

# Programmierung in Python

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## Einheit 4: Datenvisualisierung

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<http://www.ebusiness-unibw.org/wiki/Teaching/PIP>

# **1 Grundlagen der Datenvisualisierung**

## **1.1 Ziel und Probleme**

## **1.2 Ansätze**

## **1.3 Datenvisualisierung in Python**

# 2 Matplotlib

## 2.1 Geschichte

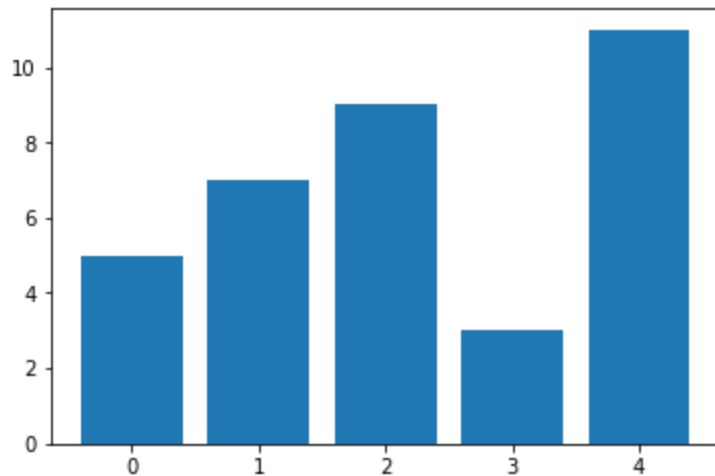
## 2.2 Grundlagen der Anwendung

- Beispiel
- Anzeige in Jupyter Notebooks
- Speichern als Datei

## 2.3 Ressourcen

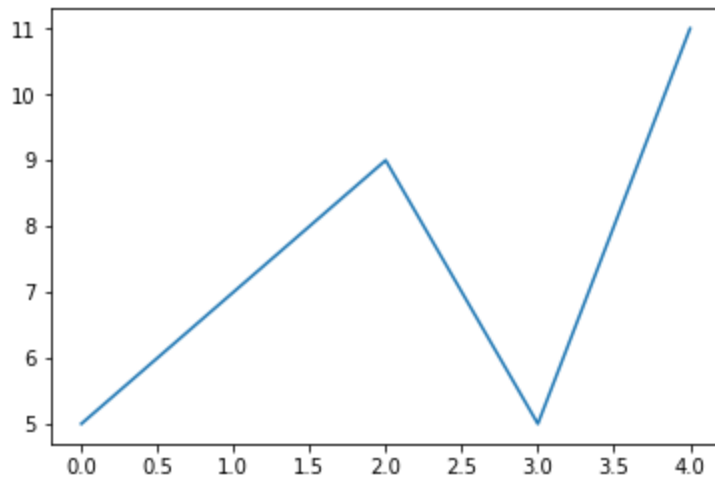
# 3 Balkendiagramme

```
In [3]: from matplotlib import pyplot as plt  
plt.bar(range(5), [5, 7, 9, 3, 11])  
plt.show()
```



# 4 Liniendiagramme

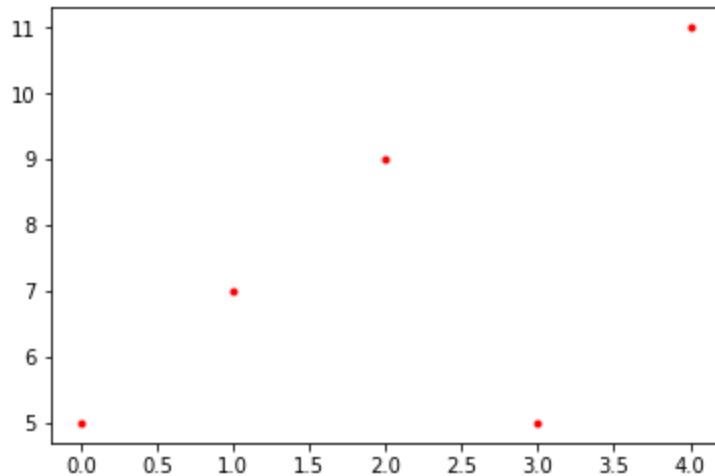
```
In [5]: from matplotlib import pyplot as plt  
plt.plot(range(5), [5, 7, 9, 5, 11])  
plt.show()
```



# 5 Punktdiagramme

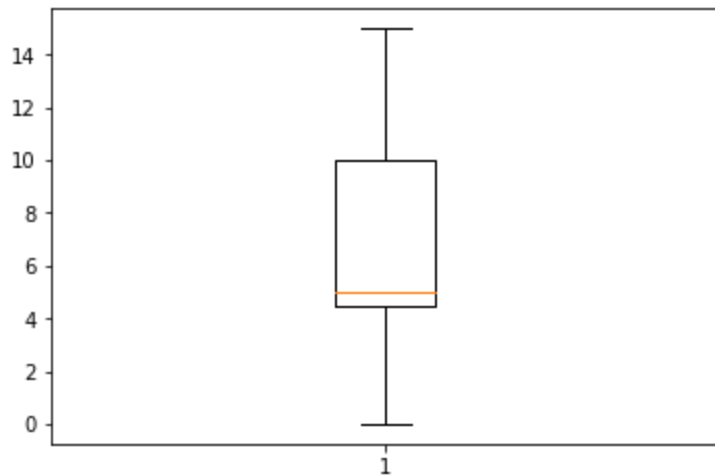
Vgl. auch [hier](#).

```
In [18]: from matplotlib import pyplot as plt  
plt.plot(range(5), [5, 7, 9, 5, 11], '.r')  
plt.show()
```



# 6 Boxplots

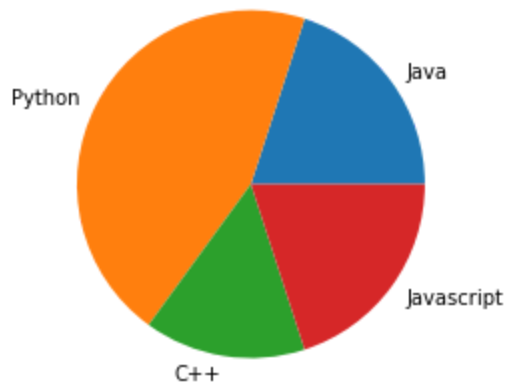
```
In [12]: from matplotlib import pyplot as plt
plt.boxplot([0, 1, 5, 15, 4, 12, 5, 7, 9, 5, 11])
plt.show()
```



# 7 Tortendiagramme

```
In [16]: # auf Basis von https://matplotlib.org/gallery/pie\_and\_polar\_charts/pie\_features.html
import matplotlib.pyplot as plt

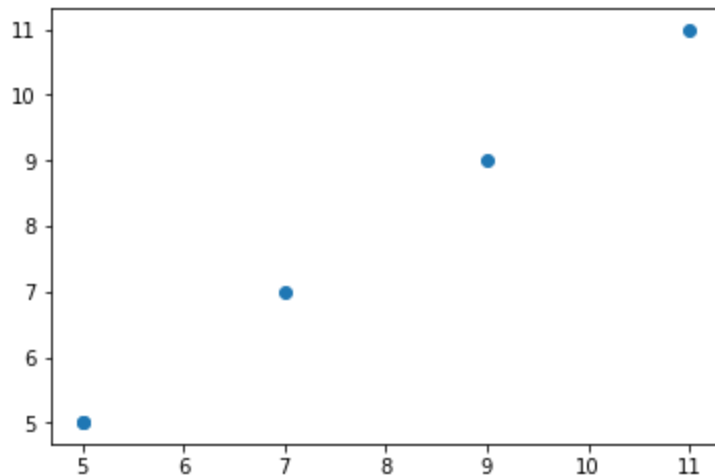
labels = ['Java', 'Python', 'C++', 'Javascript']
sizes = [20, 45, 15, 20]
plt.pie(sizes, labels=labels)
plt.show()
```





# 8 Scatter Plots

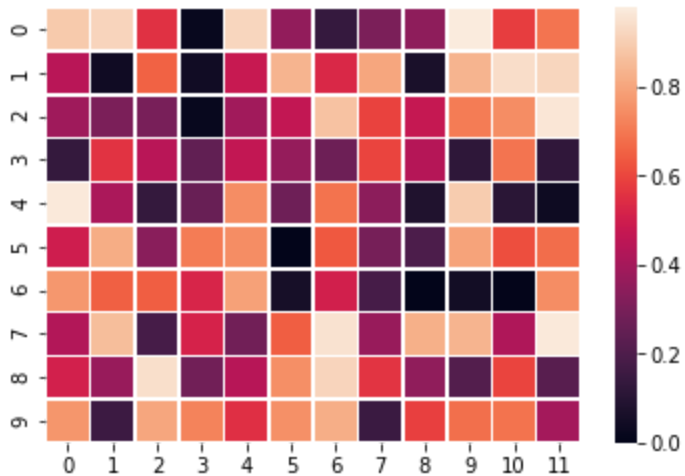
```
In [21]: from matplotlib import pyplot as plt  
plt.scatter([5, 7, 9, 5, 11], [5, 7, 9, 5, 11])  
plt.show()
```



# 9 Heatmaps

```
In [22]: # Beispiel aus https://stackoverflow.com/a/49608671/516699
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt

uniform_data = np.random.rand(10, 12)
ax = sns.heatmap(uniform_data, linewidth=0.5)
plt.show()
```



# **10 Individualisierung und Gestaltung**

**10.1 Titel**

**10.2 Achsen und Achsenbeschriftungen**

**10.3 Farben**

**10.4 Legende**

**10.5 Mehrere Diagramme**

# 11 Visualisierung von Daten mit geographischem Bezug

Landkarten etc. Vgl. z.B. [hier](#).

# 12 Quellenangaben und weiterführende Literatur

[Pyt2019] Python Software Foundation. Python 3.8.0 Documentation. <https://docs.python.org/3/>.

[Ov2019] Ohne Verfasser. Plotting Data with Matplotlib. [https://howtothink.readthedocs.io/en/latest/PvL\\_H.html](https://howtothink.readthedocs.io/en/latest/PvL_H.html)

# Vielen Dank!

<http://www.ebusiness-unibw.org/wiki/Teaching/PIP>