Untitled

June 22, 2021

1 Blatt 08

1.1 Noah Scheugenpflug, Salem Rezik, Nikola Mang

1.2 Aufgabe 17

1.2.1 c)

Nun gilt es, den Informationsgewinn auch für die anderen Attribute anzeigen zu lassen.

[1]:
```
# Libraries we use for data analysis and visualisation
import matplotlib.pyplot as plt
import seaborn as sns
import pandas as pd
import numpy as np

# libraries used for the notebook
from IPython.display import SVG
from graphviz import Source
from IPython.display import display
from ipywidgets import interactive

from sklearn.tree import DecisionTreeClassifier
from sklearn.datasets import make_moons
```

[2]:
```
df = pd.read_csv("data.csv", sep = ";") # read data from csv file
```

[3]:
```
df.head()
```

[3]:

	Temperatur	Wettervorhersage	Luftfeuchtigkeit	Wind	Fußball
0	29.4	2	85	False	False
1	26.7	2	90	True	False
2	28.3	1	78	False	True
3	21.1	0	96	False	True
4	20.0	0	80	False	True

[4]:
```
# sono molto contento
def entropy(p):
    m, counts = np.unique(p, return_counts = True) # possible values
```

```
    H = 0

    for i in range(len(m)):
        H += counts[i]/len(p) * np.log2(counts[i]/len(p))

    return - H
```

[5]:
```
entropy(df["Fußball"]) # to test result of a)
```

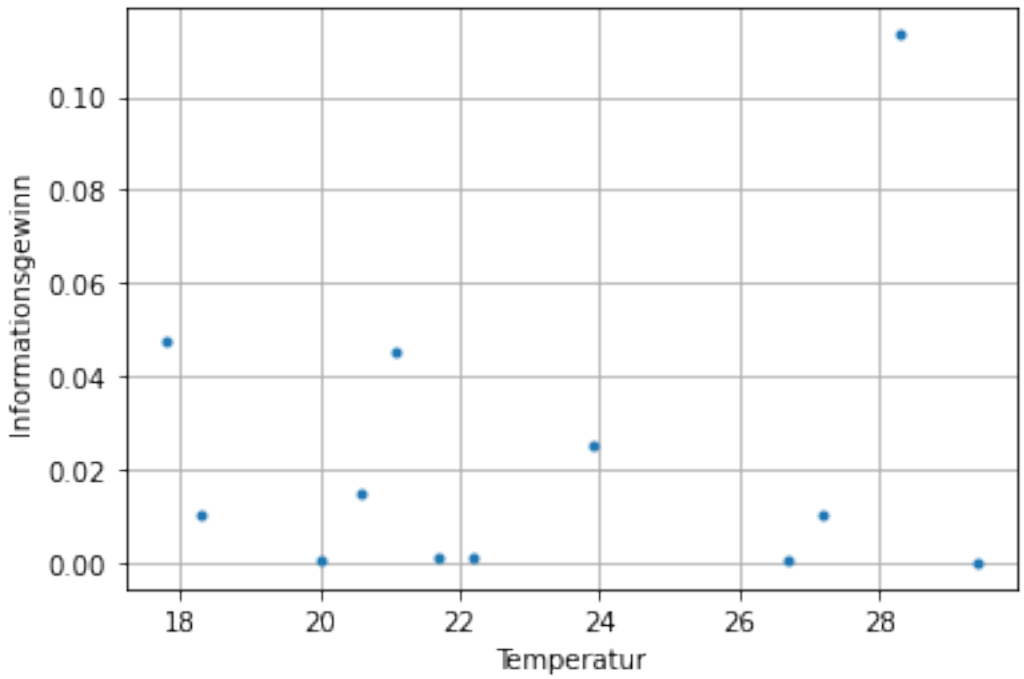
[5]:
```
0.9402859586706309
```

[6]:
```
def info_gained(y, x):
    mask = x == True
    n = mask.sum()
    n_ges = len(y)
    n_spec = n_ges - n


    H_y = entropy(y)

    H_yx = n/n_ges * entropy(y[mask]) + n_spec/n_ges * entropy(y[-mask])

    IG_yx = H_y - H_yx

    return IG_yx
```

[7]:
```
def find_max_cut(y, x):
    states = np.unique(x)

    IG_states = np.array([info_gained(y, x > i) for i in states])

    plt.figure()
    plt.plot(states[:], IG_states[:], ".")

    plt.xlabel(x.name)
    plt.ylabel("Informationsgewinn")

    plt.grid()

    return IG_states.max()
```

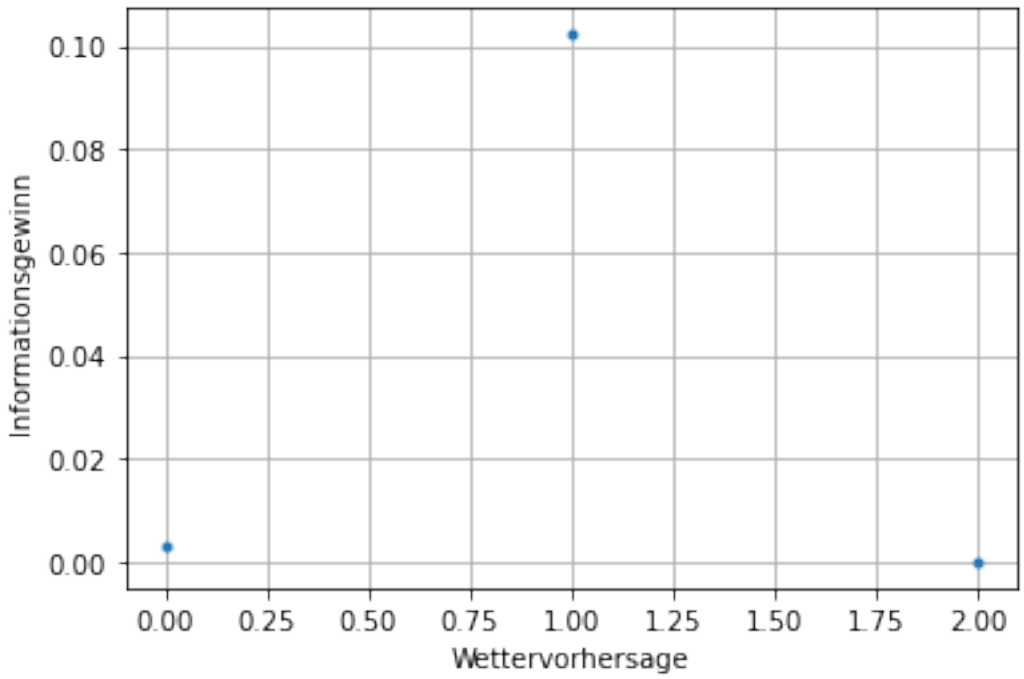
[8]:
```
IG_max_T = find_max_cut(df["Fußball"], df["Temperatur"])
print("Maximum Information gained = ", IG_max_T)
```

```
Maximum Information gained =  0.11340086418110318
```



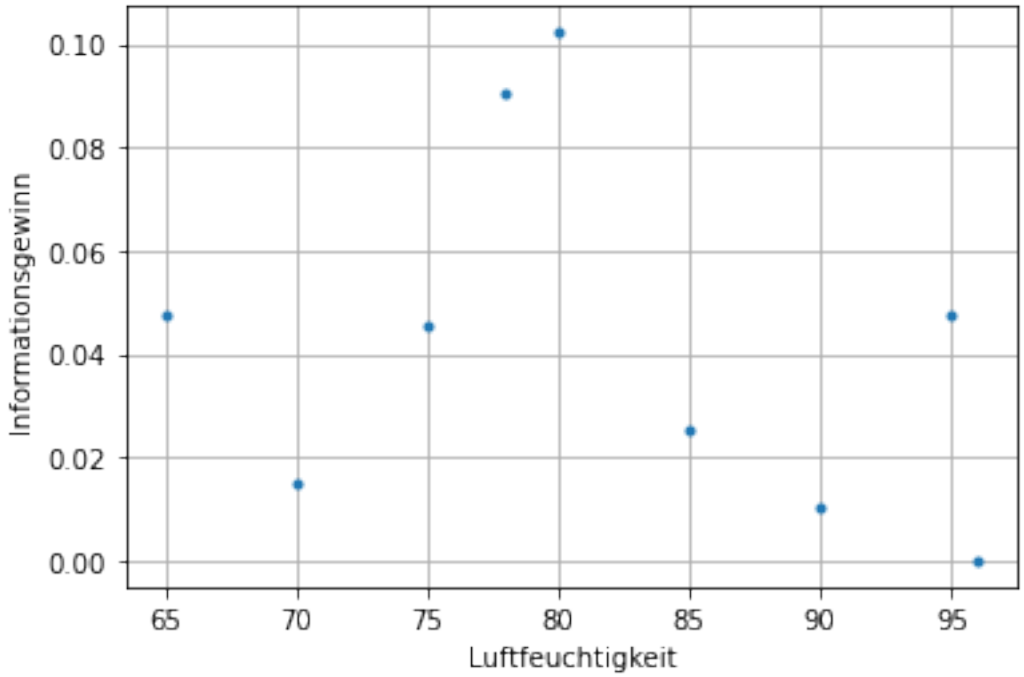
[9]:
```
IG_max_WV = find_max_cut(df["Fußball"], df["Wettervorhersage"])
print("Maximum Information gained = ", IG_max_WV)
```

```
Maximum Information gained =  0.10224356360985054
```



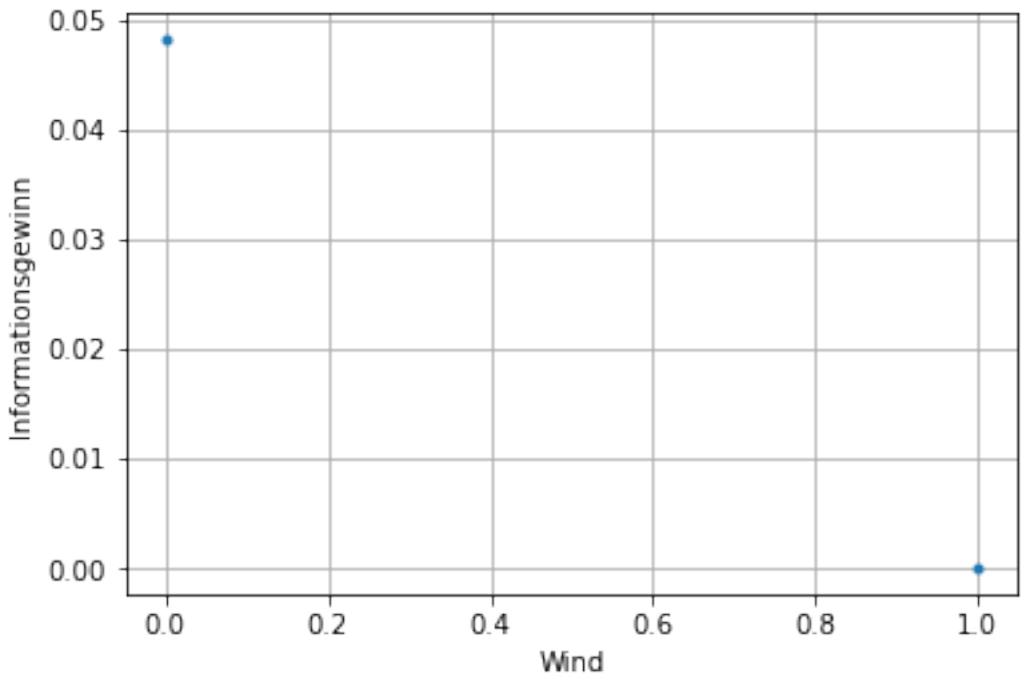
[10]:
```
IG_max_L = find_max_cut(df["Fußball"], df["Luftfeuchtigkeit"])
print("Maximum Information gained = ", IG_max_L)
```

```
Maximum Information gained =  0.10224356360985054
```



[12]:
```
IG_max_W= find_max_cut(df["Fußball"], df["Wind"])
print("Maximum Information gained = ", IG_max_W)
```

```
Maximum Information gained =  0.04812703040826927
```



1.2.2 d)

Es zeigt sich also, dass durch einen cut bei der Temperatur die meiste Information gewonnen werden kann, gleich darauf folgen auf derselben Höhe die Luftfeuchtigkeit und Wettervorhersage.

[ ]: