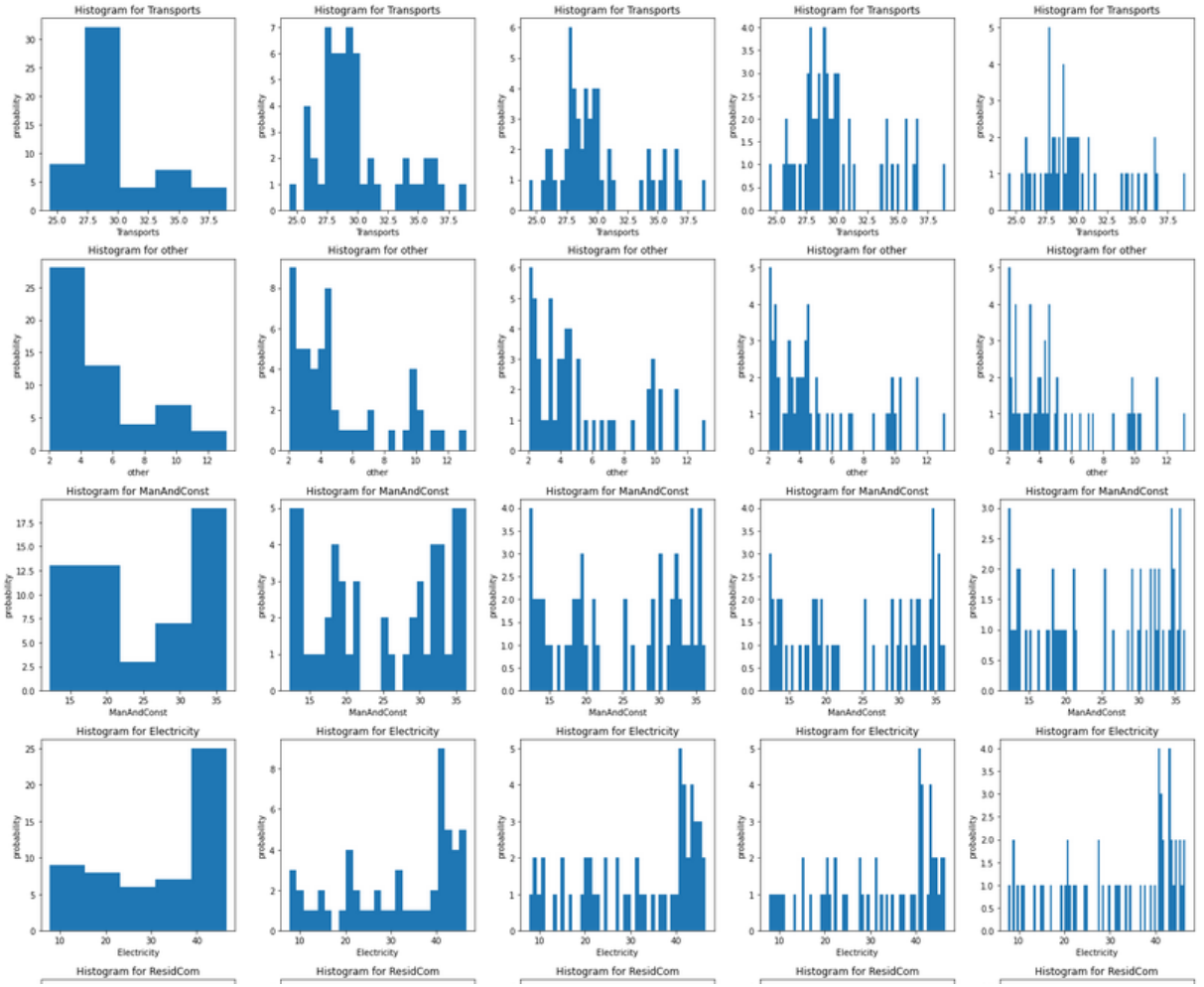
Plot the distribution

Granularity

```
columns = data.select_dtypes(include='number').columns
rows = len(columns)
cols = 5
plt.figure()
fig, axs = plt.subplots(rows, cols, figsize=(cols*4, rows*4), squeeze=False)
bins = range(5, 100, 20)
for i in range(len(columns)):
    for j in range(len(bins)):
        axs[i, j].set_title('Histogram for %s'%columns[i])
        axs[i, j].set_xlabel(columns[i])
        axs[i, j].set_ylabel("probability")
        axs[i, j].hist(data[columns[i]].dropna().values, bins[j])
fig.tight_layout()
plt.show()
```

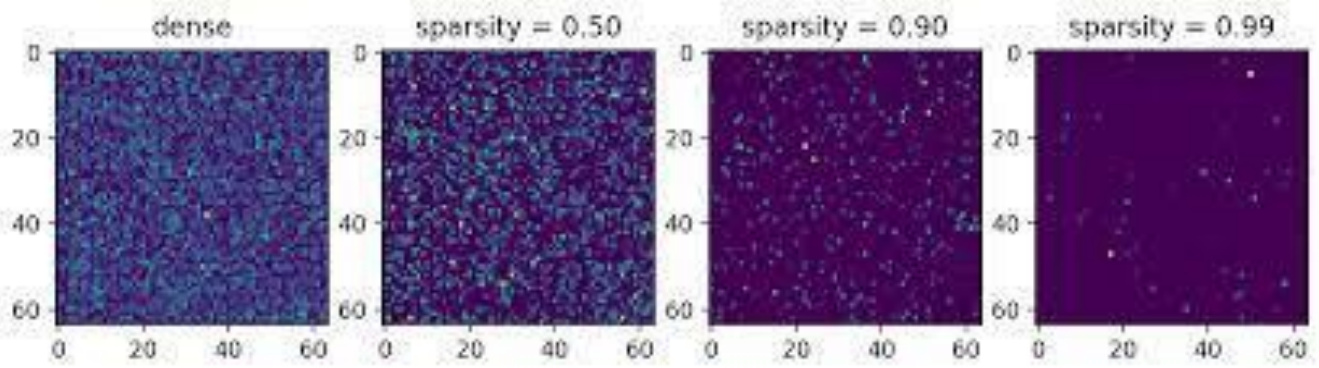
Granularit

```
columns = data.select_c
rows = len(columns)
cols = 5
plt.figure()
fig, axs = plt.subplots
bins = range(5, 100, 20
for i in range(len(colu
    for j in range(len(
        axs[i, j].set_t
        axs[i, j].set_x
        axs[i, j].set_y
        axs[i, j].hist(
fig.tight_layout()
plt.show()
```



Multi-Variate Analysis

- ***Sparsity***
- ***Correlation analysis***



Correlation analysis

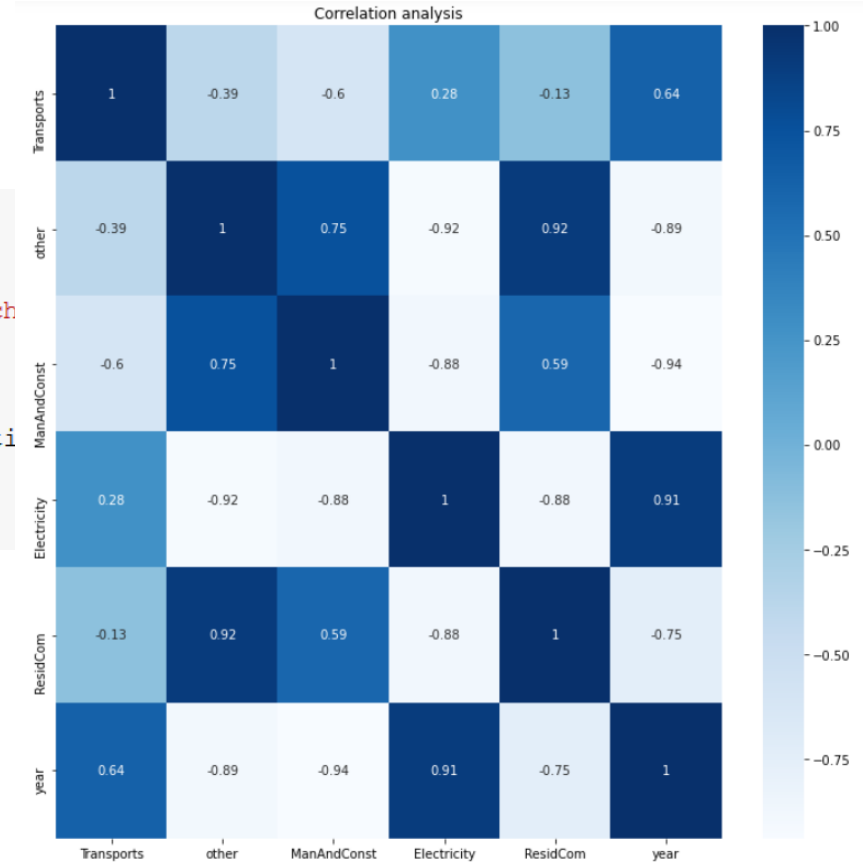
- Correlation analysis

```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
file='https://raw.githubusercontent.com/isegul/progtech/master/WorldBankPort.csv'
data = pd.read_csv(file,sep=";")
fig = plt.figure(figsize=[12, 12])
corr_mtx = data.corr()
sns.heatmap(corr_mtx, xticklabels=corr_mtx.columns, yticklabels=corr_mtx.columns, annot=True, cmap='Blues')
plt.title('Correlation analysis')
plt.show()
```

Correlation analysis

- Correlation analysis

```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
file='https://raw.githubusercontent.com/isegul/progtech
data = pd.read_csv(file,sep=";")
fig = plt.figure(figsize=[12, 12])
corr_mtx = data.corr()
sns.heatmap(corr_mtx, xticklabels=corr_mtx.columns, yti
plt.title('Correlation analysis')
plt.show()
```



Conclusion

- Content identification
- Variables Type and Domain
- Missing values
- Variables Distribution
- Granularity
- Multi-Variate Analysis