Zillow Regression Report

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Agenda

1. Executive Summary
2. Data Wrangling
3. Exploration and Stats
4. Modeling and Results
5. Tax Rate Distribution
6. Conclusion

Executive Summary

Goals

- Create a step-by-step process of collecting and wrangling data
- Explore the data for possible drivers of tax value
- Run statistical analysis of features
- Model and test the chosen features

Tax Rate Distribution

Properties are within 1 of 3 counties in California:

- LA County
  - Tax rate: 1.294 %
  - Tax amount: $5013.56
- Orange County
  - Tax rate: 1.188 %
  - Tax amount: $5471.98
- Ventura County
  - Tax rate: 1.147 %
  - Tax amount: $4979.44

Top Drivers of value

Square feet

Bathrooms

Bedrooms

Year built

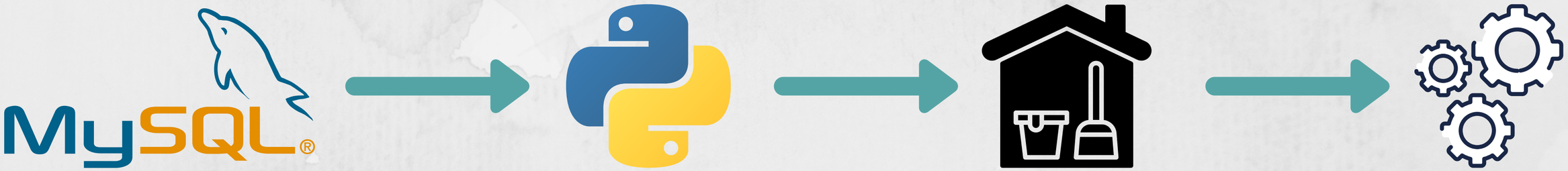
Conclusions

- Polynomial Regression model:
  - RMSE 213,616
  - R squared: 38.1%
- Stats:
  - Square feet
    - r = 0.5296
  - bathrooms
    - r = 0.4431
- LA County Tax Rate is significantly different from total population

Data Wrangling

Pull data 2017 Zillow data from the Codeup SQL Database

Clean data: removing duplicates, nulls, changing data types, etc.



Bring data to python to familiarize with the data: shape, data types, basic stats, number of null values, id categorical and continuous variables, etc.

Engineered data into a useable form and size for exploration by removing outliers, creating new features from existing ones, etc.

Exploration and Stats

Feature Selection:

Used **Select K Best** and **RFE** to assist in selecting best features for my model.
Top 4 :

- bathrooms
- bedrooms
- square_feet
- age_of_house

Correlation Test

Hypothesis:

- The H0 is that there is no correlation between the two samples
- The H1 is that there is a correlation between the two samples

Results

- **Move forward with the H1 with all features**

Feature	r	p-value
bathrooms	0.4431	0.0
bedrooms	0.2590	0.0
square_feet	0.5296	0.0
beds_and_baths	0.3871	0.0
beds_per_sqft	-0.3647	0.0
baths_per_sqft	-0.152	0.0

One Sample T-test

Hypothesis:

- The H0 is that there is no difference in the means of the LA County Tax rates.
- The H1 is that the LA County Tax Rate is a different mean than the entire population.

Results:

- **Move forward with H1**

- t-statistic: 46.5759
- p-value = 0.0

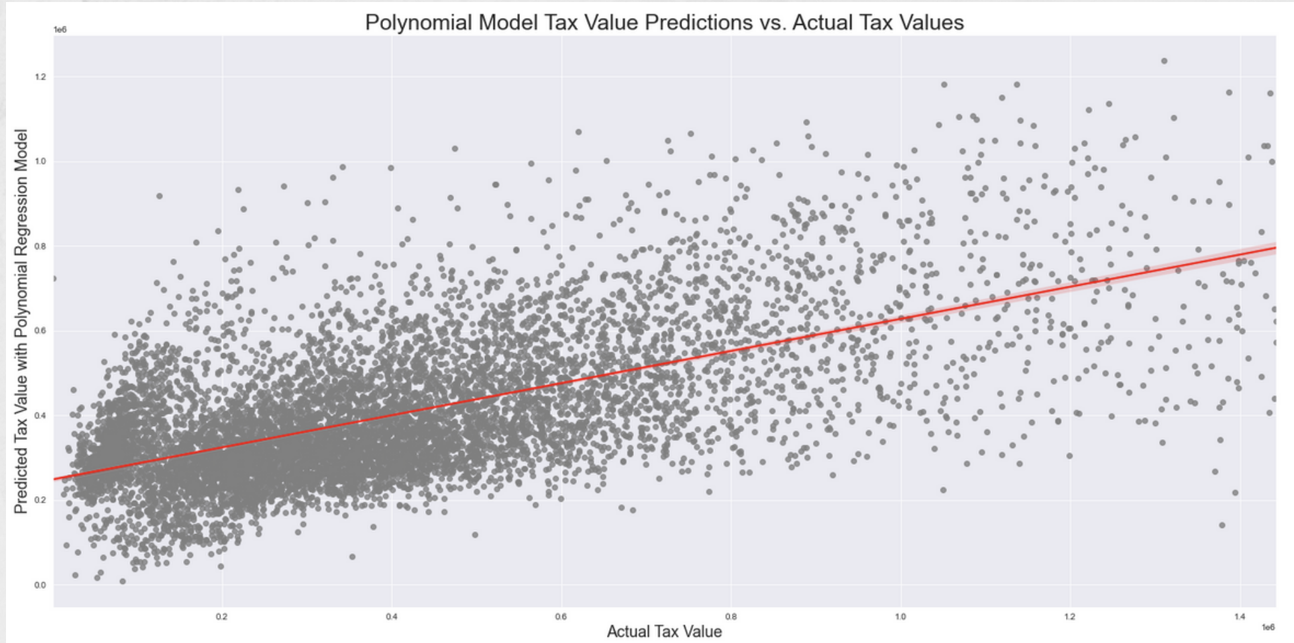
Modeling and Results

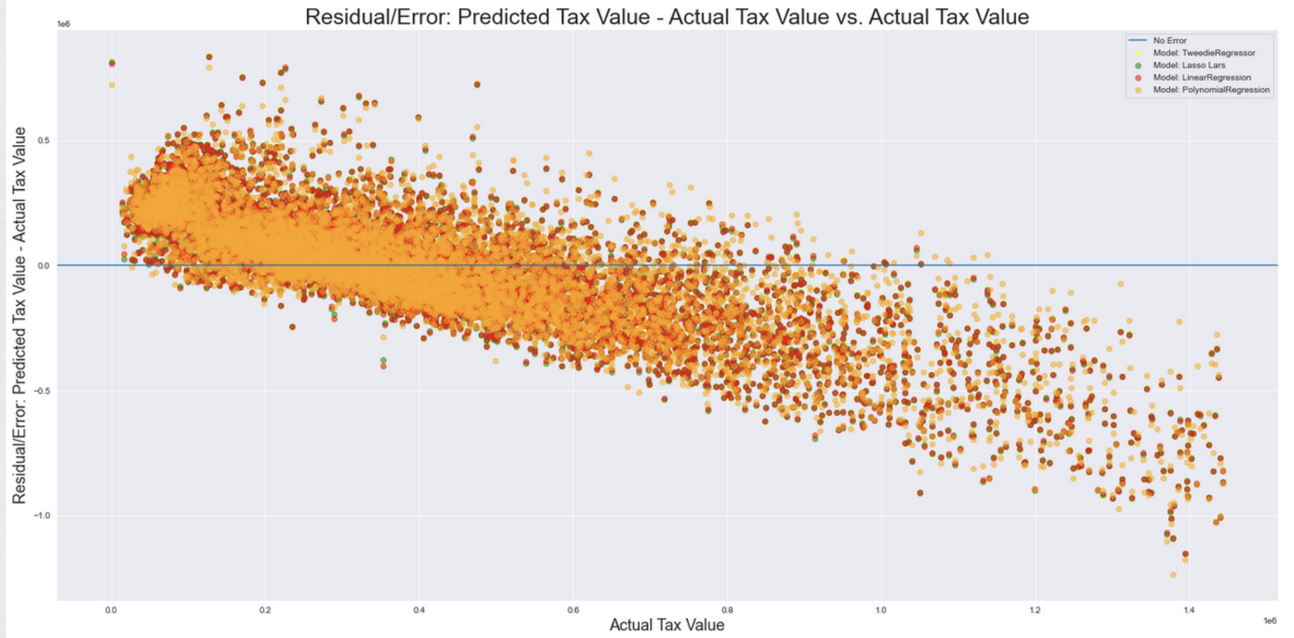
My best model was the **Polynomial Regression model**

- RMSE dropped from the baseline of 272,150 to 213,616
  - **RMSE improvement of 58,534**
- **R2 Value of the model, 38.1%**, indicates there is an improvement over the baseline but not a very strong fit overall.

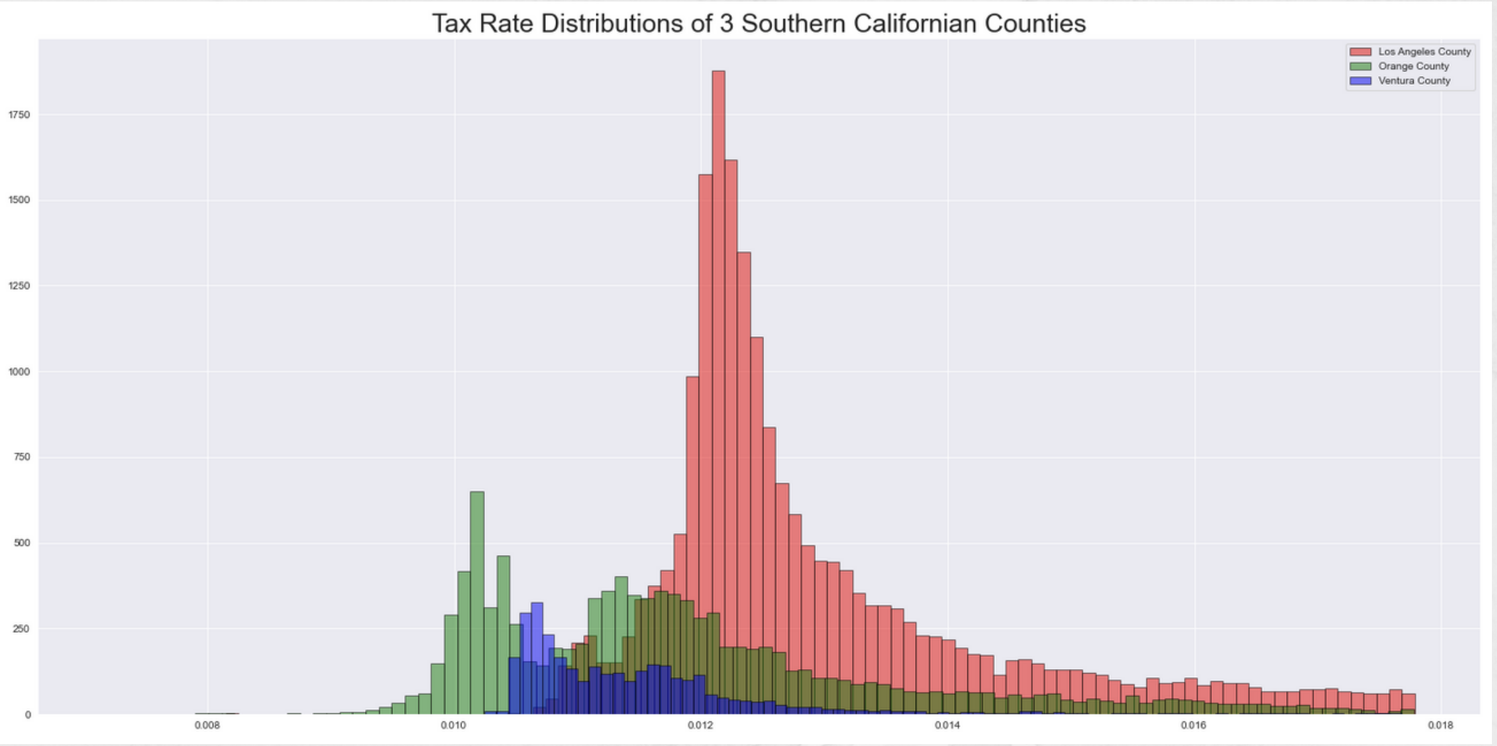
Interpretations:

- My model begins by **overvaluing** properties less than **~$150K**
- Then appears to be most accurate from ~$150K to ~$500K
- Then begins to **undervalue** properties over **~$500K**





Tax Rate Distribution



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  - Tax rate: 1.147 %
  - Tax amount: $4,979.44

Conclusion

Stats

- **Square feet** and number of **bathrooms** are good drivers of the property value
- A large amount of features are lacking data
- Square feet correlates best with the tax value of the chosen features.

Model

- I created a **Polynomial Regression** model that out performs the baseline RMSE by 58,534 and fits the data with an **R squared value of 38.1%**.

Appendix

For complete details of the **Zillow project** visit my Github and take a look at the corresponding README.md file.

Connect with me on Linkedin and maybe we can collaborate on future projects