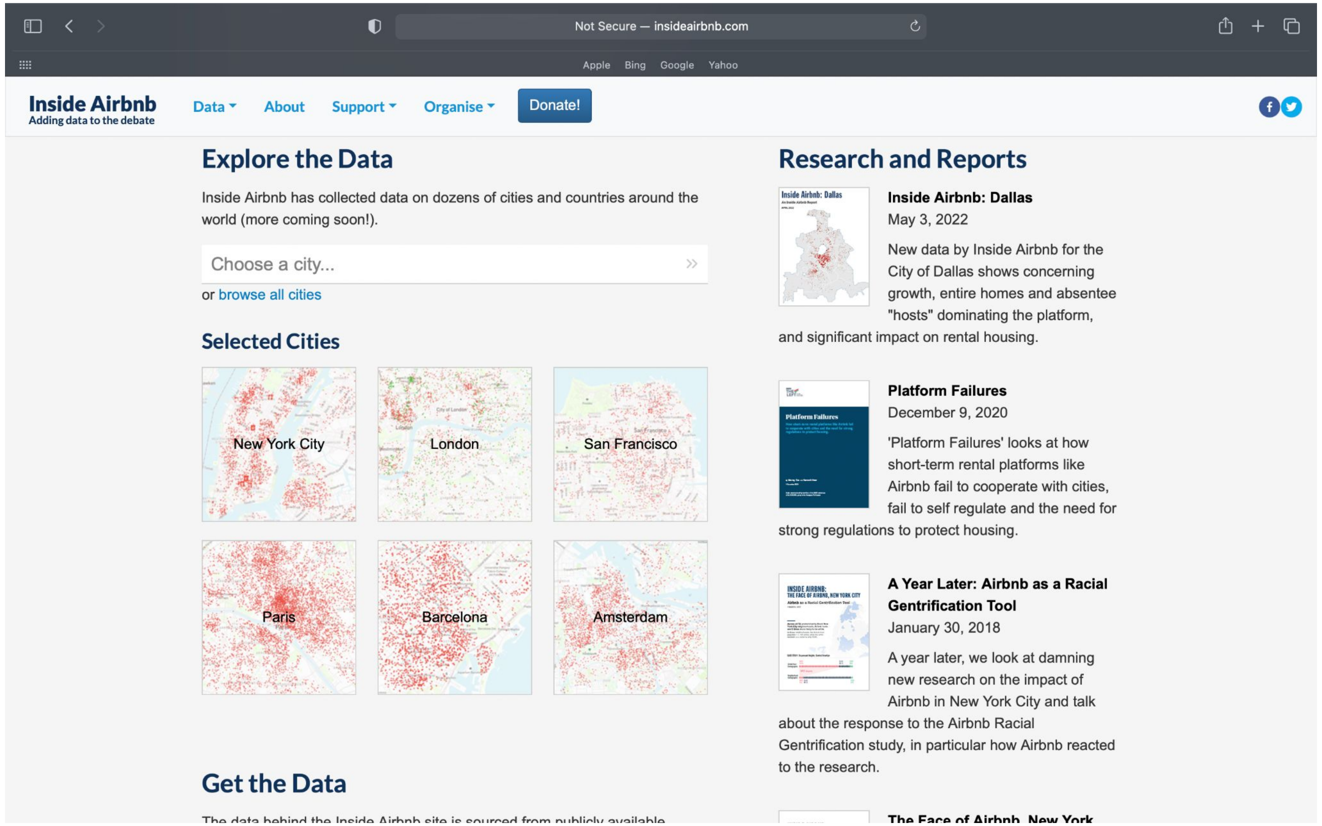
Airbnb Dataset Analysis

Chris Monteleone

About the Data!



- Where the Project Originates
    - Inside Airbnb, a project that provides data about Airbnb's impact on resident communities
    - Launched in 2016 as an investigatory website to scrape and report data on Airbnb
    - Created to reveal illegal renting on the site and gentrification caused by landlords buying properties to rent on Airbnb
    - *Gentrification: Process of changing the character of a neighborhood through the influx of more affluent residents and businesses.*

Why the Airbnb Dataset?

- Question I Found Interesting: Can we use the Inside Airbnb Dataset to make more educated investments into Airbnb?
- Even more interesting: Can we do this for the Clark County area?
- Yes! Data is available through Inside Airbnb

What’s Included in the Data

```
[47]: data.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 14808 entries, 0 to 14807
Data columns (total 18 columns):
 #   Column                          Non-Null Count  Dtype
---  ------                          --------------  -----
 0   id                              14808 non-null  int64
 1   name                            14808 non-null  object
 2   host_id                         14808 non-null  int64
 3   host_name                       14369 non-null  object
 4   neighbourhood_group             0 non-null      float64
 5   neighbourhood                   14808 non-null  object
 6   latitude                        14808 non-null  float64
 7   longitude                       14808 non-null  float64
 8   room_type                       14808 non-null  object
 9   price                           14808 non-null  int64
 10  minimum_nights                  14808 non-null  int64
 11  number_of_reviews               14808 non-null  int64
 12  last_review                     10992 non-null  object
 13  reviews_per_month               10992 non-null  float64
 14  calculated_host_listings_count  14808 non-null  int64
 15  availability_365                14808 non-null  int64
 16  number_of_reviews_ltm           14808 non-null  int64
 17  license                         408 non-null    object
dtypes: float64(4), int64(8), object(6)
memory usage: 2.0+ MB
```

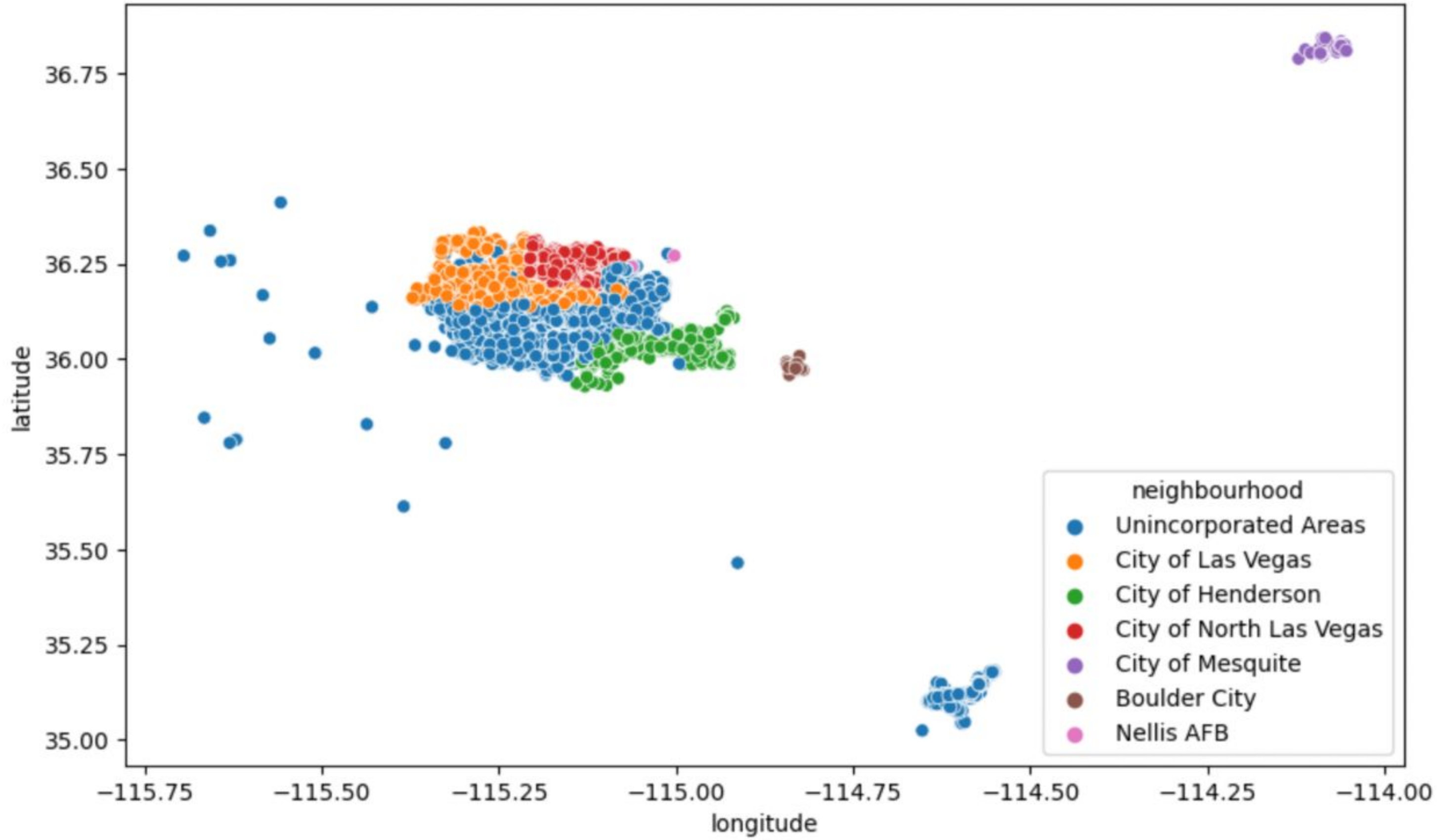
Data That I Found Useful:

- neighbourhood
- latitude / longitude
- room_type
- price
- minimum_nights
- number_of_reviews
- availability_365

Preprocessing:

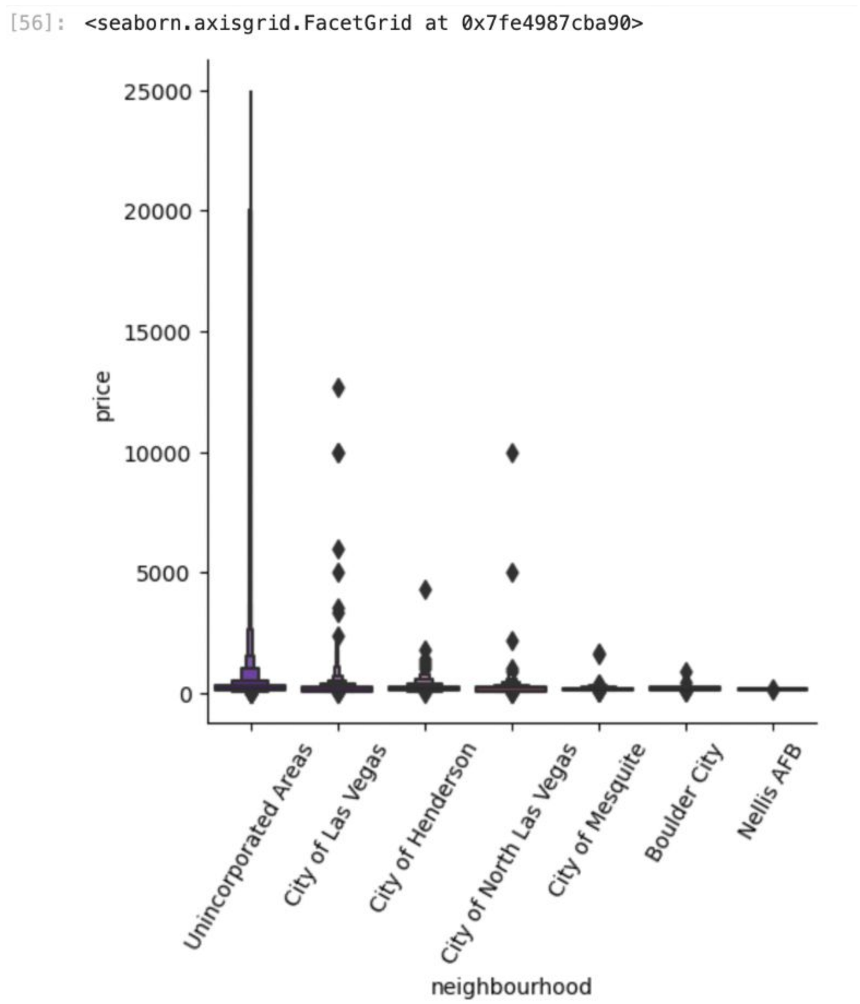
- Remove other columns that were irrelevant

Dataset Distribution By Area



- Clark County, NV Data
  - Includes:
    - Boulder City (Far SE)
    - City of Henderson (SE)
    - City of Las Vegas (NW)
    - City of Mesquite (E)
    - City of North Las Vegas (N)
    - Nellis AFB (Far NE)
    - Unincorporated Areas (Other) [Possibly problematic]
- This is important because…

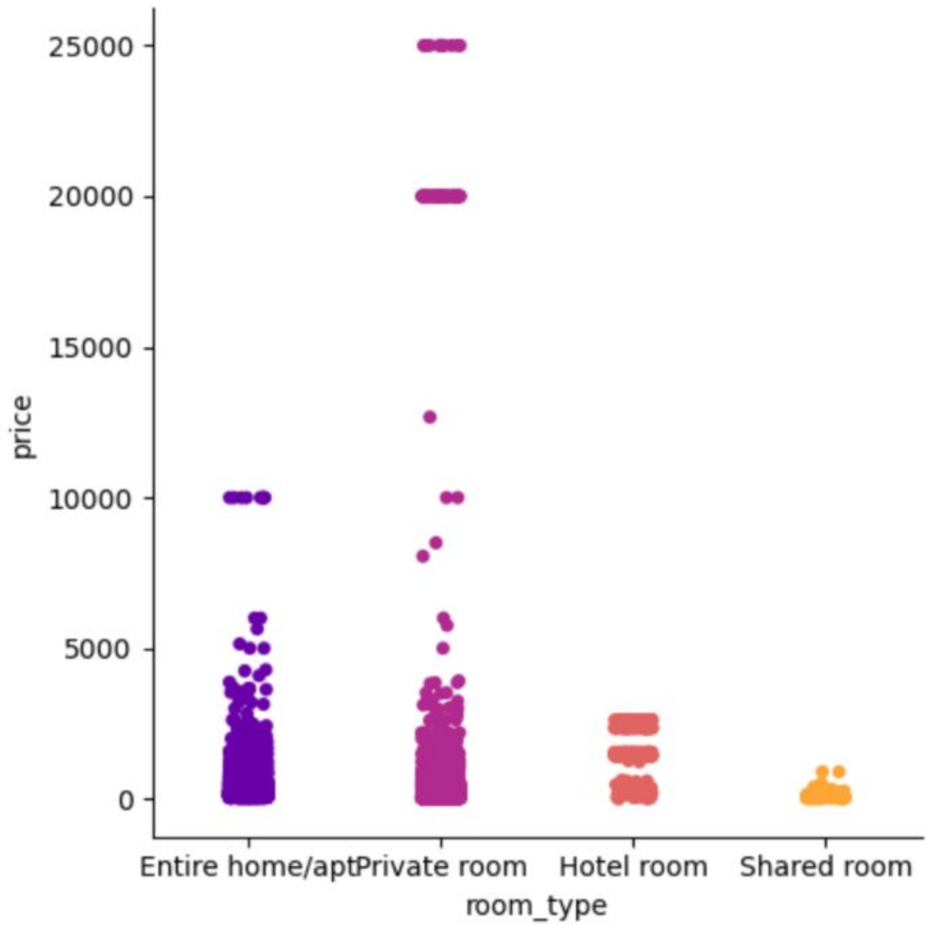
Analysis: Price by Area



- "Unincorporated Areas" Slightly Problematic
  - Not local to one geographic region, so it's difficult to draw conclusions based on the price data
- Still useful to compare other areas
  - Highest Price: City of Las Vegas
  - Lowest Price: Nellis AFB

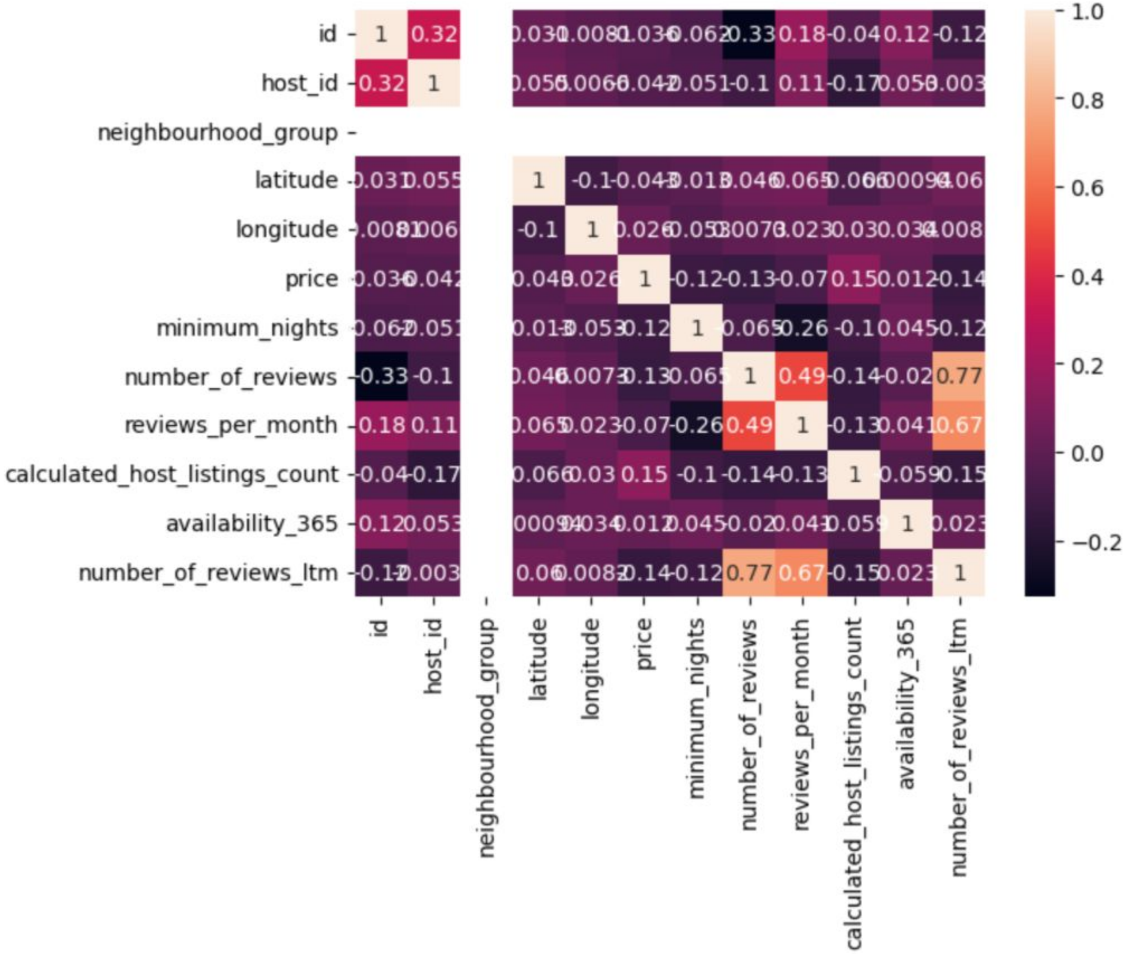
Analysis: Price By Type

[51]: <seaborn.axisgrid.FacetGrid at 0x7fe46b0d37c0>



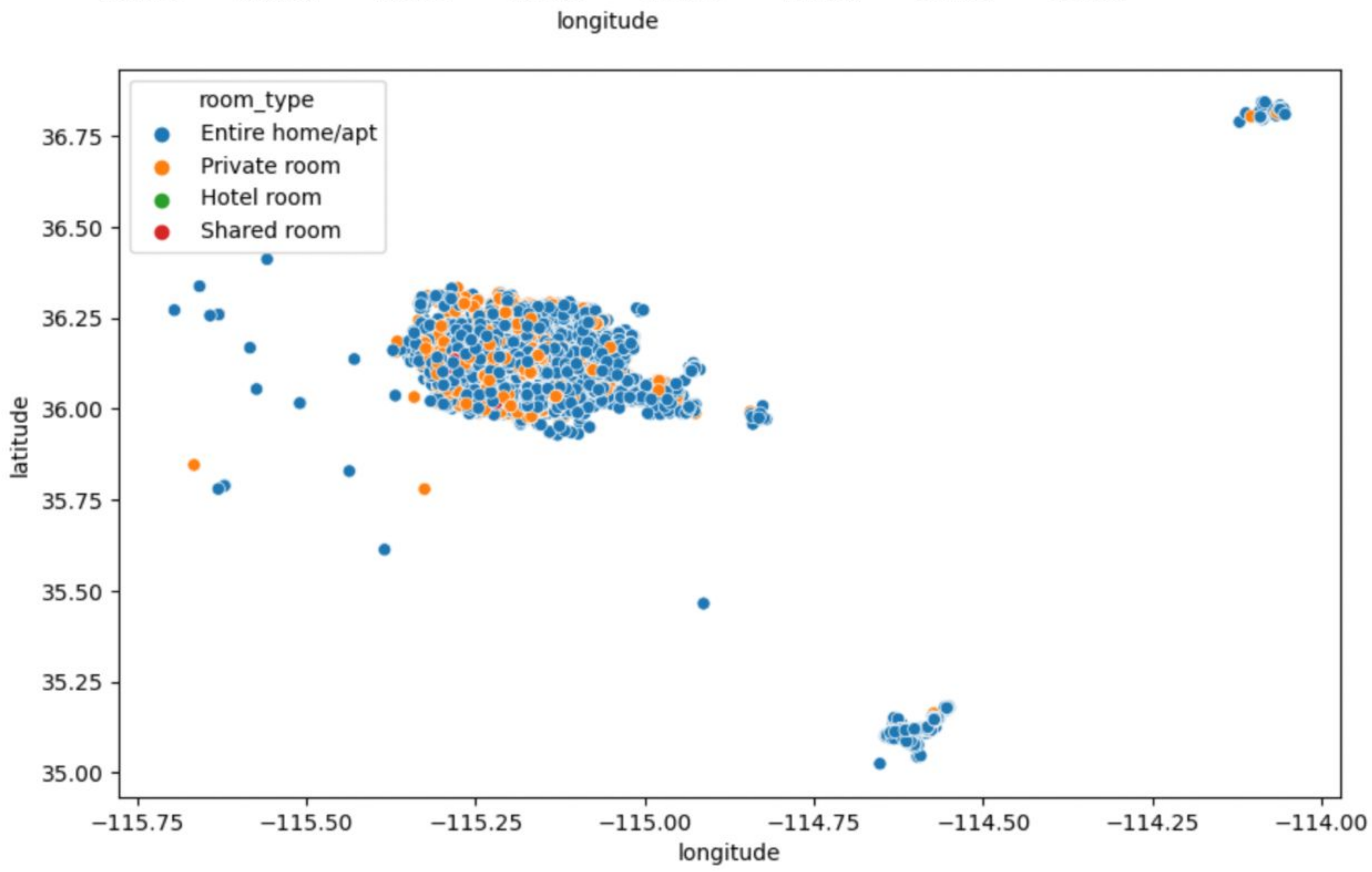
- Entire Home:
  - Most common but caps at a lower price
- Private Room:
  - Highest prices at 25000 per night
- Hotel / Shared Room:
  - Lowest pricing
  - Less common

Correlations



- Difficult to interpret in this way
- Inspires further exploration of correlated variables
- Price category especially important
- Will dive deeper into these correlations with linear regression!

Analysis: Type By Area



- Private room more common on the West side than East
- Entire Home / Apt seems to be more common on the East side
- Hotel room / shared room very uncommon (unable to see any red / green)

Linear Regression: Number of Reviews VS Price (Preparation)

Hypothesis: As number of reviews increases, this implies popularity, meaning the owner can charge more for their listings, increasing price.

[84]:
```
#independent variable
X = np.array(data['number_of_reviews']).reshape(-1,1)
#dependent variable
y = np.array(data['price']).reshape(-1,1)
```

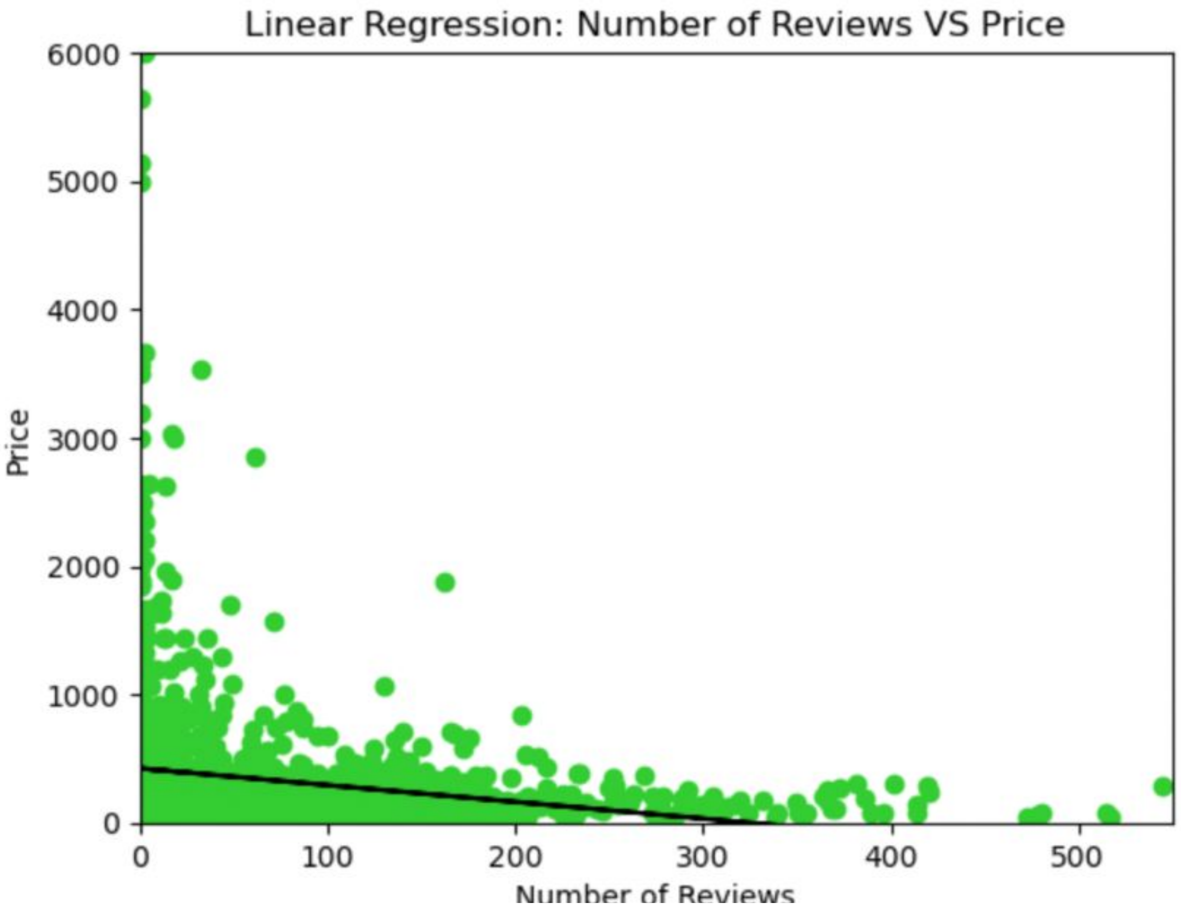
[106…
```
#Split into test and train data
X_train, X_test, y_train, y_test = train_test_split(X,y, test_size = 0.25)
#Regression Type
regr = LinearRegression()
```

[114]:
```
#Fit
regr.fit(X_train, y_train)
print(regr.score(X_test,y_test))

#Prediction
y_pred = regr.predict(X_test)

plt.scatter(X_test, y_test, color ='limegreen')
plt.plot(X_test, y_pred, color ='k')
plt.title('Linear Regression: Number of Reviews VS Price')
plt.xlabel('Number of Reviews')
plt.ylabel('Price')
plt.show()
```

- Preparation:
  - Take independent variable as X, dependent variable as Y
  - Split into test and train
  - Fit and predict
- Prediction:
  - As number of reviews increase, price will increase as well.
  - Positive correlation.
- Implications if True:
  - New Airbnb listings might have to charge less since they're less "credible" (less reviews), and can charge more over time.
- What's your guess? (Accept / Reject)

Linear Regression: Number of Reviews VS Price

~~Hypothesis: As number of reviews increases, this implies popularity, meaning the owner can charge more for their listings, increasing price.~~



- Hypothesis Rejected
    - As number of reviews increase, price decreases
- Possible Reasons:
    - Expensive properties are rented less, providing less opportunity for reviews
- Implications:
    - New Airbnb listings that are not highly reviewed will not have to charge less

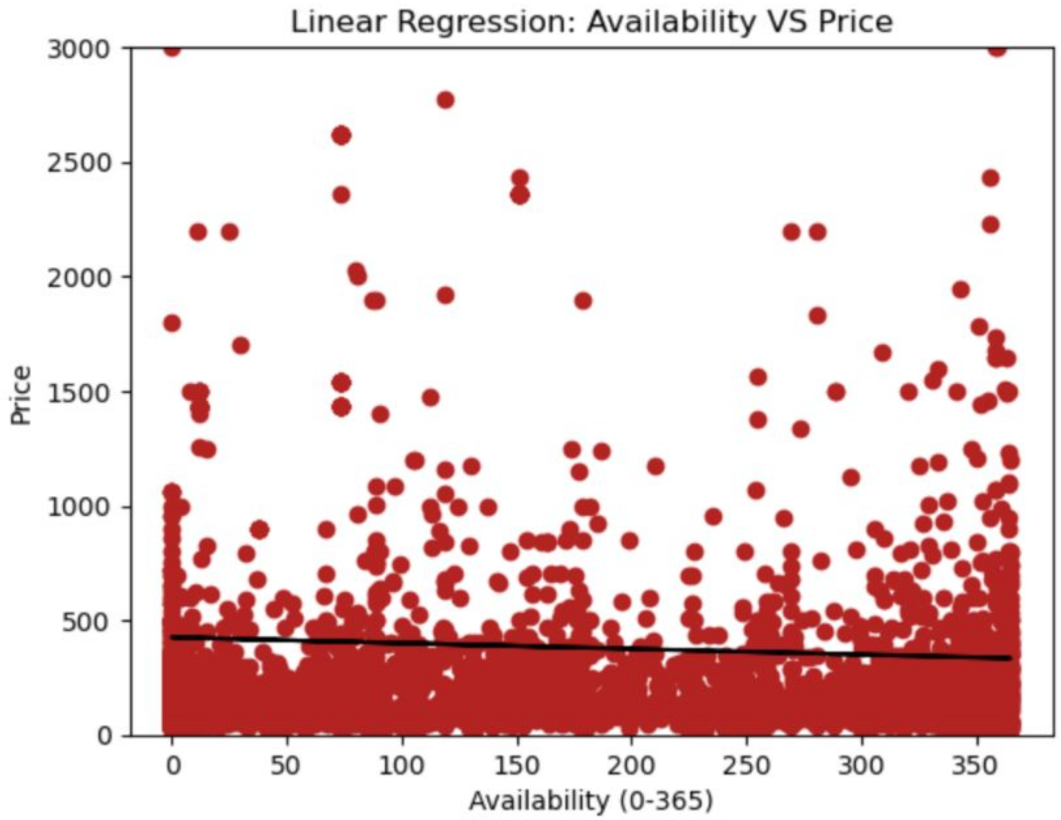
Linear Regression (2): Availability VS Price

Hypothesis: Properties that are available more are more popular and receive more demand through repeat renters, and are therefore able to charge more.

- Independent variable:
  - Availability: The number of days that a property is listed per year from 0 to 365
- Dependent variable:
  - Price
- My prediction: Higher availability means higher price
  - Do you have a prediction?

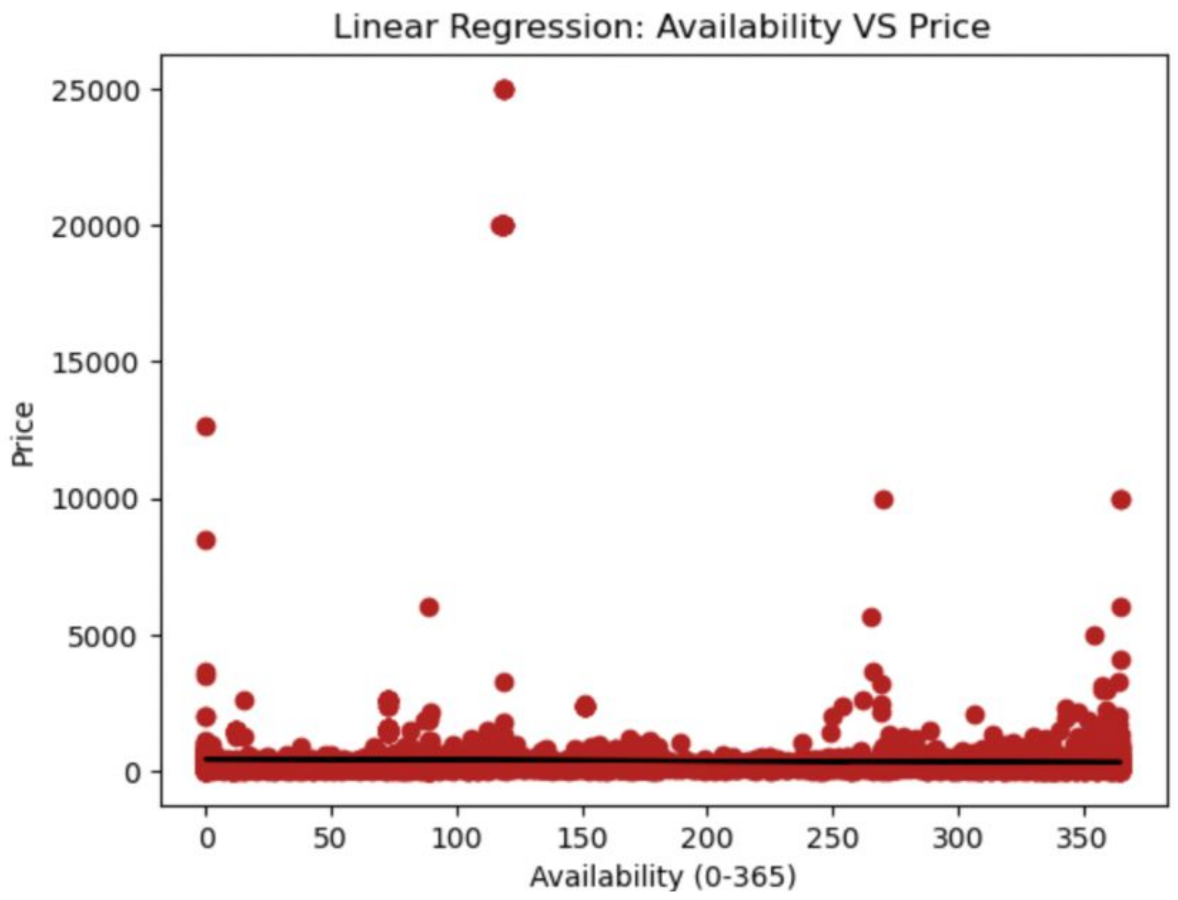
Linear Regression (2): Availability VS Price

~~*Hypothesis: Properties that are available more are more popular and receive more demand through repeat renters, and are therefore able to charge more.*~~



- Hypothesis Rejected
  - As availability increases, price decreases slightly
- Possible Reasons:
  - Properties that are available more often are able to generate more revenue per month, and listers are able to charge less
- Implications:
  - Seasonal Properties
  - If a property is only listed during a certain season or time of year, they won't expect to be able to afford a significant price increase

Sidenote: Scaling!



- Almost didn’t see the slight negative correlation because of scaling of the y-axis
- Initially thought that this had no correlation!

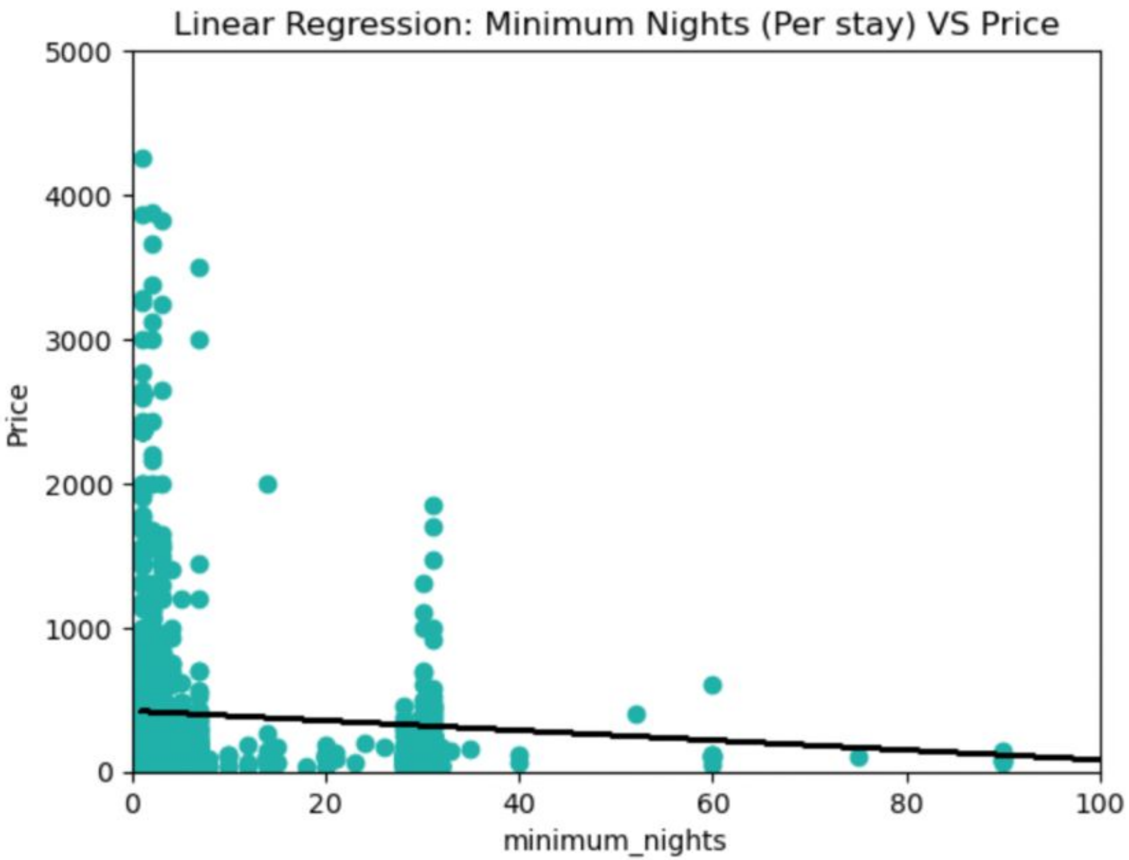
Linear Regression (3): Minimum Nights VS Price

Hypothesis: As minimum nights increases, owners can afford to charge less, since there are less fees that normally occur between guests (cleaning, etc)

- Independent variable:
    - Availability: The number of days that a property is listed per year from 0 to 365
- Dependent variable:
    - Price
- My prediction: Higher availability means higher price
    - Do you have a prediction?

Linear Regression (3): Minimum Nights VS Price

Hypothesis: As minimum nights increases, owners can afford to charge less, since there are less fees that normally occur between guests (cleaning, etc)



- Hypothesis Accepted!
  - As minimum nights increases, price decreases
- Possible Reasons:
  - Properties that rotate guests more often have to hire cleaners or other help that increase price. Without this added cost, owners can charge less.
- Implications:
  - If owners are able looking to increase their prices, they may want to decrease their minimum stay.

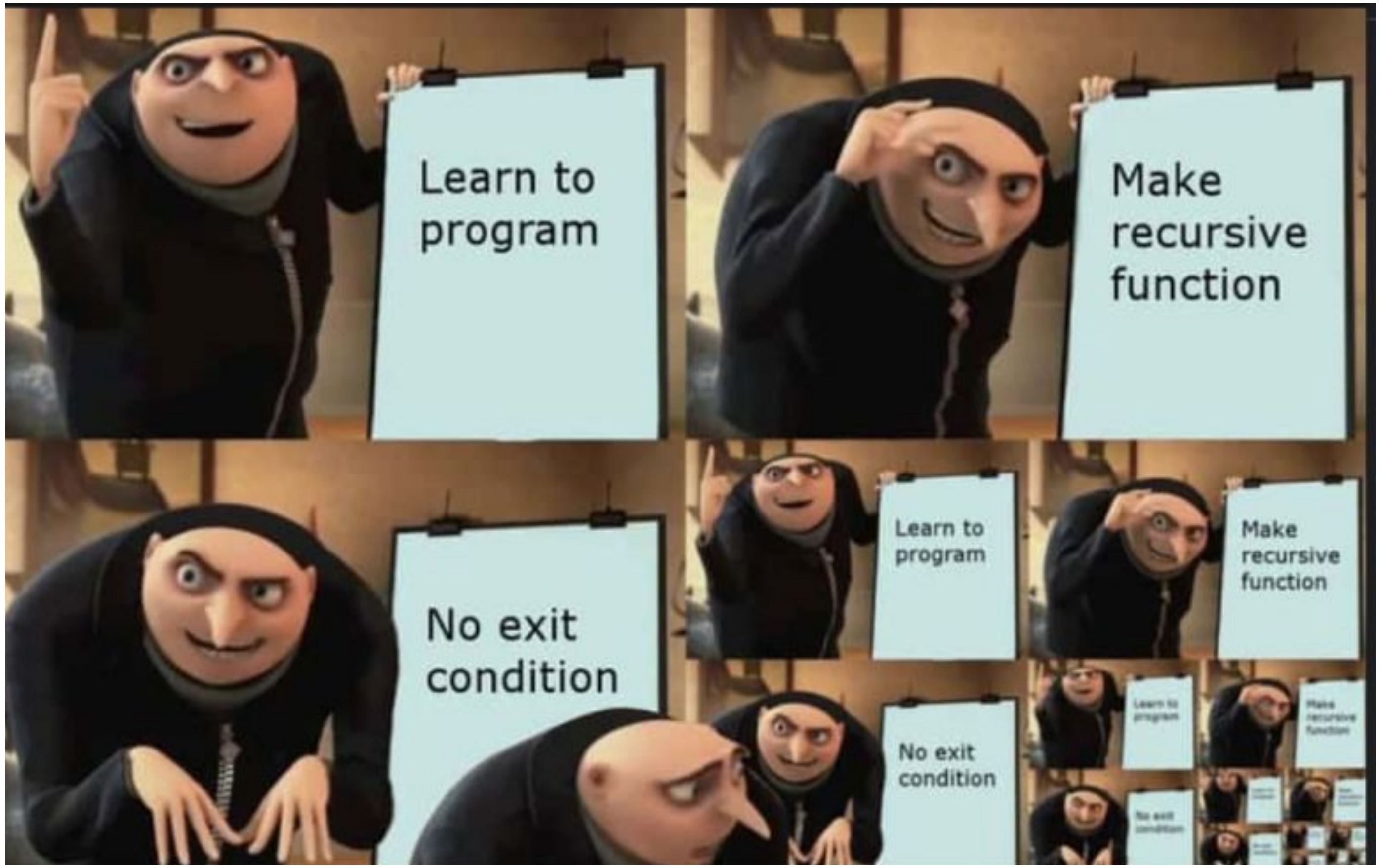
Conclusion Summary

Conclusion: We can make unexpected connections using Data Visualization and the Inside Airbnb Dataset

- What we did:
  - Analysis of Data
    - Important features
    - Type By Area
    - Distribution By Area
  - Correlation
    - To find linked variables
  - Linear Regression
    - Generated Hypothesis
    - Number of Reviews vs Price
    - Availability vs Price
    - Minimum nights vs Price

- Why This is Important:
  - Personally, my guesses were wrong 2 out of 3 times
  - Important to investors that are financially invested to make educated, correct decisions
  - Further exploration can be done in all three areas to ensure correct decision making

Thank You!



Learn to program
Make recursive function
No exit condition
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