



Lisbon School
of Economics
& Management
Universidade de Lisboa



Carlos J. Costa

VISUALIZATION

Learning Goals

- Know the main Python libraries used in data visualization
- Create line charts
- Create bar charts
- Create scatter plots
- Compare the data visualization libraries

matplotlib

<https://matplotlib.org/>

Import data

```
import pandas as pd
```

```
df = pd.read_csv('electionsUSA.csv')
```

Import data

```
import pandas as pd
import matplotlib.pyplot as plt
df = pd.read_csv('electionsUSA.csv')
```

Scatter Plot

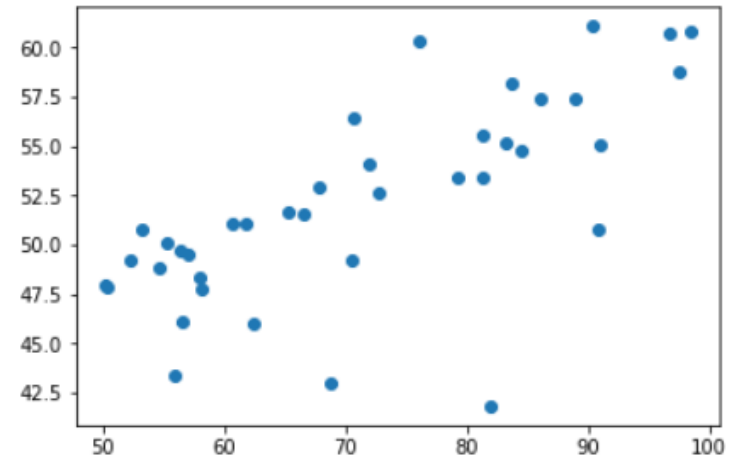
```
# create a figure and axis
```

```
fig, ax = plt.subplots()
```

```
# scatter the 'electoral college percentage' against the
```

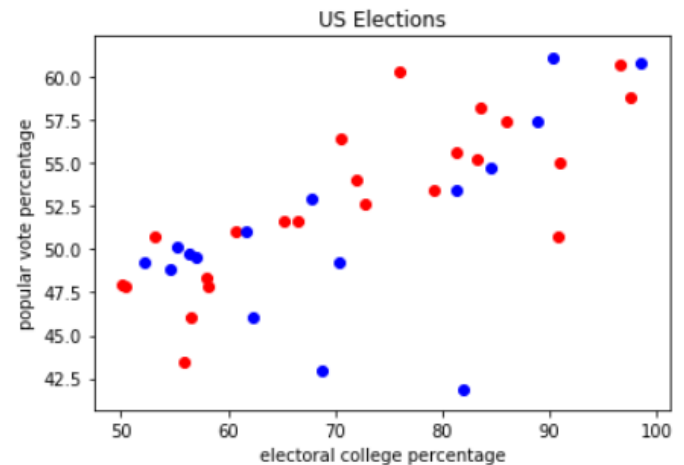
```
# popular vote percentage
```

```
ax.scatter(df['electoral college percentage'], df['popular vote percentage'])
```



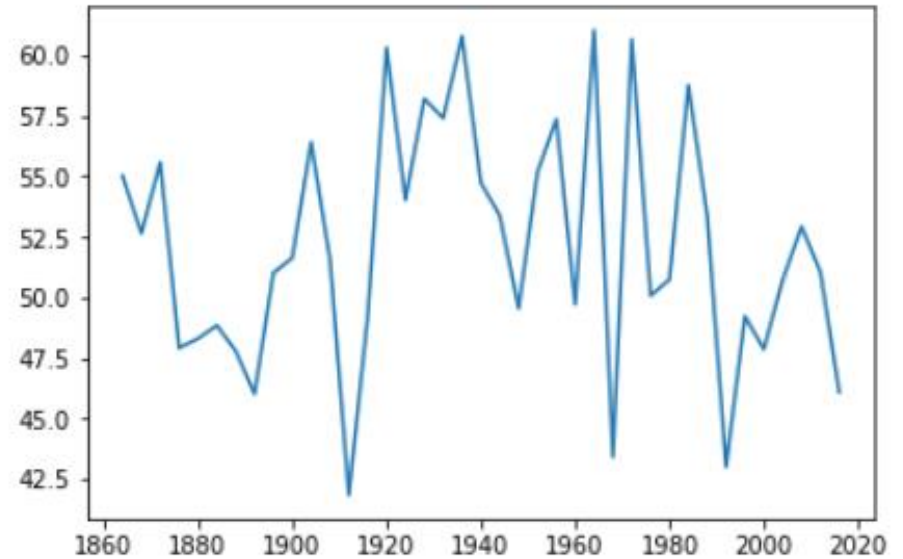
Scatter Plot

```
# create colour dictionary
colrs = {'Rep.': 'r', 'Dem.': 'b'}
# create a figure and axis
fig, ax = plt.subplots()
# plot each data-point
for i in range(len(df['electoral college percentage'])):
    ax.scatter(df['electoral college percentage'][i],
              df['popular vote percentage'][i], colr=colrs[df['party'][i]])
# set a title
ax.set_title('US Elections')
ax.set_xlabel('electoral college percentage')
ax.set_ylabel('popular vote percentage')
```



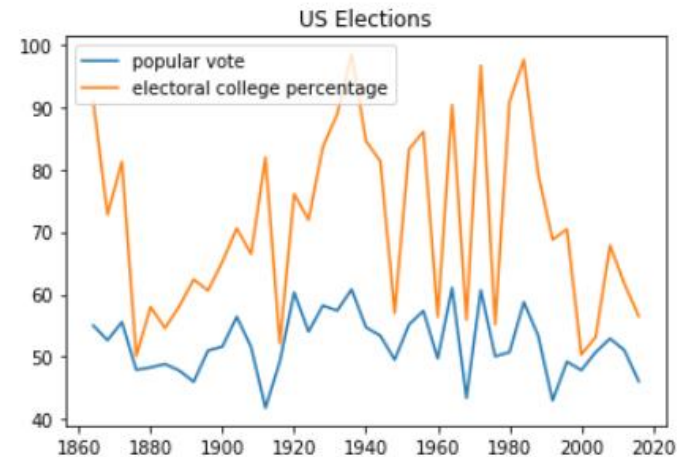
Line Chart

```
fig, ax = plt.subplots()  
ax.plot(df['year'],df['popular vote percentage'])
```



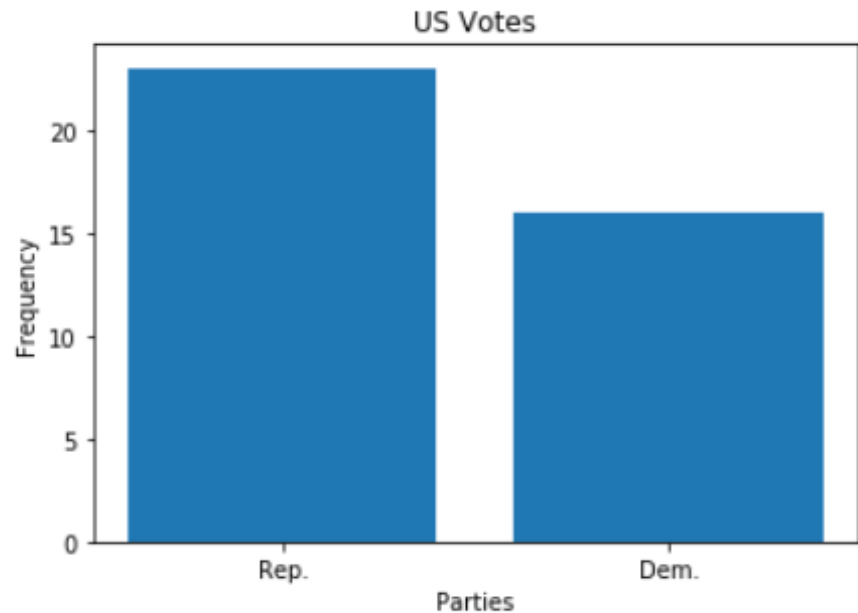
Line Chart

```
fig, ax = plt.subplots()
ax.plot(df['year'],df['popular vote percentage'], label="popular vote")
ax.plot(df['year'],df['electoral college percentage'], label="electoral college percentage")
ax.set_title('US Elections')
ax.legend()
```



Bar Chart

```
# create a figure and axis
fig, ax = plt.subplots()
# count the occurrence of each class
data = df['party'].value_counts()
# get x and y data
points = data.index
frequency = data.values
# create bar chart
ax.bar(points, frequency)
# set title and labels
ax.set_title('US Votes')
ax.set_xlabel('Parties')
ax.set_ylabel('Frequency')
```

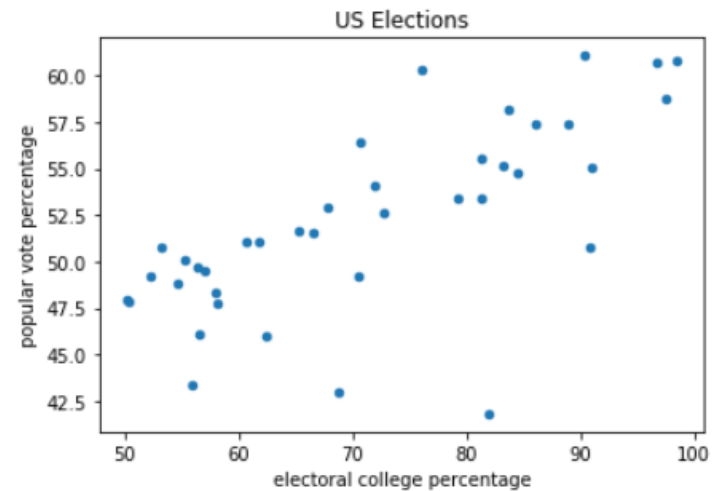




Bar Chart

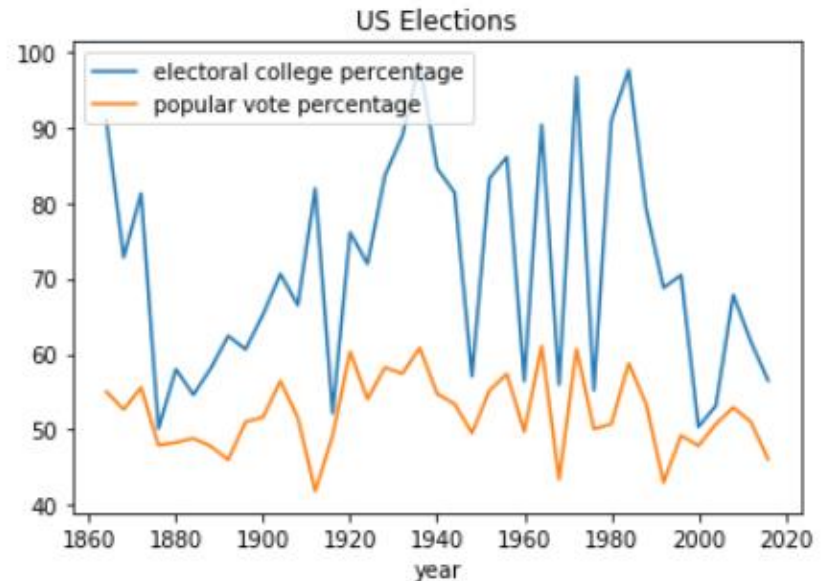
```
import pandas as pd
import matplotlib.pyplot as plt
df = pd.read_csv('electionsUSA.csv')
gr=df.plot.scatter(x='electoral college percentage', y='popular vote percentage', title='US Elections')
```

gr.plot



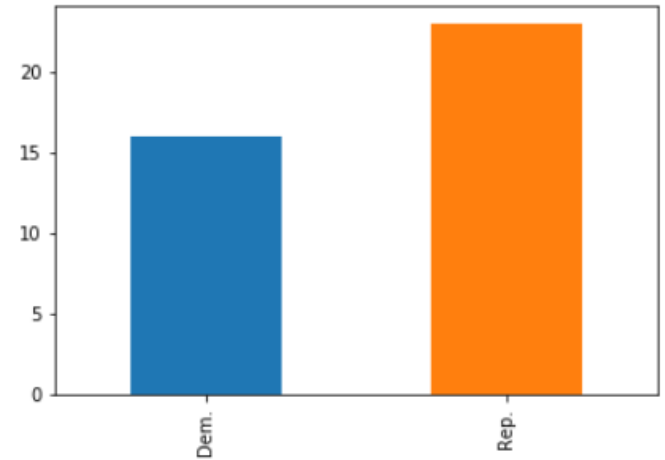
Line Chart

```
df=df.set_index('year')  
gr=df.drop(['party'], axis=1).plot.line(title='US Elections')  
gr.plot
```



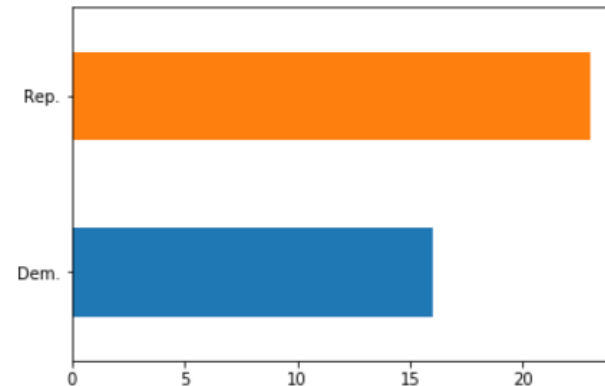
Bar Chart

```
df['party'].value_counts().sort_index().plot.bar()
```



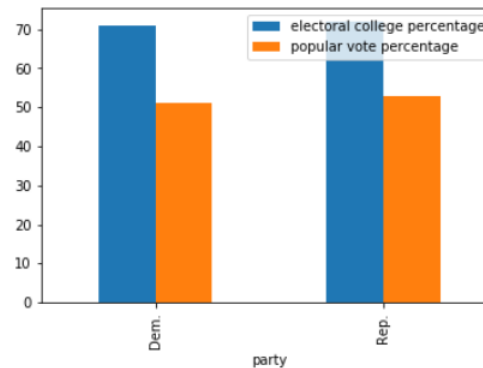
Bar Chart

```
df['party'].value_counts().sort_index().plot.barh()
```



Bar Chart

```
df.groupby("party").mean().plot.bar()
```



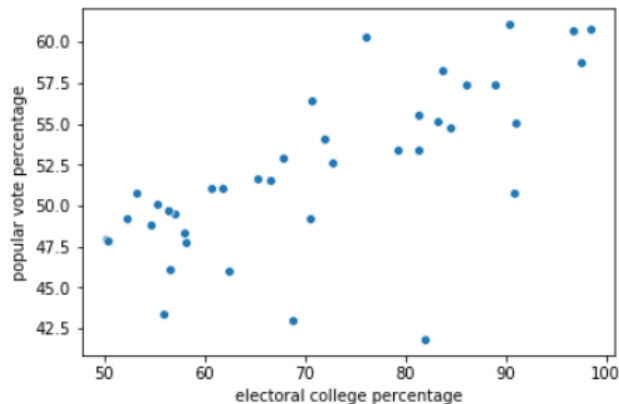


seaborn

<https://seaborn.pydata.org/>

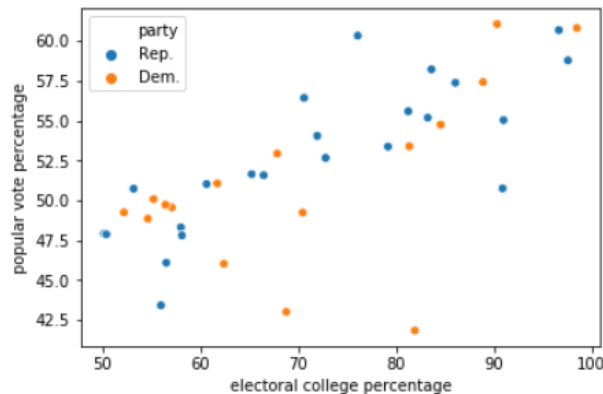
Scatter plot

```
import pandas as pd
import seaborn as sns
df = pd.read_csv('electionsUSA.csv', sep=";")
sns.scatterplot(x='electoral college percentage', y='popular vote percentage', data=df)
```



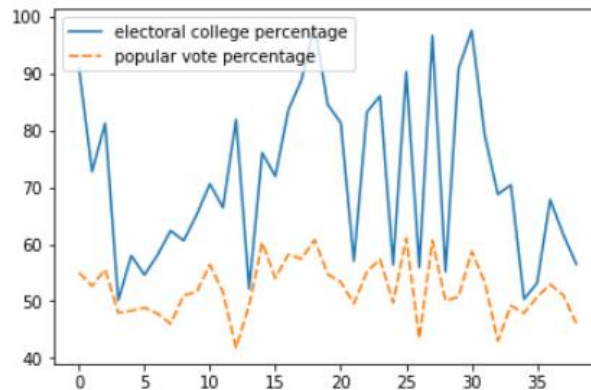
Scatter plot

```
import pandas as pd
import seaborn as sns
df = pd.read_csv('electionsUSA.csv', sep=";")
sns.scatterplot(x='electoral college percentage', y='popular vote percentage', hue="party", data=df)
```



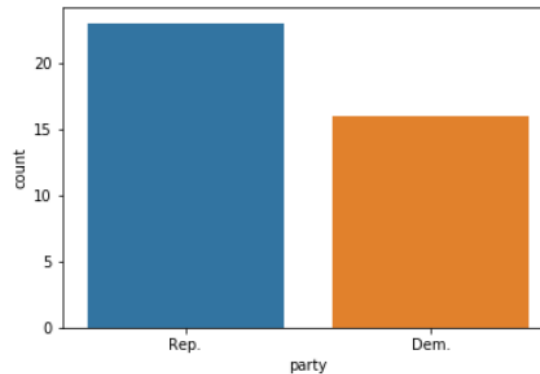
Line chart

```
import pandas as pd
import seaborn as sns
df = pd.read_csv('electionsUSA.csv, sep=";")
XY=df[['electoral college percentage','popular vote percentage']]
sns.lineplot(data=XY)
```



Bar chart

```
import pandas as pd
import seaborn as sns
df = pd.read_csv('electionsUSA.csv', sep=";")
sns.countplot(df['party'])
```



Other charts

- Histograms
- Pairplot (e.g. `sns.pairplot(df)`)
- Heatmaps (e.g. `sns.heatmap(df.corr(), annot=True)`)

- Plot and subplots:
- https://matplotlib.org/devdocs/gallery/subplots_axes_and_figures/subplots_demo.html

Conclusions

- Python libraries used in data visualization
- Creating line charts, bar charts and scatter plots using Matplotlib, Pandas and Seaborn