Aufgabe3_test

November 21, 2020

1 Aufgabe 3: Data Preparation und Modeling

1.1 TODO:

- Anomalien bereinigen
- Feature Engineering
  - Unnötige Spalten (siehe Aufg. 2) entfernen
  - One-Hot Encoding einiger Eigenschaften
-

[11]:
```
import pandas as pd
import matplotlib.pyplot as plt
import math
import seaborn as sb
from sklearn.linear_model import LinearRegression
from sklearn.linear_model import LogisticRegression, SGDClassifier
from sklearn.model_selection import train_test_split
```

[3]:
```
dataset = pd.read_csv('./DatenAusgegeben1.0.csv', delimiter=';', encoding =␣
↪'cp852')
dataset
```

[3]:

	Grundstück in qm	Grundstücksform	Steigung	Bezirk	Zone	Lage	\
0	898	IR1	Nein	Somerset	RL	Norm	
1	1326	Reg	Nein	North East	RL	Norm	
2	725	Reg	Nein	Somerset	RL	Norm	
3	725	Reg	Nein	Somerset West	RL	Norm	
4	697	Reg	Nein	Miller	RL	Norm	
…	…	…	…	…	…	…	
1995	1272	IR1	Nein	North East	RL	Norm	
1996	941	IR1	Nein	Miller	RL	Norm	
1997	1093	Reg	Nein	Grand Park	RL	Norm	
1998	1228	IR1	Nein	North East	RL	Norm	
1999	778	Reg	Nein	Somerset	RL	Norm	

	Typ	Zustand	Gebaut	Renoviert	…	Schlafzimmer	Küchen	\
0	2Fam	4	2107	2107	…	6	2	
1	1Fam	5	2133	2133	…	3	1	

```
2     1Fam         7    2096       2138  …              3       1
3     1Fam         5    2135       2135  …              3       1
4     1Fam         5    2129       2129  …              3       1
…     …       …      …          …  …             …      …
1995  1Fam         5    2133       2134  …              3       1
1996  1Fam         5    2134       2134  …              3       1
1997  1Fam         7    2040       2130  …              2       1
1998  1Fam         5    2134       2134  …              3       1
1999  1Fam         7    2071       2103  …              2       1

     Küchenqualitt Rume   Garage Typ  Garagenkapazitt  Pool  Verkaufsmonat  \
0                3   10        Anbau                2   NaN              8
1                4    7        Anbau                3   NaN              1
2                4    5  Freistehend                1   NaN              6
3                4    8        Anbau                2   NaN              4
4                4    7        Anbau                2   NaN              6
…              …  …          …                …   …           …
1995             5   10    Eingebaut                3   NaN              3
1996             4    7        Anbau                2   NaN              7
1997             3    6  Freistehend                1   NaN              5
1998             4    9    Eingebaut                3   NaN              2
1999             4    6       2Typen                3   NaN              6

      Verkaufsjahr   Preis
0             2136  156500
1             2137  350000
2             2140  137900
3             2136  184000
4             2140  189000
…             …     …
1995          2138  412500
1996          2139  195500
1997          2137  112000
1998          2136  279000
1999          2138  152400

[2000 rows x 28 columns]
```

1.2 Unnötige Spalten entfernen

Zu entfernen sind:
Siehe Aufg. 2. Untersuchung auf einen Zusammenhang zwischen Preis und Verkaufszeitpunkt: - Verkaufsjahr - Verkaufsmonat

(Da Gesamtwohnfläche zusammengesetzt aus erster Stock und zweiter Stock ist: - Erster Stock in qm - Zweiter Stock in qm #TODO: Prüfen ob nicht rauszunehmen)

Siehe Aufg. 2. Untersuchung des Datensatzes auf vernachlässigbare Hauseigenschaften (Spalten):

- Pool - Küchen - Klimaanlage - Heizung

[4]:
```
df_keinunnoetig = dataset.drop(['Verkaufsjahr', 'Verkaufsmonat', 'Erster Stock␣
↪in qm', 'Zweiter Stock in qm', 'Pool', 'Küchen', 'Klimaanlage', 'Heizung'],␣
↪axis = 1)
```

1.3 Anomalien bereinigen

Nun sollen Anomalien in dem Datensatz gefunden und bereinigt werden. Hierbei wird der Interquartilsabstand verwendet um Ausreißer zu finden.
(https://en.wikipedia.org/wiki/Interquartile_range)

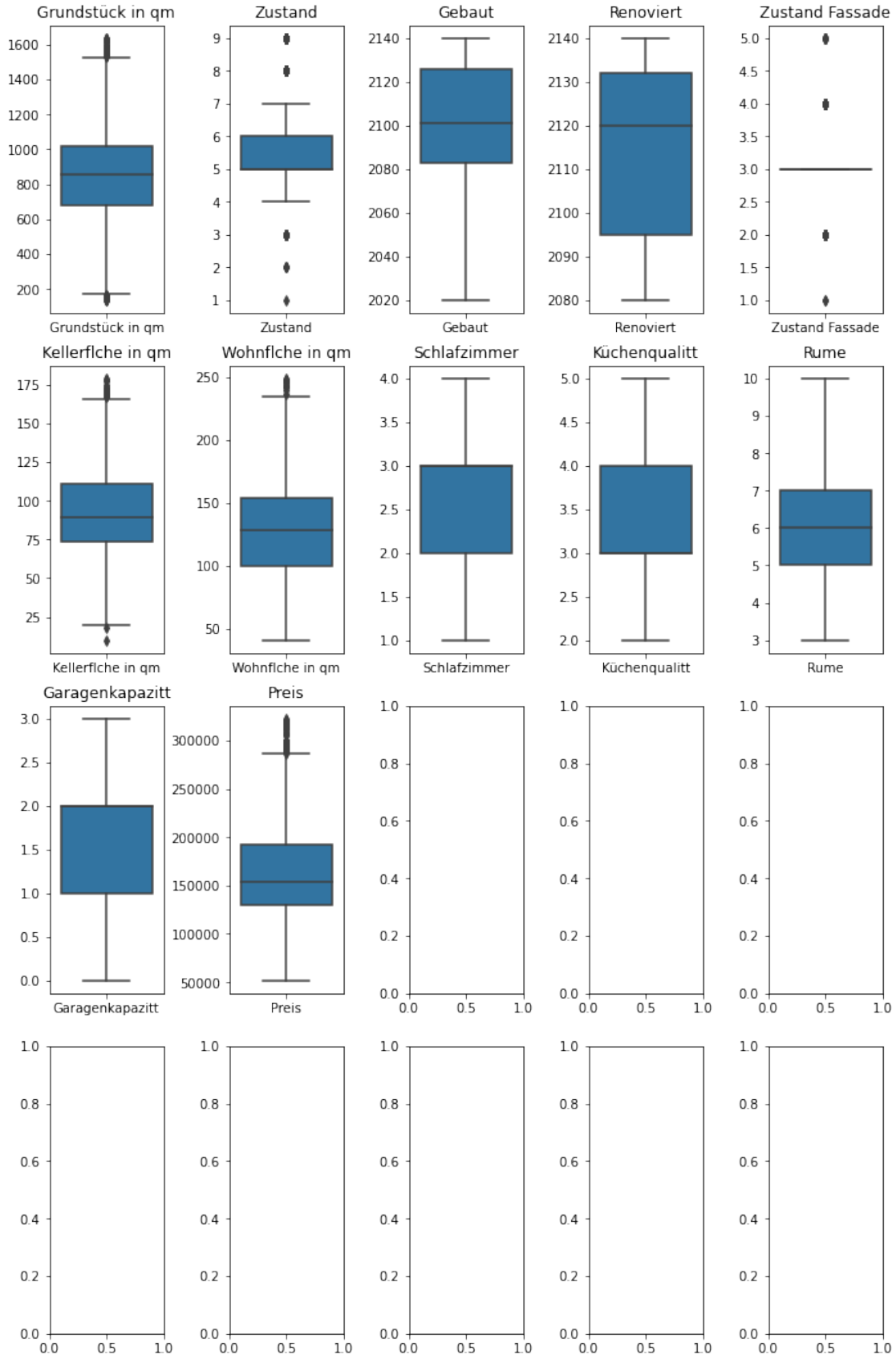
Hierbei sollen ausschließlich numerische Werte, also keine Werte einer ordinalen Skala betrachtet werden. (`columns_filtered`)

[5]:
```
columns = ['Grundstück in qm', 'Zustand', 'Gebaut',
           'Renoviert', 'Zustand Fassade', 'Kellerflche in qm',
           'Wohnflche in qm', 'Schlafzimmer', 'Küchenqualitt',
           'Rume', 'Garagenkapazitt', 'Preis']

columns_filtered = ['Grundstück in qm', 'Kellerflche in qm', 'Wohnflche in qm',
           'Schlafzimmer', 'Gebaut', 'Rume', 'Garagenkapazitt', 'Preis']

Q1 = df_keinunnoetig[columns_filtered].quantile(0.25)
Q3 = df_keinunnoetig[columns_filtered].quantile(0.75)
IQR = Q3 - Q1

df_anomalienbereinigen = df_keinunnoetig[~((df_keinunnoetig[columns_filtered] <␣
↪(Q1 - 1.5 * IQR)) |(dataset[columns_filtered] > (Q3 + 1.5 * IQR))).
↪any(axis=1)]
```

1.4 Verifikation der Bereinigung

Nun soll verifiziert werden, ob die Bereinigung auf Anomalien erfolgreich gewesen ist. Hierzu können die untenstehenden Boxplots mit denen aus **Aufg. 2, Finden von Anomalien** verglichen werden.

[6]:
```
fig, axes = plt.subplots(4, 5, figsize = (10, 15))
i = 0
plt.tight_layout(pad = 2)
for column in columns:
  chosenax = axes[math.floor(i / 5)][i % 5]
  chosenax.set_title(column)
  sb.boxplot(data = df_anomalienbereinigen[[column]], ax = chosenax)
  i = i + 1
plt.show()
```


Grundstück in qm
Zustand
Gebaut
Renoviert
Zustand Fassade
Kellerflche in qm
Wohnflche in qm
Schlafzimmer
Küchenqualitt
Rume
Garagenkapazitt
Preis

[7]:
```
encode_kategorien = ['Bezirk', 'Lage', 'Heizungsqualitt', 'Typ', 'Steigung',␣
↪'Grundstücksform', 'Garage Typ', 'Zone']

encoded_kategorieeigenschaften = pd.get_dummies(dataset[encode_kategorien].
↪fillna('Keine'))
df_encoded = df_anomalienbereinigen.drop(encode_kategorien, axis = 1).
↪join(encoded_kategorieeigenschaften)
```

[41]:
```
import plotly.express as px
fig = px.parallel_coordinates(df_encoded, color = 'Preis', width = 1300, height␣
↪= 800)
fig.show()
```

[35]:
```
reg = LinearRegression()
reg2 = LogisticRegression()

df_train = df_encoded.drop('Preis', axis = 1)
values_predict = df_encoded['Preis']
x_train, x_test, y_train, y_test = train_test_split(df_train, values_predict,␣
↪test_size = 0.2)

reg.fit(x_train, y_train)
reg2.fit(x_train, y_train)
y_pred = reg.predict(x_test)

print(y_test.values, y_pred)

for bla in y_pred:
    print(type(bla))

# print(reg.coef_, reg.intercept_, reg.rank_)
print("Linear Regression", reg.score(x_test, y_test))
print("Logistic Regression", reg2.score(x_test, y_test))

from sklearn.metrics import classification_report
classification_report(y_test.values, y_pred)
```

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[193500 275000 119900 149300 254750 159500 155000 274300 188500 230000
 147000 135000 137000 130000 135000 220000 215000 204000 134900 312500
 194000  80000 159000 168000  72000 162900 145250 257500 133700  99500
 233500 184100 306000 119500 180000  64000 179200 182000 235000 202000
 139000 218000 194700 157000  86000 214000 133000 175000 147000 246900
 177625 102000 180500 147000 163000 220000 290000 215000 240000 142500
 133000 184500 121000 122000 165000 215000  91000 189900  89000 128000
 165500 118900 159900 185000 191000 105000 240000  91300 214000 197500
```

```
 128000 174900 144900 116000 154000 114504 148000 185000 224000  96900
 109900 125000 145000 154000 146000 236000 202500 144100 285000 128000
 134450  85000 250000 110000 133000 167500 115000 184500 162500 174500
 145000 135500 156000 191500 189000 112900 172500 132000 127500 105000
 130000 200000 140000 128500 166000 155000 192500 147000 178000  85000
 136000 248000 142250 128000  99500 135500 137500 130000 220000 166000
 115000 150000 148500 116900 110000 226000 155000 289000 181000 246000
 148000 212500 179600 193000 111500 136500 187500 260000 144000 265000
 217000 275000 215000 159000 187000 111000 148000  89000 164000 123000
 124000 189000 129900 201000 164500  85500 260000 212000 313000  94900
 212300 184000 281213 123900 100500 140000 197000 159000 177000 247000
 143750 120500 181500 137000 119900 123500 127000 193000 195500 256000
 119164 160000 178000 143500 128000 149000 263550 122600 120875 168675
 144000 105000 226500 157500  91500 319900 145400 139000 129000 153900
 111750  83500  88250 275000 181000 149500 205000 142500 174000 125000
 224900 120500 122900 174000 145000 275000 186500 135000 137500 120000
 274000 280000 146300 159500 176000 109000 203000 219000 200000 167000
 120000 130000 140000 228500 184000 190000 157000 260000 159000 125500
 217500 315500 214000 135000 154900 124500 151500 138500 171500 113000
 306000 128500 309000 159000 187000 177000 133500 284000 153000 290000
 260000 138500 168500 239000 122500 178000 226001 169000 134000 114500
  79000 196000 178000 241500 173000 120000 255000 133500 213250 131000
 246990 175000 140000 110000 185000 181316 133000 236500 103500 117600
 228000 160000 155000 150000 162000 126000 165000 125000 147500 275500
 183200 128600 118000 139900 148500 124400 170000 135000 200000 159000
 137500 176000  87000 322500  93900 135000  94500 142000 172000 139000
 282000 144750 158450] [197481.17166009 277429.34947723 114538.11968616
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101783.71520202 142851.08332305 149047.19577925 202614.31651364
209688.09244076 178231.66707598 131975.59471799 116682.17530996
155031.97969369 207574.65031114 164091.72958988 108981.46820237
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146034.57242455 201815.78348087 169654.19148597 133614.78327437
165387.48793738 138867.19413356 217543.76652647 125033.83814168
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Linear Regression 0.8866111199235576
Logistic Regression 0.0029154518950437317
```

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       ␣
 ↪---------------------------------------------------------------------------

        ValueError                                Traceback (most recent call␣
 ↪last)

        <ipython-input-35-16398a4e30c4> in <module>
         20
         21 from sklearn.metrics import classification_report
    ---> 22 classification_report(y_test.values, y_pred)


        ~\Anaconda3\lib\site-packages\sklearn\utils\validation.py in␣
 ↪inner_f(*args, **kwargs)
         71                           FutureWarning)
         72         kwargs.update({k: arg for k, arg in zip(sig.parameters,␣
 ↪args)})
    ---> 73         return f(**kwargs)
         74     return inner_f
         75
```

```
      ~\Anaconda3\lib\site-packages\sklearn\metrics\_classification.py in␣
↪classification_report(y_true, y_pred, labels, target_names, sample_weight,␣
↪digits, output_dict, zero_division)
     1927     """
     1928
   -> 1929     y_type, y_true, y_pred = _check_targets(y_true, y_pred)
     1930
     1931     labels_given = True


      ~\Anaconda3\lib\site-packages\sklearn\metrics\_classification.py in␣
↪_check_targets(y_true, y_pred)
       88
       89     if len(y_type) > 1:
   ---> 90         raise ValueError("Classification metrics can't handle a mix␣
↪of {0} "
       91                          "and {1} targets".format(type_true,␣
↪type_pred))
       92


      ValueError: Classification metrics can't handle a mix of multiclass and␣
↪continuous targets
```