Lisbon School of Economics & Management
Universidade de Lisboa

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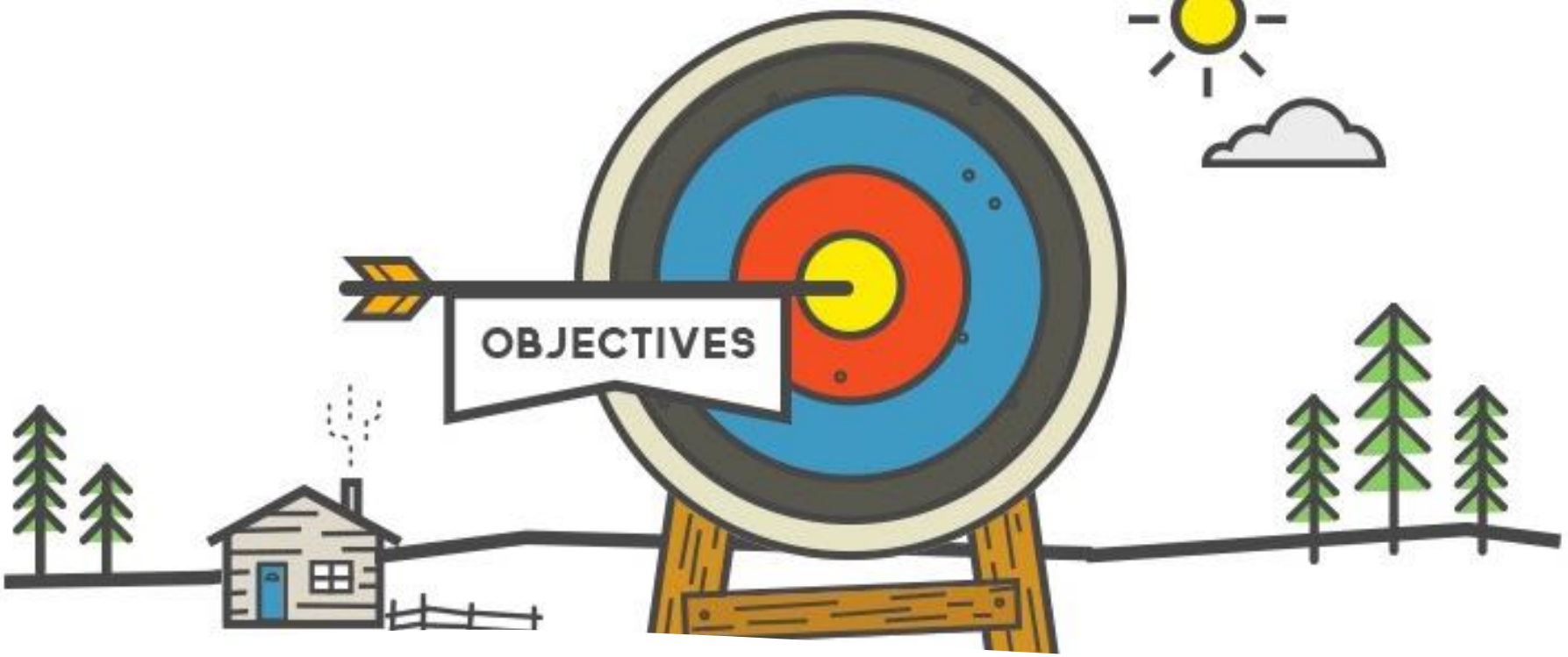
Visualization

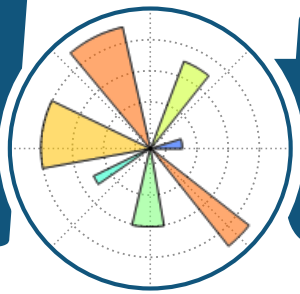
Prof. Carlos J. Costa, PhD



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



Import data

```
import pandas as pd

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

File:

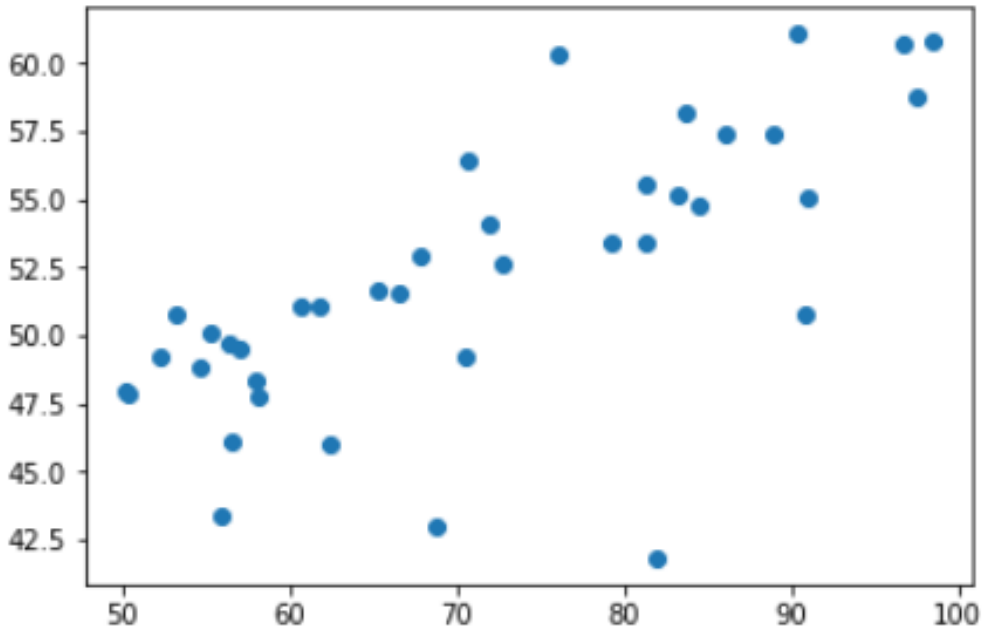
https://raw.githubusercontent.com/masterfloss/data/main/electionsUSA.csv

Import data

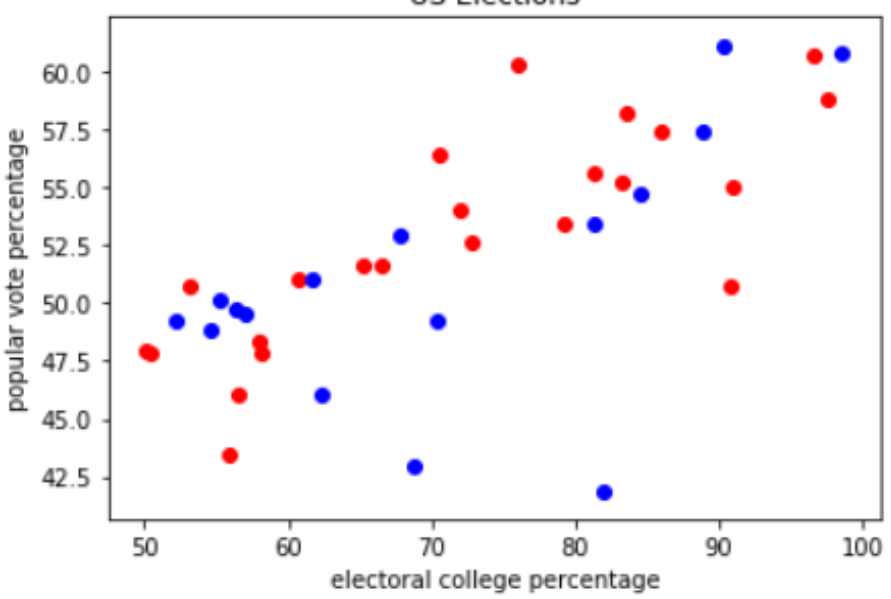
```
import pandas as pd
import matplotlib.pyplot as plt
df = pd.read_csv('electionsUSA.csv')
```

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'])
```

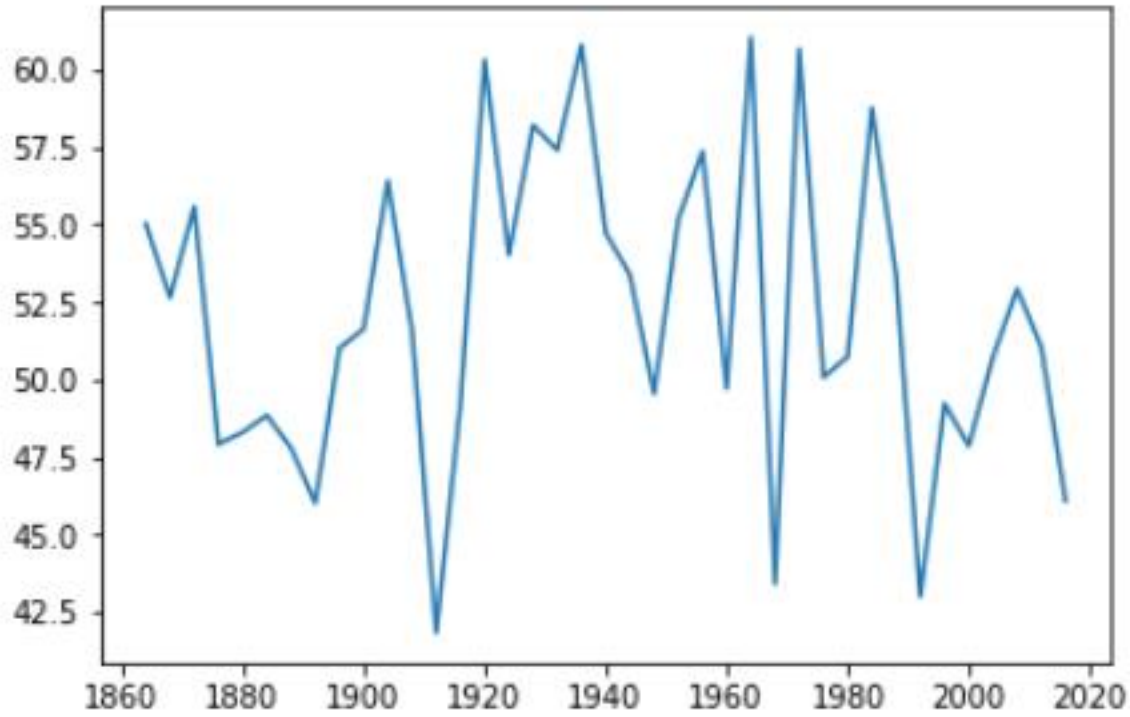


Scatter Plot



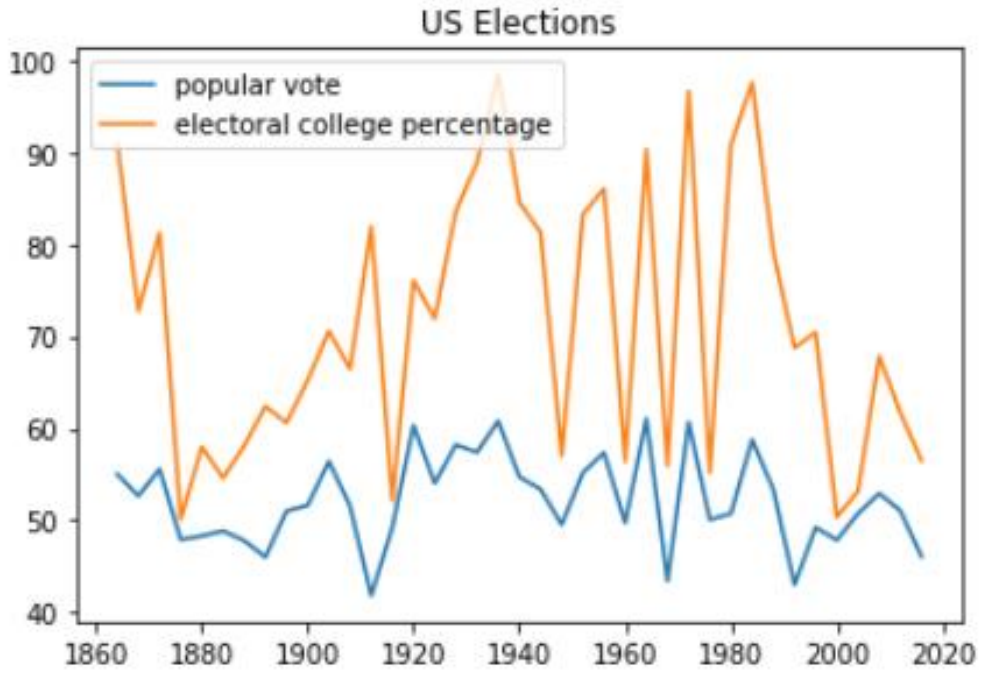

```
# create colour dictionary
colrs = {'Rep.':'r', 'Dem.':'b'}
# create a figure and axis
fig, ax = plt.subplots()
# plot each data-point
for i in range(len(df['electoral college percentage'])):
    ax.scatter(df['electoral college percentage'][i],df['popular vote percentage'][i],colr=colrs[df['party'][i]])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

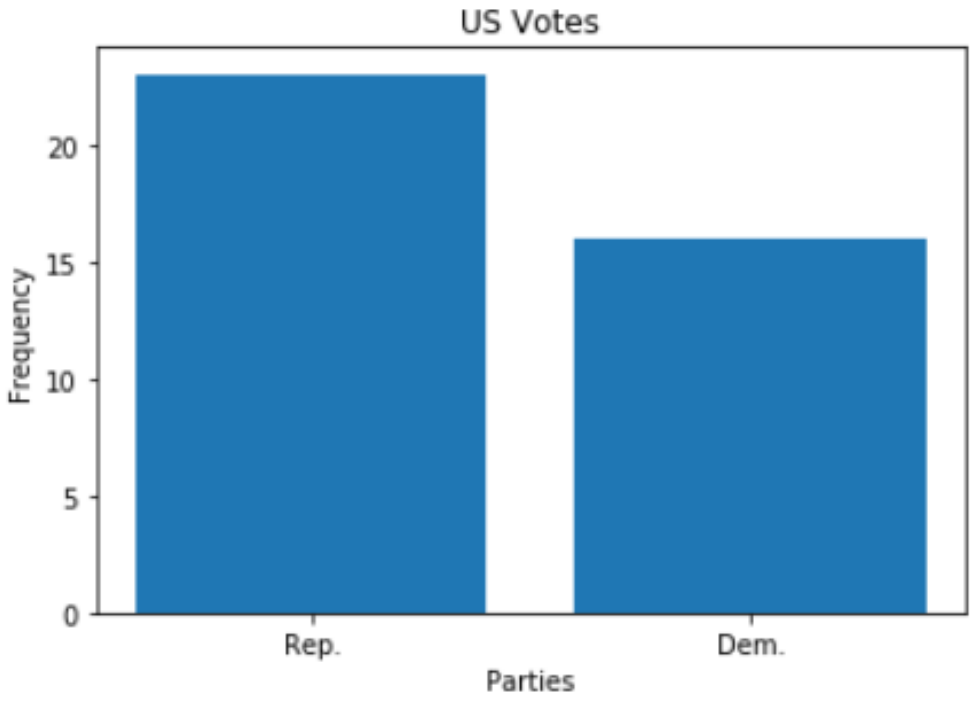
Line Chart




```
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()
```

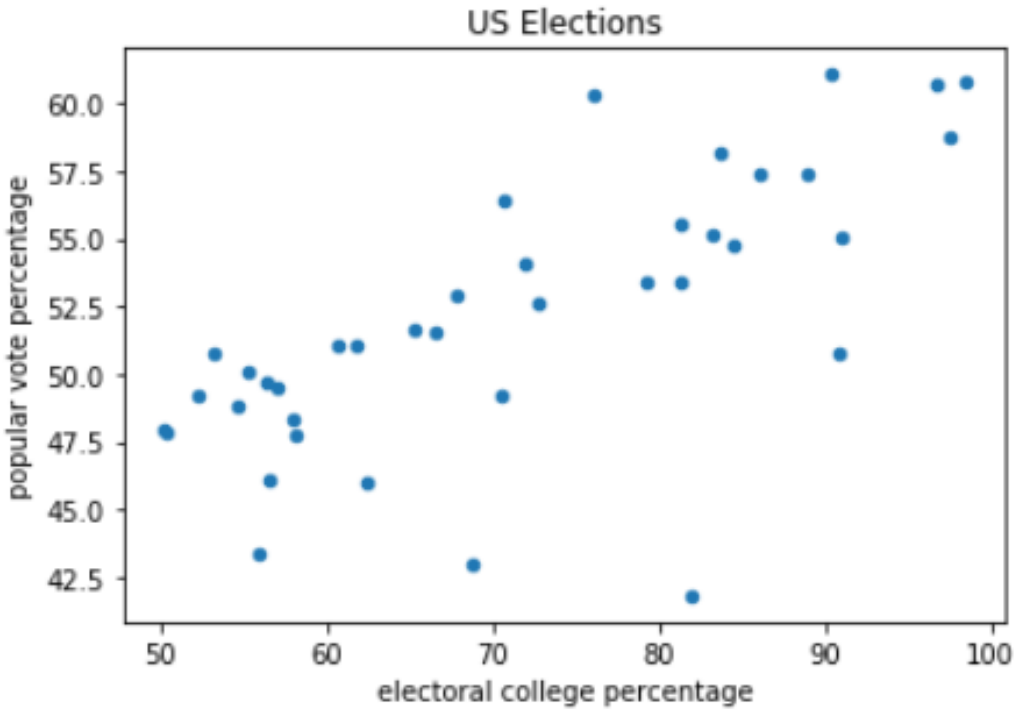
Bar Chart

```
# 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')
```



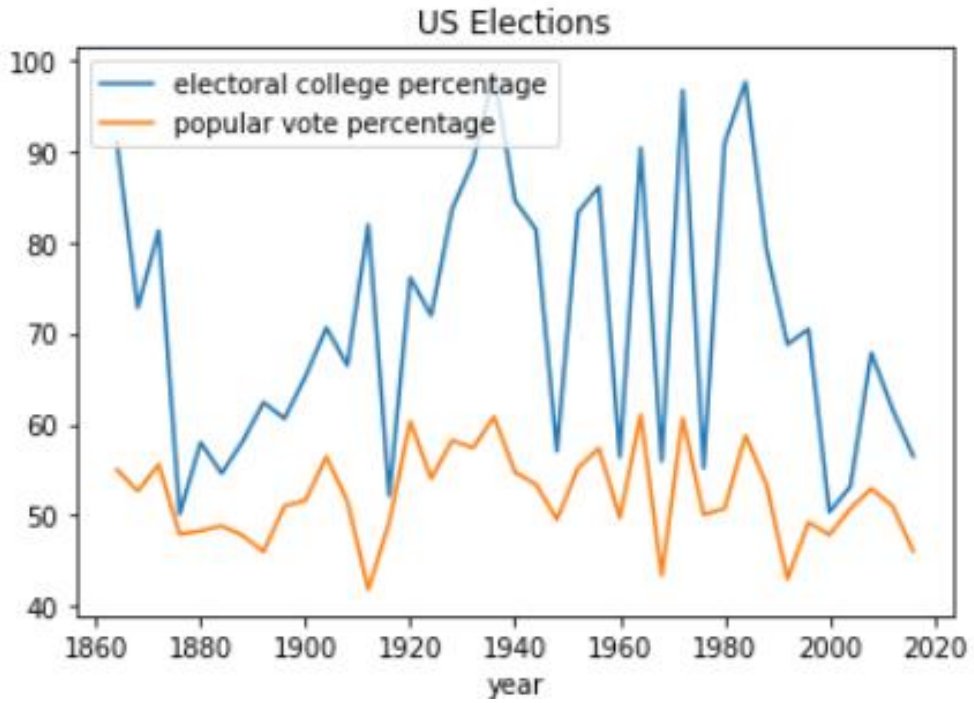

pandas

Bar Chart

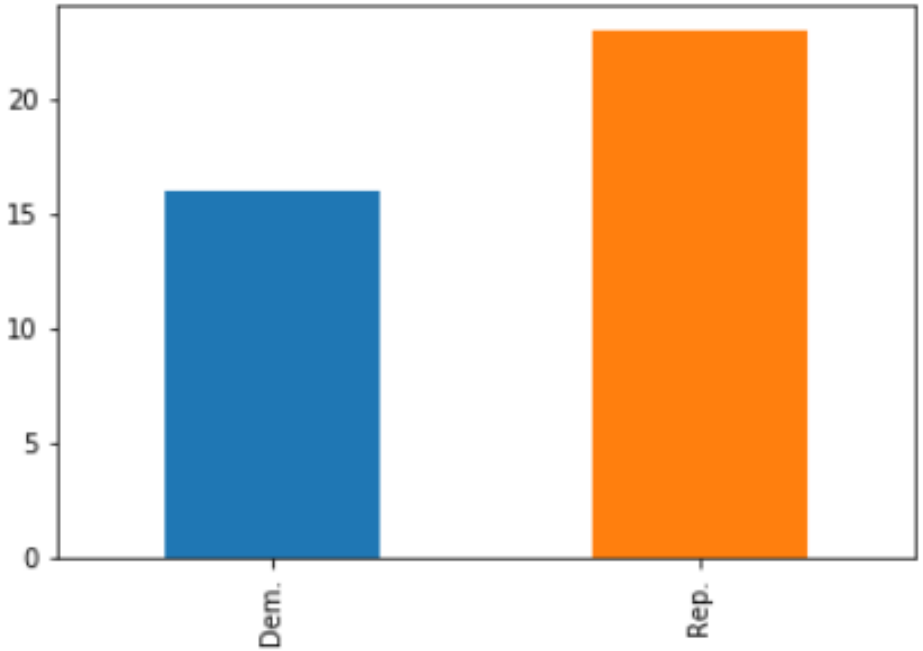



```
import pandas as pd
import matplotlib.pyplot as plt
url=df = pd.read_csv('electionsUSA.csv')
gr=df.plot.scatter(x='electoral college percentage', y='popular vote percentage', title='US Elections')
gr.plot
```

Line Chart



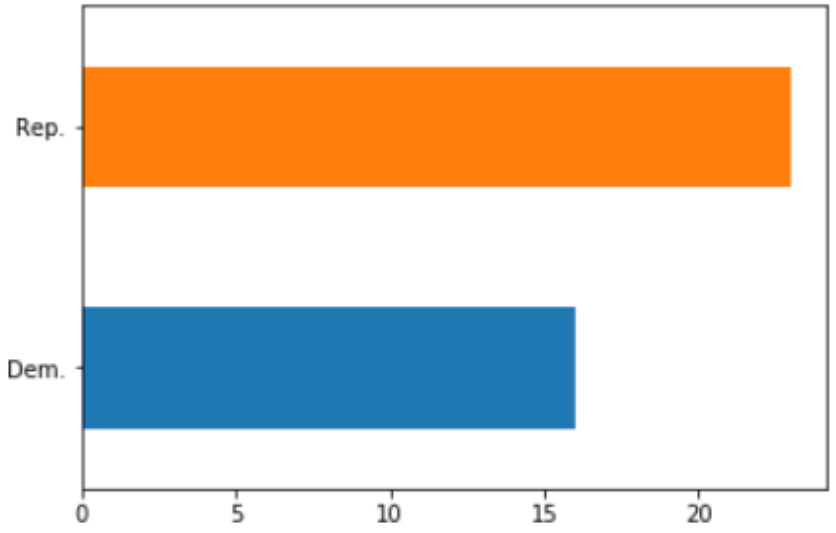

```
df=df.set_index('year')
gr=df.drop(['party'], axis=1).plot.line(title='US Elections')
gr.plot
```



Bar Chart

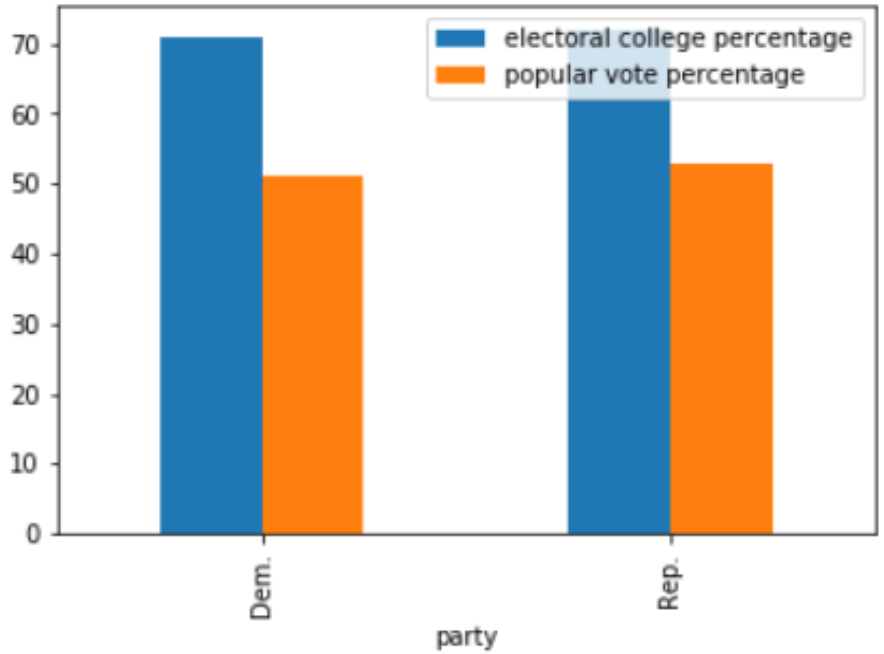
```
df['party'].value_counts().sort_index().plot.bar()
```

Bar Chart



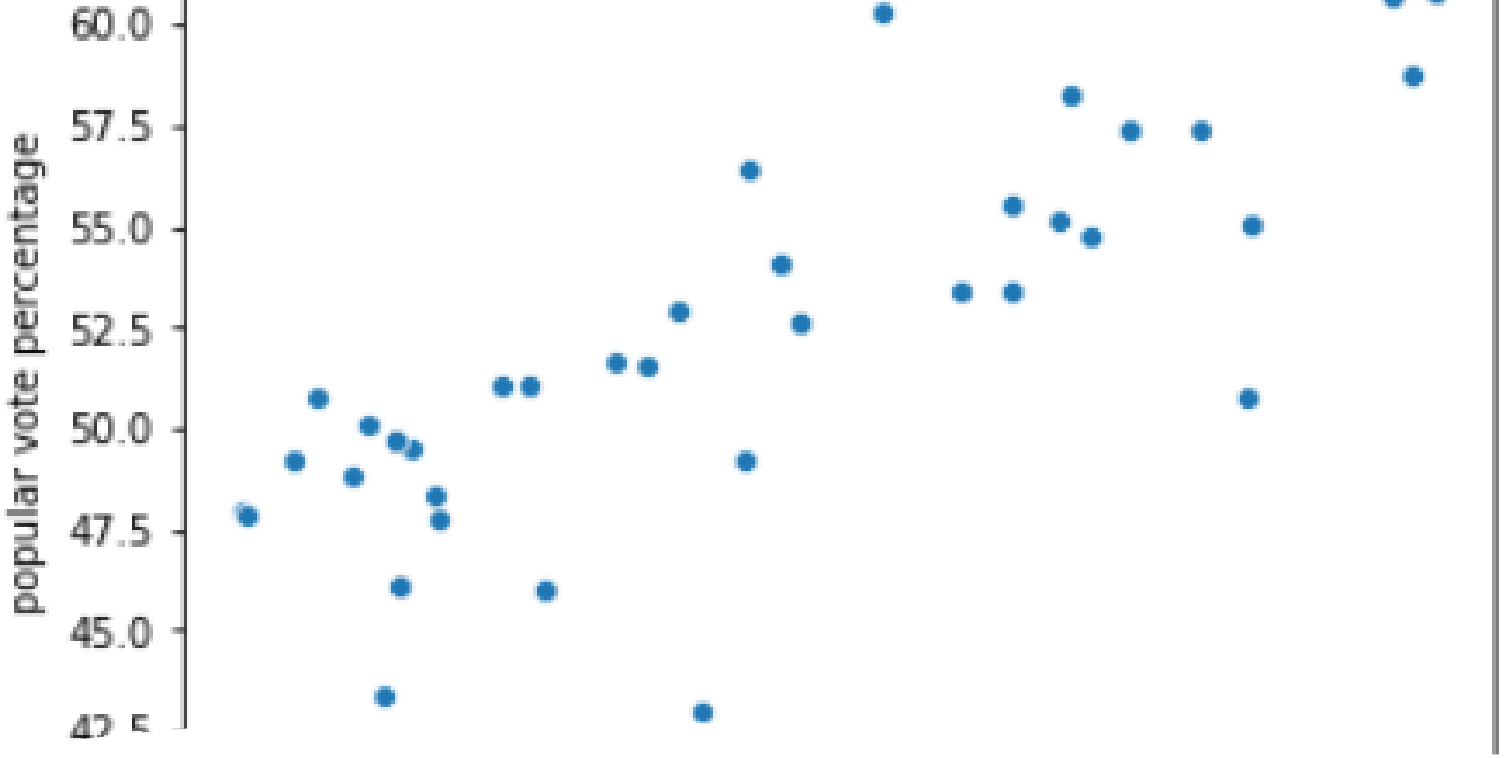
df['party'].value_counts().sort_index().plot.barh()

Bar Chart



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

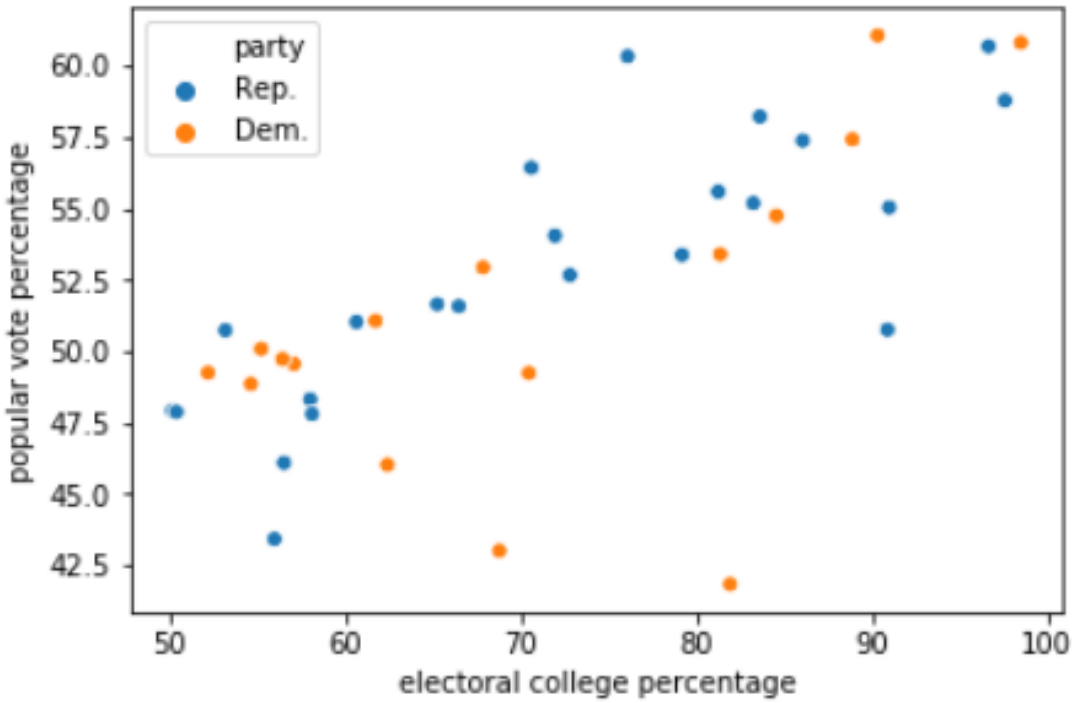
seaborn



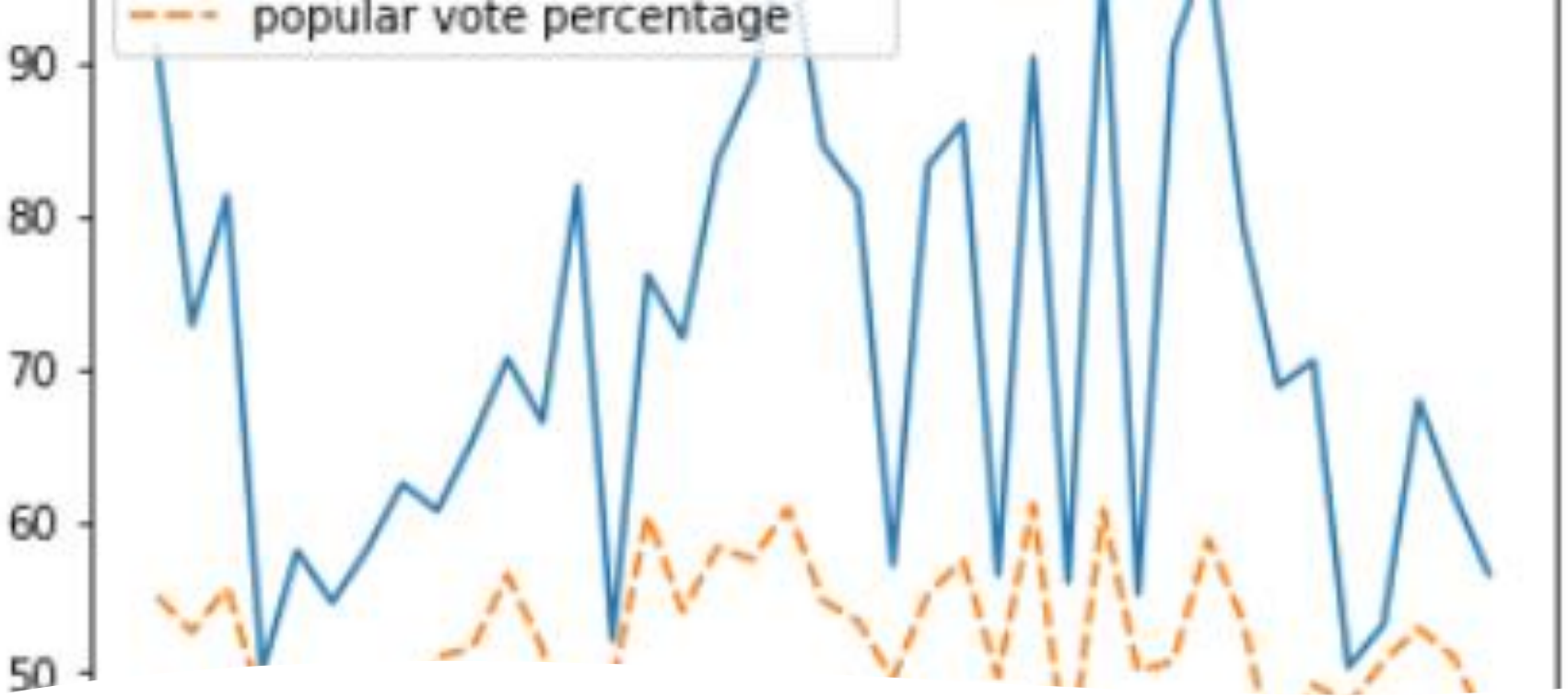
Scatter plot

```
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



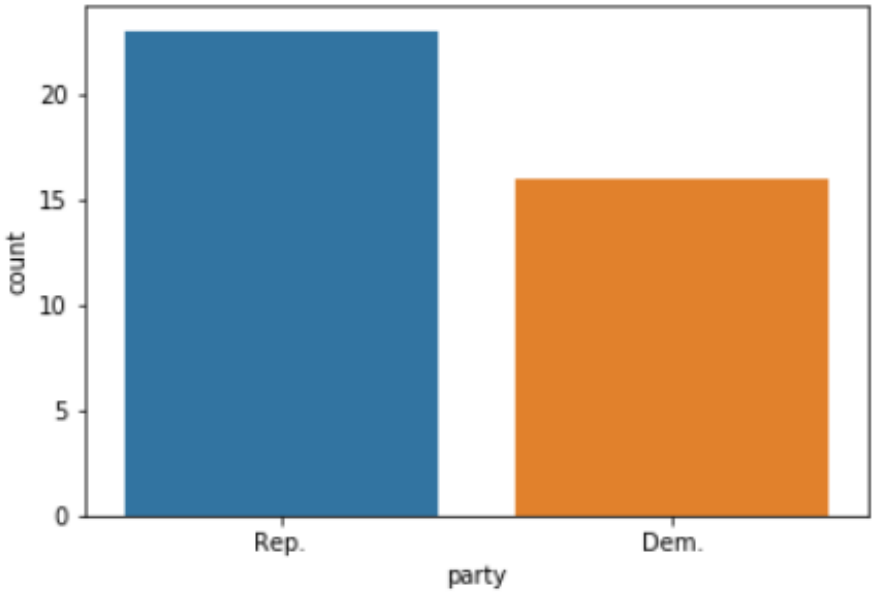

```
import pandas as pd
import seaborn as sns
df = pd.read_csv('electionsUSA.csv, sep=";")
sns.scatterplot(x='electoral college percentage', y='popular vote percentage', hue="party", data=df)
```



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`)

Conclusions

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