APARTMENT FOR RENT CLASSIFIED ANALYSIS

Final project on Jungle's Data Science Academy

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Preview the data and select the useful columns

The data was available to download on:

https://archive.ics.uci.edu/dataset/555/apartment+for+rent+classified

Which is fulfills the rules in the gdpr. The data was available in 10 thousand rows and 100 thousand rows, i downloaded the 100 thousand rows dataset.

The dataset has 22 variables or columns which are:

'id', 'category', 'title', 'body', 'amenities', 'bathrooms', 'bedrooms', 'currency', 'fee', 'has_photo', 'pets_allowed', 'price', 'price_display', 'price_type', 'square_feet', 'address', 'cityname', 'state', 'latitude', 'longitude', 'source', 'time'

I don't need all of them so I will only use:

'id', 'title', 'bathrooms', 'bedrooms', 'currency', 'pets_allowed', 'price', 'price_type', 'square_feet' and 'state'

Loading the dataset

For my data processing i used python and more specifically pandas.

The libraries needed:

```
import pandas as pd
import numpy as np
from scipy import stats
import chardet
```

One of the beginning problems was the encoding on the data i had to find it manually using this code:

```
with open("dataset.csv", "rb") as f:
    result = chardet.detect(f.read(100000))  # Read a chunk of the file
    print(result["encoding"])  # Print the detected encoding
```

After finding the encoding we are safe to load the data into a pandas data frame that i named df

```
df=pd.read_csv("dataset.csv", encoding="Windows-1252", sep=";",usecols=[0,1,2,5,6,7,10,11,13,14,17])
df.head(100)
```

The usecols part selects the columns that we discussed

	id	category	title	bathrooms	bedrooms	currency	pets_allowed	price	price_type	square_feet	state
0	5668640009	housing/rent/apartment	One BR 507 & 509 Esplanade	1.0	1.0	USD	Cats	2195.0	Monthly	542	CA
1	5668639818	housing/rent/apartment	Three BR 146 Lochview Drive	1.5	3.0	USD	Cats,Dogs	1250.0	Monthly	1500	VA
2	5668639686	housing/rent/apartment	Three BR 3101 Morningside Drive	2.0	3.0	USD	NaN	1395.0	Monthly	1650	NC
3	5668639659	housing/rent/apartment	Two BR 209 Aegean Way	1.0	2.0	USD	Cats,Dogs	1600.0	Monthly	820	CA
4	5668639374	housing/rent/apartment	One BR 4805 Marquette NE	1.0	1.0	USD	Cats,Dogs	975.0	Monthly	624	NM
...	...	...	...	...	...	...	...	...	...	...	...
95	5668633801	housing/rent/apartment	Two BR 1917 S. 18th St.	1.0	2.0	USD	Cats,Dogs	1015.0	Monthly	845	NE
96	5668632658	housing/rent/apartment	Three BR 7312 South 81st Street	2.0	3.0	USD	Cats,Dogs	1495.0	Monthly	1850	NE
97	5668632537	housing/rent/apartment	One BR 4301 Grand Avenue Parkway	1.0	1.0	USD	NaN	1103.0	Monthly	652	TX
98	5668632393	housing/rent/apartment	One BR 2101 W. ANDERSON LN.	1.0	1.0	USD	NaN	1032.0	Monthly	600	TX
99	5668632355	housing/rent/apartment	Studio apartment 311 Bowie	1.0	2.0	USD	NaN	1729.0	Monthly	448	TX

Cleaning the data

In the price_type column i found out that we have mostly monthly bills and 3 weekly bills

```
price_type
Monthly           99488
Weekly                3
Monthly|Weekly        1
```

For the weekly bills we will make it even by multiplying the price with 4 to make it monthly, as for the monthly|weekly part i will just drop it.

```
df["price"]=df.apply( lambda row: row["price"]*4 if row["price_type"]=="Weekly" else row["price"],axis=1)
df["price_type"]=df.apply( lambda row: "Monthly" if row["price_type"]=="Weekly" else row["price_type"],axis=1)
df=df[df["price_type"]!= "Monthly|Weekly"]
```

Just for checking i will drop null values for the price column because that's the most needed variable together with square_feet

```
df = df.dropna(subset=["price"])
```

```
df["square_feet"].isna().value_counts()
#it doesnt have nan values so we will not perform anything
```

One important decision i had was to analyze for the 4 major populated states: New York, Texas, California and Florida. Since in my opinion doing a linear regression for the whole country won't do it justice because the prices may differ a lot between states. So, i made a filtering with 4 new data frames of the major states:

```
df_ny=df[df["state"]=="NY"]#Dataframe for new york
df_tx=df[df["state"]=="TX"]#Dataframe for Texas
df_ca=df[df["state"]=="CA"]#Dataframe for California
df_fl=df[df["state"]=="FL"]#Dataframe for Florida
```

Implement Linear Regression

What I want to do is make a linear regression where I take the square feet of the property as the independent variable and for the dependent variable to be the price for each of the states.

```
#x will be the independent variable
x_ny=df_ny['square_feet'].values.tolist()
x_tx=df_tx['square_feet'].values.tolist()
x_ca=df_ca['square_feet'].values.tolist()
x_fl=df_fl['square_feet'].values.tolist()
#y will be the dependent variable
y_ny=df_ny['price'].values.tolist()
y_tx=df_tx['price'].values.tolist()
y_ca=df_ca['price'].values.tolist()
y_fl=df_fl['price'].values.tolist()
```

After getting the variables we will perform linear regression and get the main stats:

```
slope_ny, intercept_ny, r_ny, p_ny, std_err_ny = stats.linregress(x_ny, y_ny)
slope_tx, intercept_tx, r_tx, p_tx, std_err_tx = stats.linregress(x_tx, y_tx)
slope_ca, intercept_ca, r_ca, p_ca, std_err_ca = stats.linregress(x_ca, y_ca)
slope_fl, intercept_fl, r_fl, p_fl, std_err_fl = stats.linregress(x_fl, y_fl)
```

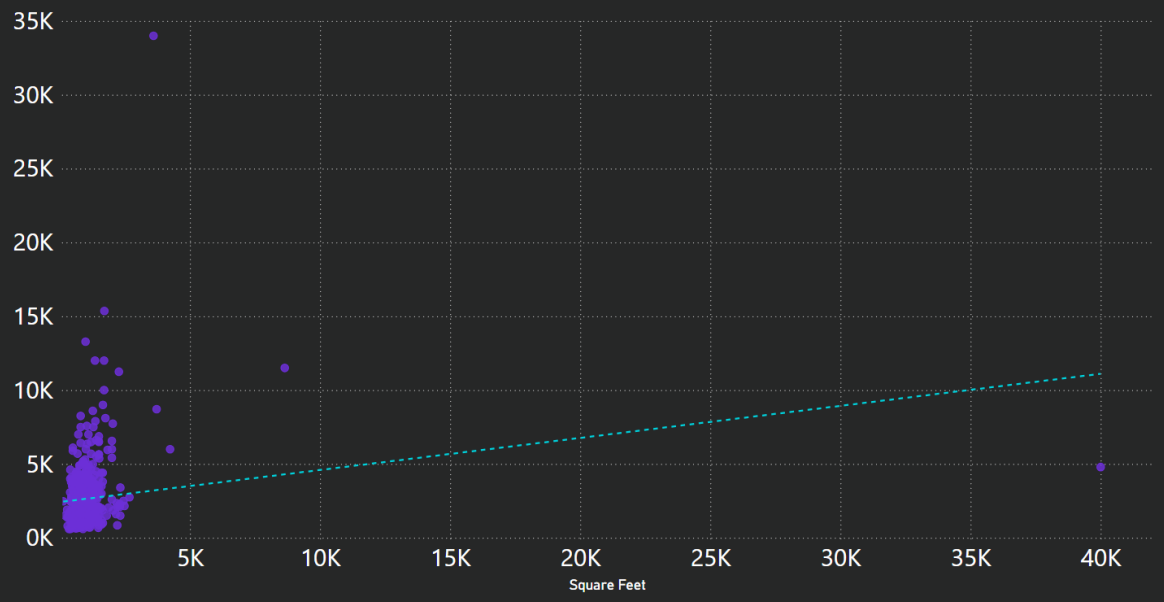
The function of regression has the form:

```
def regression_function(x):
    return slope*x+intercept
```

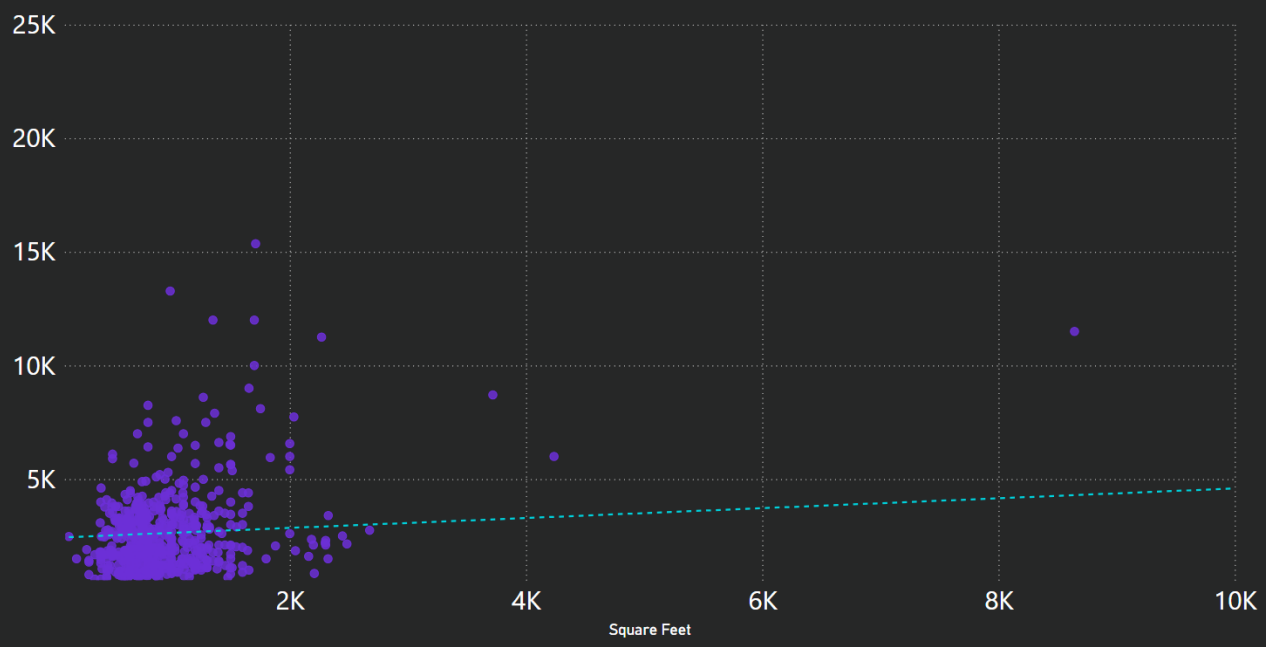
Data Visualizing

Let's see each of the data frames in Power Bi:

New York P-Value: `2.4388301279374208e-05` `Standard Error:` `0.05134658375275616`



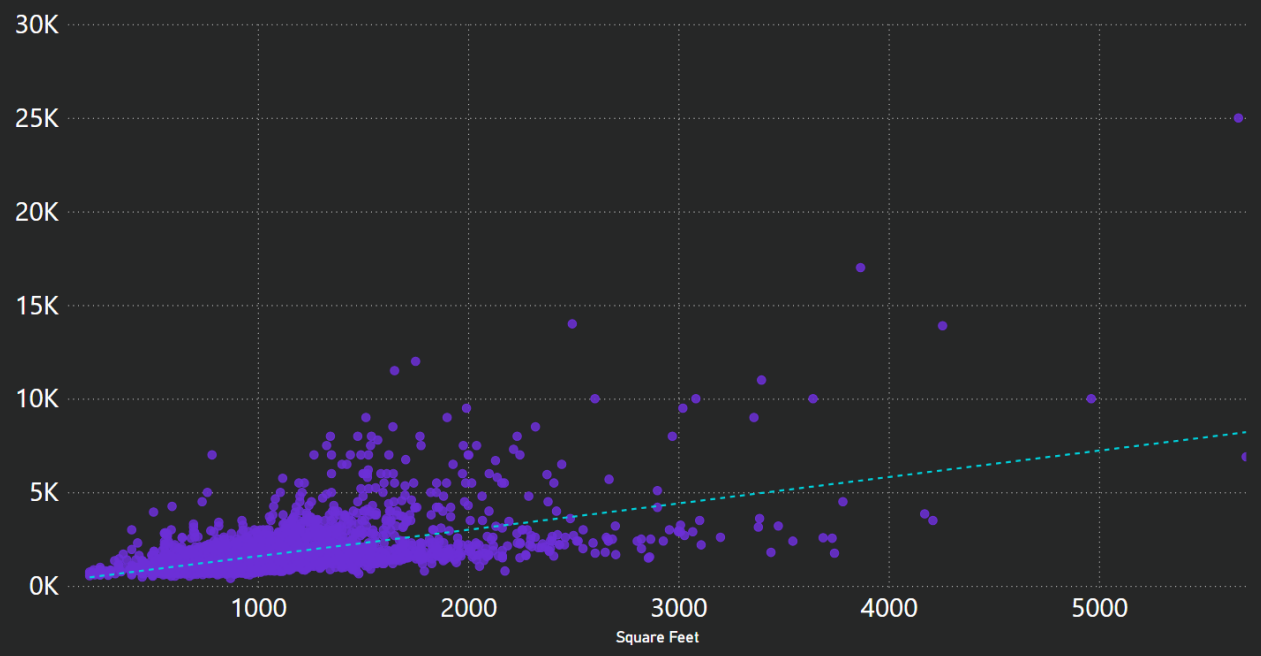
New York visual without the outliers:



Texas P-Value: very close to 0 Standard Error: 0.009442230020371 54

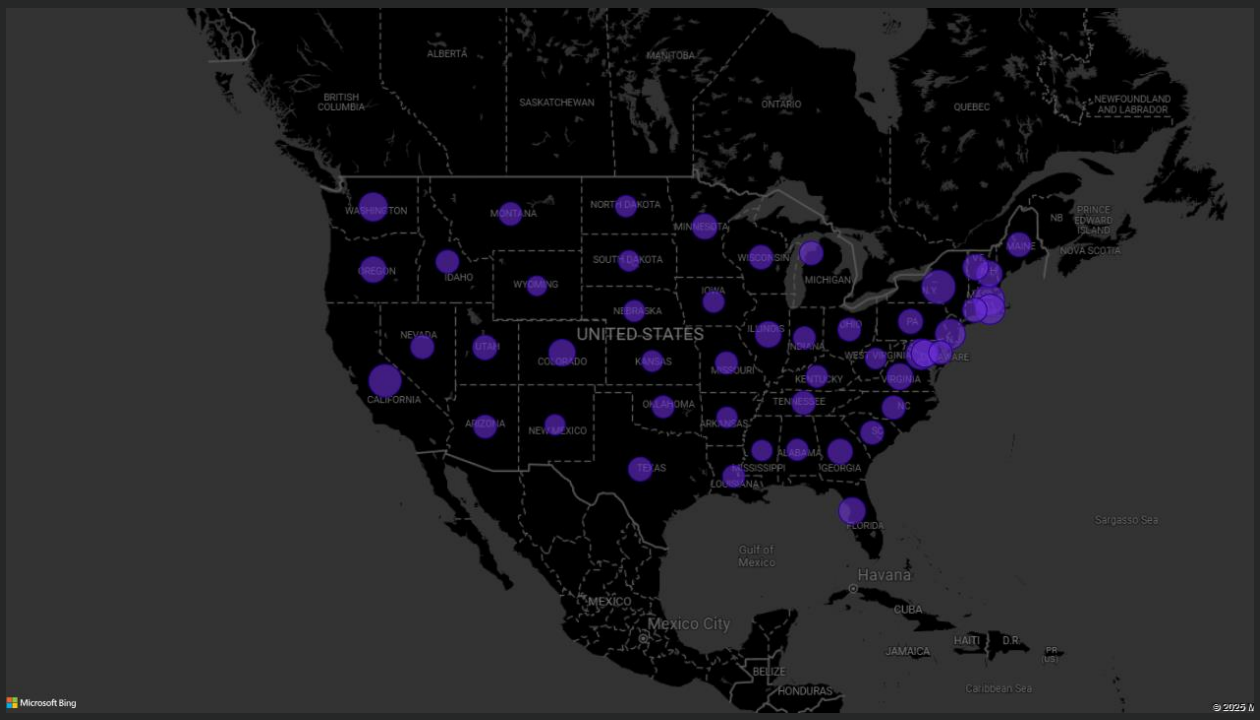
California P-Value: very close to 0 Standard Error: 0.0291989120513961

Florida P-Value: very close to 0 Standard Error: 0.026814904642868426



The best states in terms of affordability and for space

Here is a map showing the average prices for the apartments in terms of states



New York leads in terms of average price per apartment.