Week 3 Assessment

August 21, 2020

0.0.1 Data Description

"Housing Affordability Data System" of the U.S. Department of Housing and Urban Development. [HADS]

[1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import datetime

%matplotlib inline
sns.set_style('dark')
sns.set(font_scale=1.2)

import warnings
warnings.filterwarnings('ignore')

np.random.seed(0)

pd.set_option('display.max_columns',None)
#pd.set_option('display.max_rows',None)
```

[2]:
```
df = pd.read_csv("2013.csv", low_memory=False)
```

[3]:
```
df
```

[3]:

	CONTROL	AGE1	METRO3	REGION	LMED	FMR	IPOV	BEDRMS	BUILT	\
0	'100003130103'	82	'3'	'1'	73738	956	11067	2	2006	
1	'100006110249'	50	'5'	'3'	55846	1100	24218	4	1980	
2	'100006370140'	53	'5'	'3'	55846	1100	15470	4	1985	
3	'100006520140'	67	'5'	'3'	55846	949	13964	3	1985	
4	'100007130148'	26	'1'	'3'	60991	737	15492	2	1980	
…	…	…	…	…	…	…	…	…	…	
64530	'999900056779'	55	'1'	'4'	55929	556	12019	1	1930	
64531	'999900056781'	37	'1'	'2'	73600	966	28229	2	1950	
64532	'999900056784'	23	'2'	'4'	86300	2701	15517	3	1940	
64533	'999900056785'	57	'1'	'4'	79659	770	12055	1	1930	

```
64534  '999900056786'    66    '4'    '3'  50723   542  11114       1   2012

       STATUS  TYPE   VALUE  NUNITS  ROOMS  PER   ZINC2 ZADEQ  ZSMHC  \
0           1     1   40000       1      6    1   18021   '1'    533
1           1     1  130000       1      6    4  122961   '1'    487
2           1     1  150000       1      7    2   27974   '1'   1405
3           1     1  200000       1      6    2   32220   '1'    279
4           1     1      -6     100      4    2   96874   '1'    759
…       …   …      …      …    …  …      …   …     …
64530       1     1      -6       1      3    1    7000   '1'    691
64531       1     1      -6       1      5    5   74961   '1'      0
64532       1     1      -6       1      5    2   39974   '1'   2215
64533       1     1      -6       1      3    1   59987   '1'    417
64534       1     1      -6       1      3    1   14040   '1'      0

       STRUCTURETYPE OWNRENT     UTILITY   OTHERCOST       COST06  \
0                  1     '1'  169.000000  213.750000   648.588189
1                  1     '1'  245.333333   58.333333  1167.640781
2                  1     '1'  159.000000   37.500000  1193.393209
3                  1     '1'  179.000000   70.666667  1578.857612
4                  5     '2'  146.000000   12.500000   759.000000
…              …     …          …         …          …
64530              1     '2'  141.333333    0.000000   691.000000
64531              1     '2'    0.000000    0.000000     0.000000
64532              1     '2'    0.000000   15.000000  2215.000000
64533              1     '2'   77.083333    0.000000   417.000000
64534              1     '2'    0.000000    0.000000     0.000000

            COST12       COST08      COSTMED  ASSISTED
0       803.050535   696.905247   615.156712        -9
1      1669.643405  1324.671218  1058.988479        -9
2      1772.627006  1374.582175  1068.025168        -9
3      2351.169341  1820.442900  1411.700224        -9
4       759.000000   759.000000   759.000000         0
…            …          …           …       …
64530   691.000000   691.000000   691.000000         0
64531     0.000000     0.000000     0.000000         0
64532  2215.000000  2215.000000  2215.000000         0
64533   417.000000   417.000000   417.000000         0
64534     0.000000     0.000000     0.000000         0

[64535 rows x 27 columns]
```

[4]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 64535 entries, 0 to 64534
```

```
Data columns (total 27 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   CONTROL         64535 non-null  object
 1   AGE1            64535 non-null  int64
 2   METRO3          64535 non-null  object
 3   REGION          64535 non-null  object
 4   LMED            64535 non-null  int64
 5   FMR             64535 non-null  int64
 6   IPOV            64535 non-null  int64
 7   BEDRMS          64535 non-null  int64
 8   BUILT           64535 non-null  int64
 9   STATUS          64535 non-null  int64
 10  TYPE            64535 non-null  int64
 11  VALUE           64535 non-null  int64
 12  NUNITS          64535 non-null  int64
 13  ROOMS           64535 non-null  int64
 14  PER             64535 non-null  int64
 15  ZINC2           64535 non-null  int64
 16  ZADEQ           64535 non-null  object
 17  ZSMHC           64535 non-null  int64
 18  STRUCTURETYPE   64535 non-null  int64
 19  OWNRENT         64535 non-null  object
 20  UTILITY         64535 non-null  float64
 21  OTHERCOST       64535 non-null  float64
 22  COST06          64535 non-null  float64
 23  COST12          64535 non-null  float64
 24  COST08          64535 non-null  float64
 25  COSTMED         64535 non-null  float64
 26  ASSISTED        64535 non-null  int64
dtypes: float64(6), int64(16), object(5)
memory usage: 13.3+ MB
```

Use only the 2013 data. Consider only 'Single Family Housing'. TYPE = 1 and STRUCTURETYPE = 1

[5]:
```
df = df.copy()
```

[6]:
```
df.columns
```

[6]:
```
Index(['CONTROL', 'AGE1', 'METRO3', 'REGION', 'LMED', 'FMR', 'IPOV', 'BEDRMS',
       'BUILT', 'STATUS', 'TYPE', 'VALUE', 'NUNITS', 'ROOMS', 'PER', 'ZINC2',
       'ZADEQ', 'ZSMHC', 'STRUCTURETYPE', 'OWNRENT', 'UTILITY', 'OTHERCOST',
       'COST06', 'COST12', 'COST08', 'COSTMED', 'ASSISTED'],
      dtype='object')
```

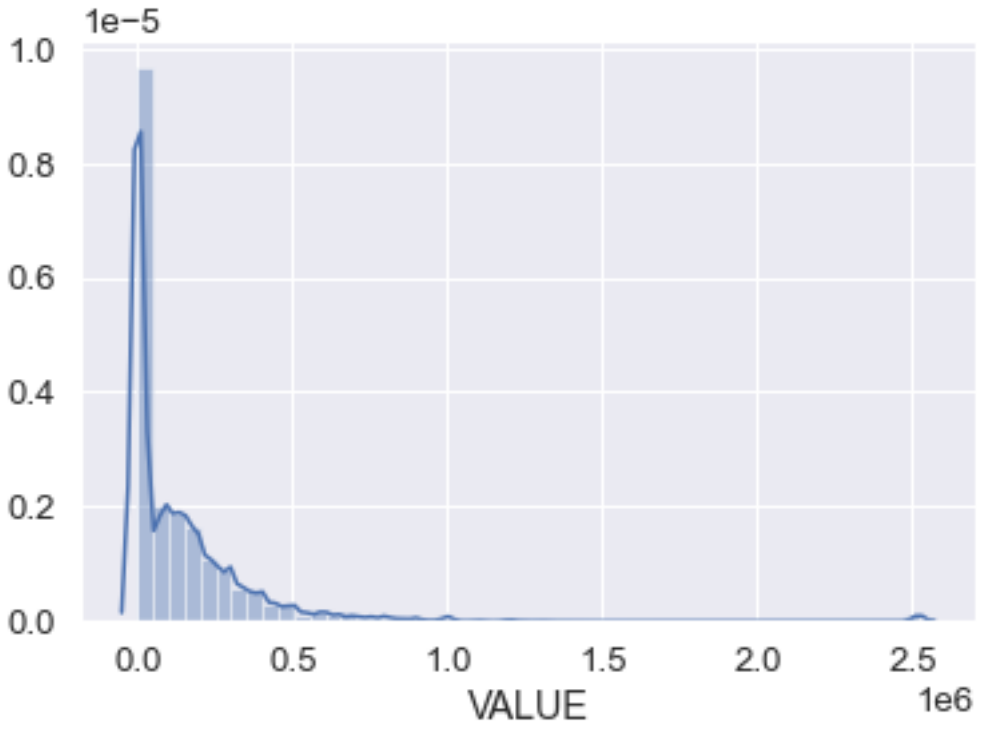
[7]:
```
df = df[['TYPE','STRUCTURETYPE','VALUE']]
```

[8]:
```
df
```

[8]:
```
        TYPE  STRUCTURETYPE   VALUE
0          1              1   40000
1          1              1  130000
2          1              1  150000
3          1              1  200000
4          1              5      -6
…      …             …      …
64530      1              1      -6
64531      1              1      -6
64532      1              1      -6
64533      1              1      -6
64534      1              1      -6

[64535 rows x 3 columns]
```

[9]:
```
sns.distplot(df.VALUE);
```



[10]:
```
df["VALUE"].value_counts()
```

[10]:
```
-6          27389
 150000      1918
```

```
200000      1817
100000      1774
80000       1524
            …
1040000        1
970000         1
1130000        1
1230000        1
930000         1
Name: VALUE, Length: 117, dtype: int64
```

The VALUE variable may have a negative or very low value.

For our analysis we will delete all housing units which have a market value of less than 1,000$.

[11]:
```
df = df[df["VALUE"] >= 1000]
```

[12]:
```
df
```

[12]:
```
        TYPE  STRUCTURETYPE   VALUE
0          1              1   40000
1          1              1  130000
2          1              1  150000
3          1              1  200000
6          1              1  260000
…      …             …      …
64509      1              1  400000
64511      1              1  380000
64512      1              1  410000
64514      1              1  350000
64521      1              1  200000

[36675 rows x 3 columns]
```

[13]:
```
df.reset_index(inplace=True, drop=True)
```

[14]:
```
df
```

[14]:
```
        TYPE  STRUCTURETYPE   VALUE
0          1              1   40000
1          1              1  130000
2          1              1  150000
3          1              1  200000
4          1              1  260000
…      …             …      …
36670      1              1  400000
36671      1              1  380000
36672      1              1  410000
```

```
36673     1               1  350000
36674     1               1  200000

[36675 rows x 3 columns]
```

[15]:
```
df["TYPE"].value_counts()
```

[15]:
```
1    34979
2     1361
3      261
9       66
7        6
5        2
Name: TYPE, dtype: int64
```

[16]:
```
df["STRUCTURETYPE"].value_counts()
```

[16]:
```
1    32850
6     1622
2      858
3      578
5      521
4      246
Name: STRUCTURETYPE, dtype: int64
```

[17]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 36675 entries, 0 to 36674
Data columns (total 3 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   TYPE           36675 non-null  int64
 1   STRUCTURETYPE  36675 non-null  int64
 2   VALUE          36675 non-null  int64
dtypes: int64(3)
memory usage: 859.7 KB
```

[18]:
```
df['TYPE'] = df["TYPE"].astype('object')
```

[19]:
```
df['STRUCTURETYPE'] = df["STRUCTURETYPE"].astype('object')
```

[20]:
```
df.info()
```

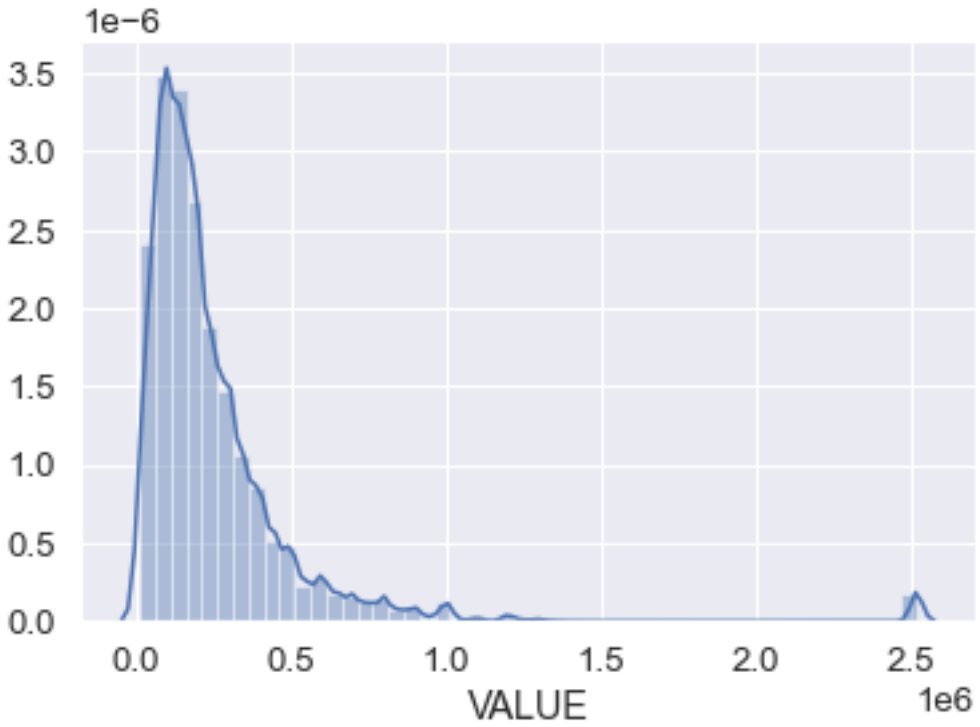
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 36675 entries, 0 to 36674
Data columns (total 3 columns):
 #   Column         Non-Null Count  Dtype
```

```
---  ------          --------------  -----
 0   TYPE            36675 non-null  object
 1   STRUCTURETYPE   36675 non-null  object
 2   VALUE           36675 non-null  int64
dtypes: int64(1), object(2)
memory usage: 859.7+ KB
```

[21]:
```
df.describe()
```

[21]:
```
              VALUE
count  3.667500e+04
mean   2.499318e+05
std    2.866298e+05
min    1.000000e+04
25%    1.000000e+05
50%    1.800000e+05
75%    3.000000e+05
max    2.520000e+06
```

[23]:
```
sns.distplot(a=df.VALUE);
```



[ ]:
```

```

[ ]: