Predicting Prices for Airbnb Accommodations

Capstone Project

Problem Statement

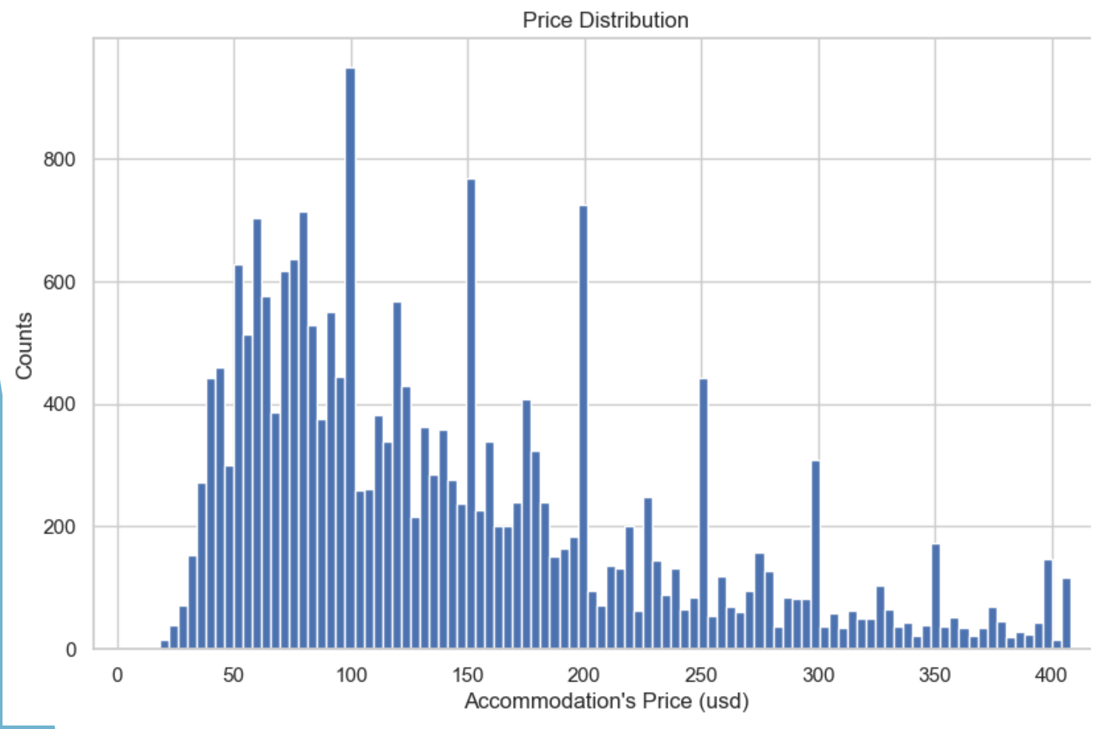
- About: Renting accommodation's site
- Audience: primary and secondary
- Metrics: Regression Problem - RMSE

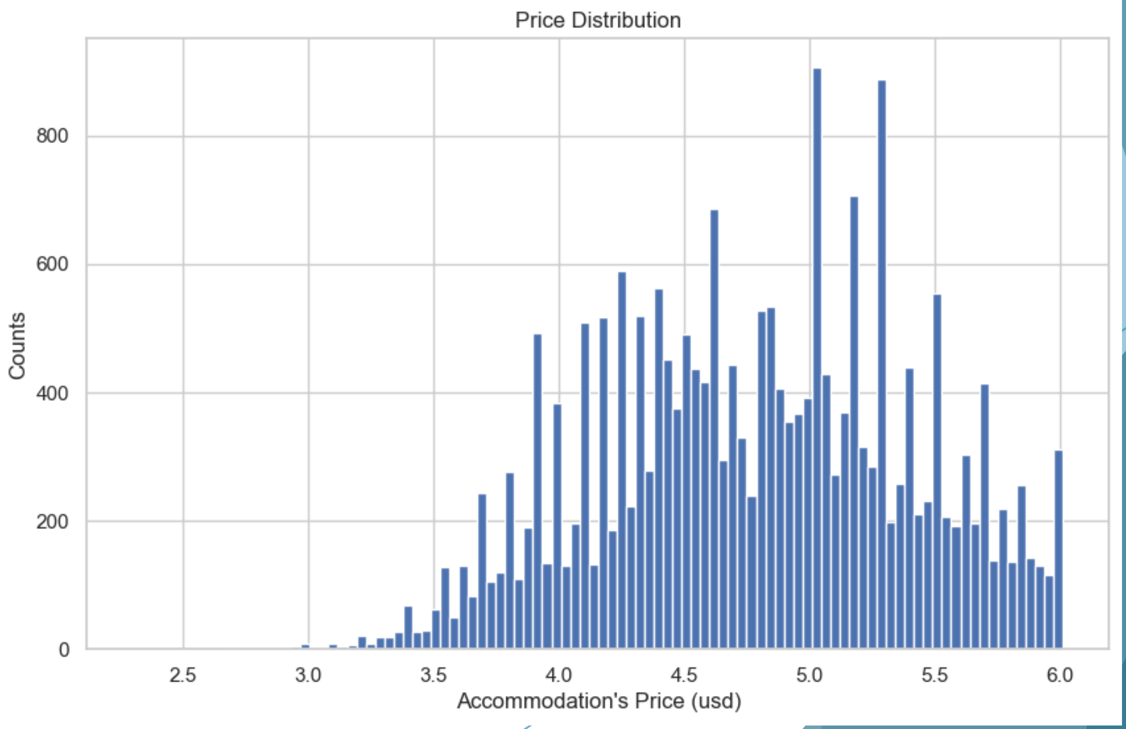
About Data

- **Datasets:**
  - **‘Listing.csv’:** Listing accommodations New York City;
    - 38,000 x 75
  - **‘Neigh_per_sft’**: Neighborhoods price;
    - ~180 neighborhoods
- **Cleaning Process:**
  - Null values, Input Strategies, Regex, Feature Engineering, handle outliers;
    - 25,000 x 23

Exploratory Data Analysis

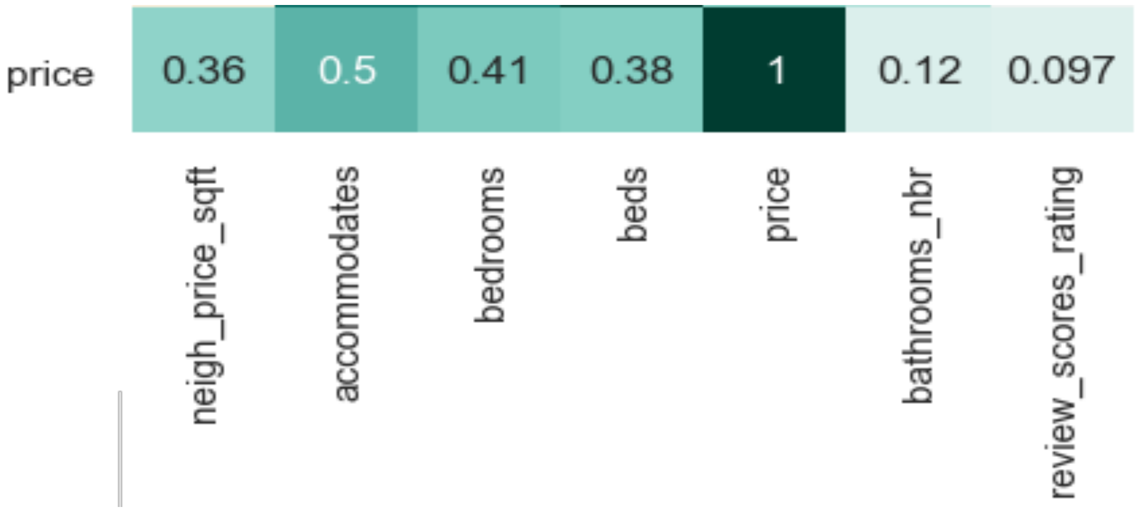
- **Distributions:**
  - skewness /log transformation





Exploratory Data Analysis

- Correlations with the target;
  - latitude/longitude x neighborhood;

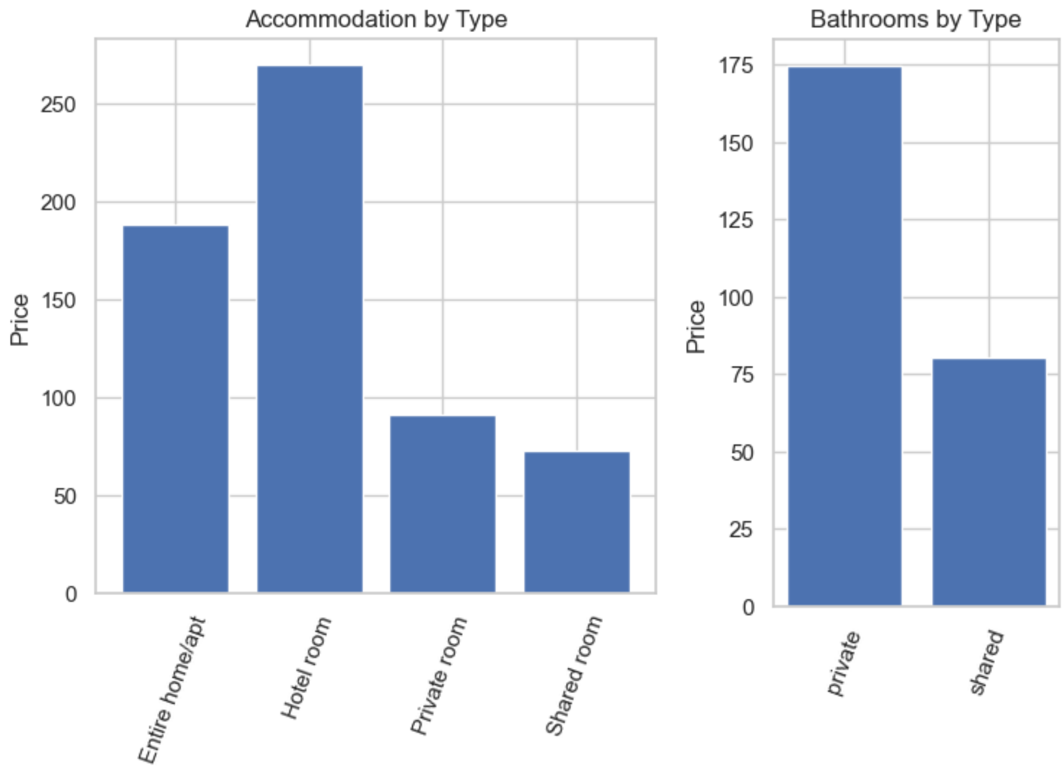


Exploratory Data Analysis

- latitude/longitude variables;

Exploratory Data Analysis

- Boxplot for categorical variables



Exploratory Data Analysis

Models Evaluation

- **Tranformers:**
  - One Hot Encoded;
  - Scalling;
- **Models:**
  - Supervised: Linear Regression / KNN
  - Unsupervised: Decision Trees / RainForest / Neural Networks
- **Techniques:**
  - Regularization
  - Gridsearch

Models Evaluation

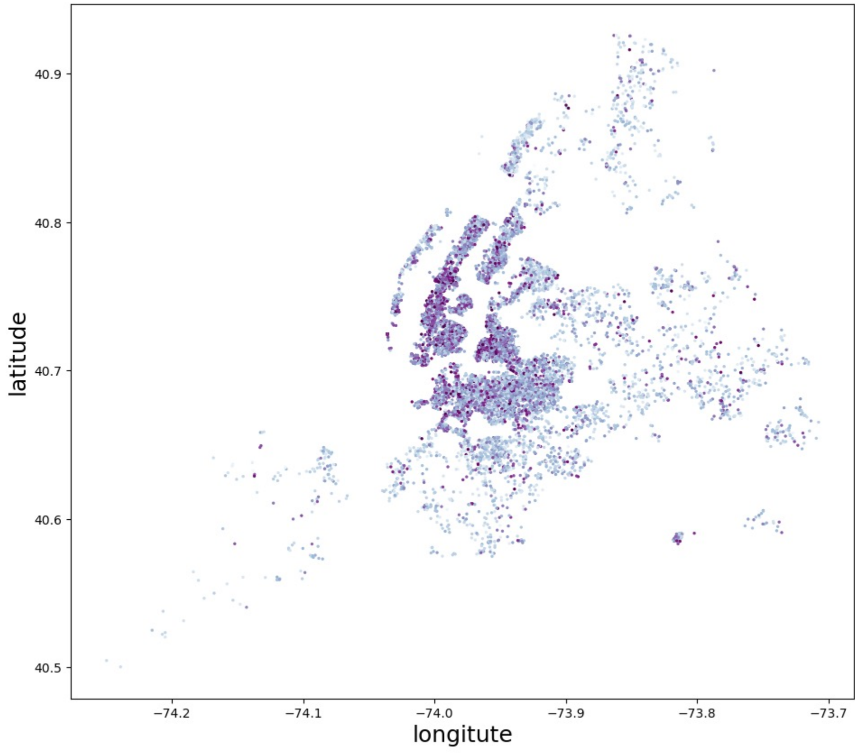
- Benchmark's Model:

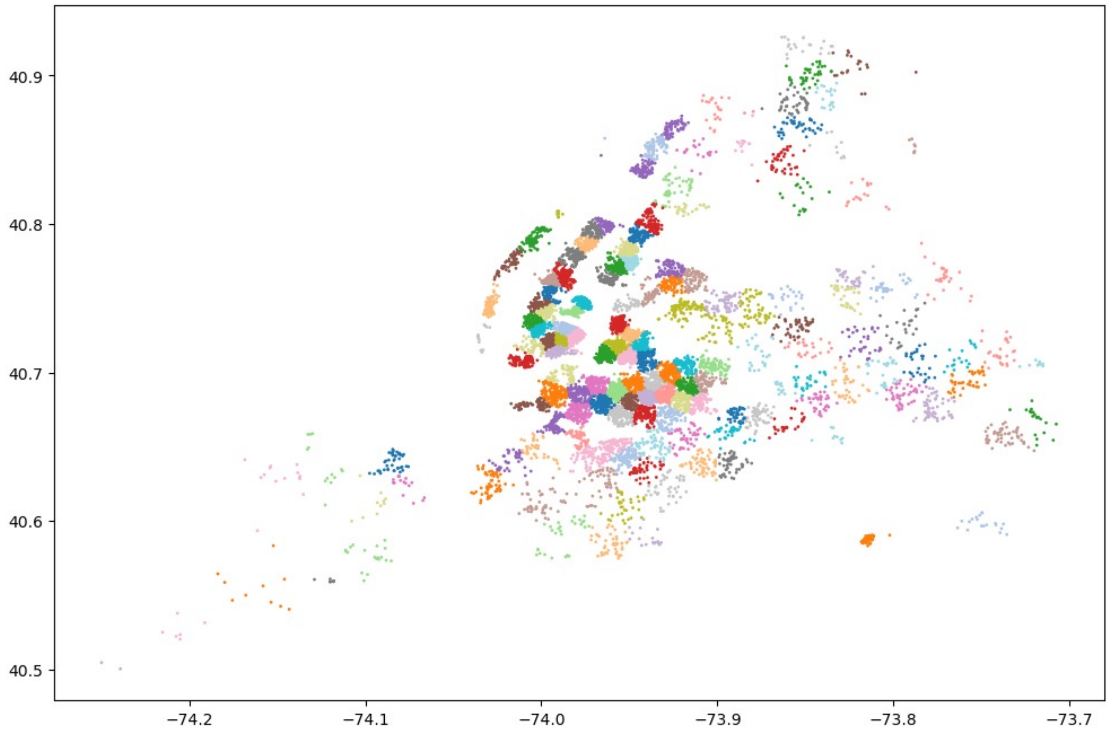
Model	Train Score	Test Score	Diff.	RMSE
Random Forest Regression	**0.8866**	**0.6818**	**20.48%**	**150.465**
K-NNeighbour	**0.7198**	**0.6619**	**5.79%**	**150.487**
Stacked Linear Regression	0.9220	0.6390	28.30%	160.117
Linear Regression Ridge	0.6402	0.6295	1.06%	144.775
Linear Regression Lasso	0.6361	0.6272	0.89%	144.961
Decision Tree Regression	0.6231	0.6029	2.02%	143.095
Stacked Model ElasticNet	**0.6526**	**0.5790**	**7.36%**	**126.150**
Neural Network	-0.1100	-0.1277	1.77%	**135.155**

Model	Train Score	Test Score	Diff.	RMSE
Random Forest	**0.8866**	**0.6818**	**20.48%**	**150.465**
K-NNeighbor	**0.7198**	**0.6619**	**5.79%**	**150.487**
Stacked Model ElasticNet	**0.6526**	**0.5790**	**7.36%**	**126.150**

Transfer Learning

- **Transfer Learning using KMeans**
  - k = 150, using silhouette score;





Conclusions and Recommendations

- **Conclusions:**
  - feature engineering 'amenities_count' and 'description_listing_count' ;
  - latitude/longitude or cluster with transfer learning to replace the neighborhood;
  - some variables are more important than others in determining the accommodation' prices
    - (the neighborhood feature carries more weight to the target than the number of beds or baths)

Conclusions and Recommendations

- **Recommendations:**
  - Between 5 groups of neighborhood Manthan has so far the higher If you living in Manhattan
  - more efficient increase the capacity of accommodate people than necessarily adding a room;
- **Future works:**
  - Get data updated data after pandemic;
  - Get a better source for price/sqft source (with all neighborhoods)
  - Try to work in a different way with the 'amenities' variable and try to get some information from it.

Airbnb App

- App to explorer Airbnb Listing Data and Predicting Prices:
  - Airbnb Explorer App

Thank You!