Predicting Home Values Through Random Forest

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Introduction

Goal

- Predict Home Prices

Client

- Keller Williams Realty, Inc.
- Other Real Estate Investment Companies

Value

- Sharper report analyses to help the negotiation of sales, purchases and other strategic agreements related to real estate properties.

Data

Housing Dataset

- Originally compile by Professor Dean De Cock at Truman State University
- Consists of 2930 observations and 80 explanatory variables for the sale of homes between years 2006-2010.
- Data is from records of city of Ames, Iowa

Weather Dataset

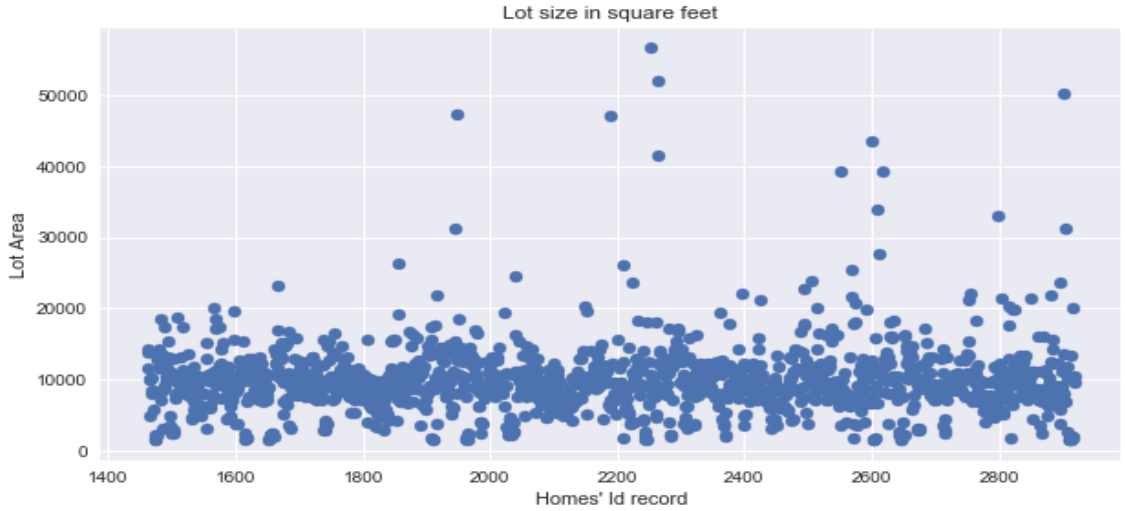
- Subtracted from the National Center for Environmental Information Webpage.
- Includes daily, monthly and yearly records from different weather stations in the city.
- Data is from records of city of Ames, Iowa

Cleaning Data

Bad Data and Outliers

- Random Forest not very sensitive to outliers

Exploratory Data analysis for error type data



Cleaning Data Continue..

Housing Data

- Attached homes' Feature data set to price data set
- Filtered cells to dates 2006 and 2009 to match weather dates available
- Built and sorted a Date Time Index for the sale of homes
- Rest of cleaning was done in future steps after splitting the data to build model

Weather Data

- Subtracted the best dates and weather station available from the data
- Filtered to the most significant weather variables
- Dates were filtered to match housing data sets
- Corrupted values were deleted, and averages obtained

At the end the two datasets were joined

Cleaning Data Continue..

Splitting the data into train and test to fit model

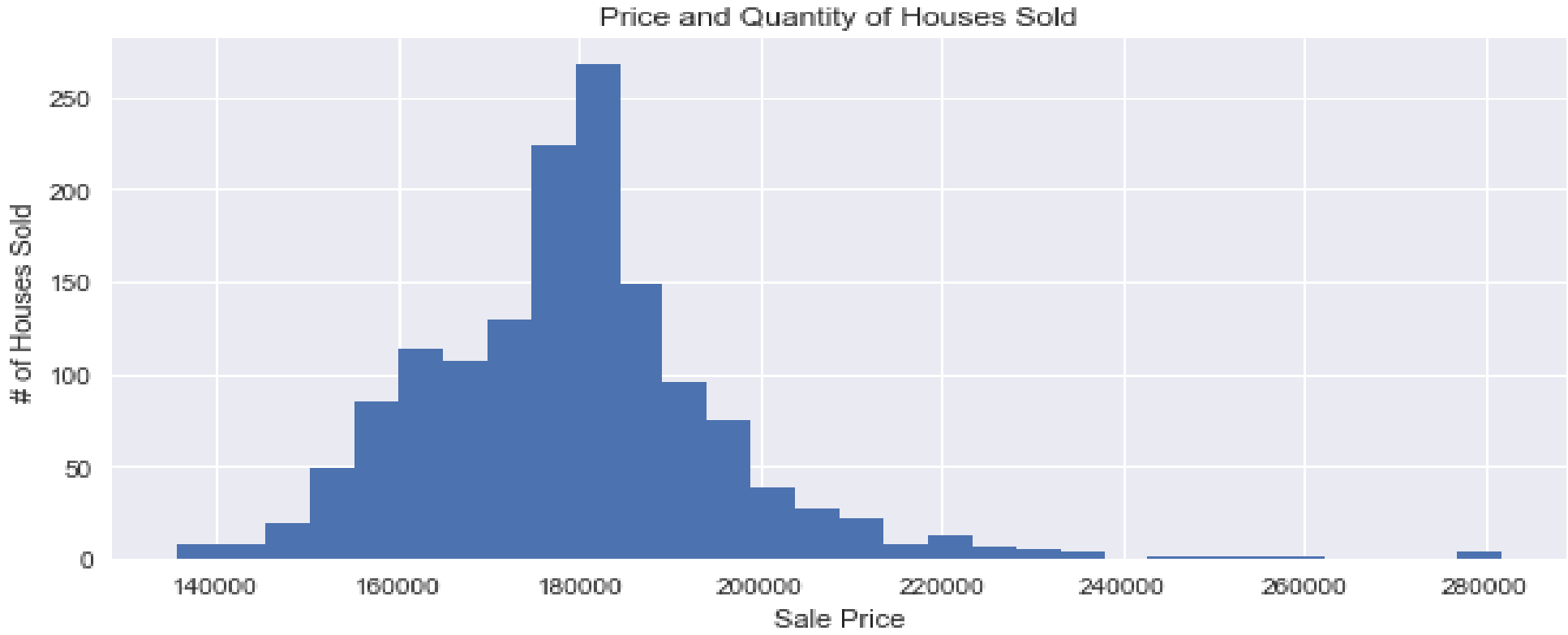
Train

- Filled NaN values with means and modes
- Built dummy columns for categorical variables

Test

- Used means and mode values from training data for any NaN values.
- Re-index and transfer the dummy variables from out training data

Exploratory Data Analysis



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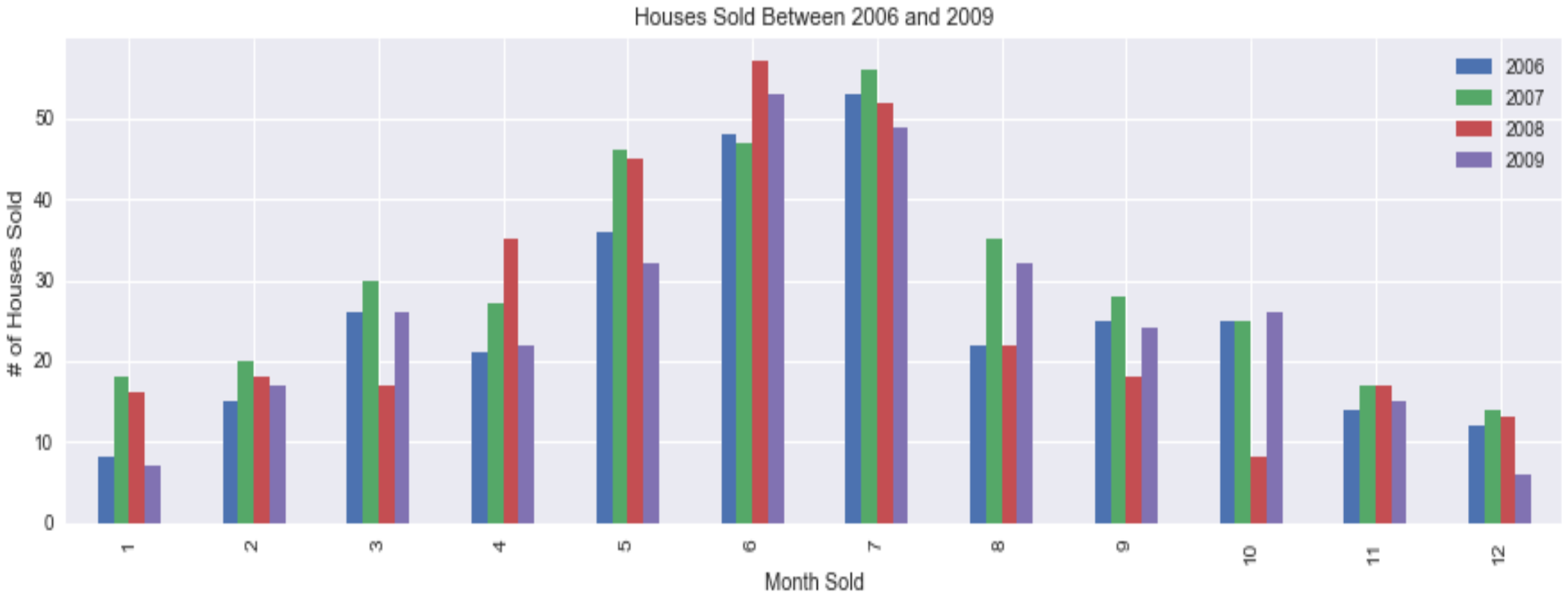

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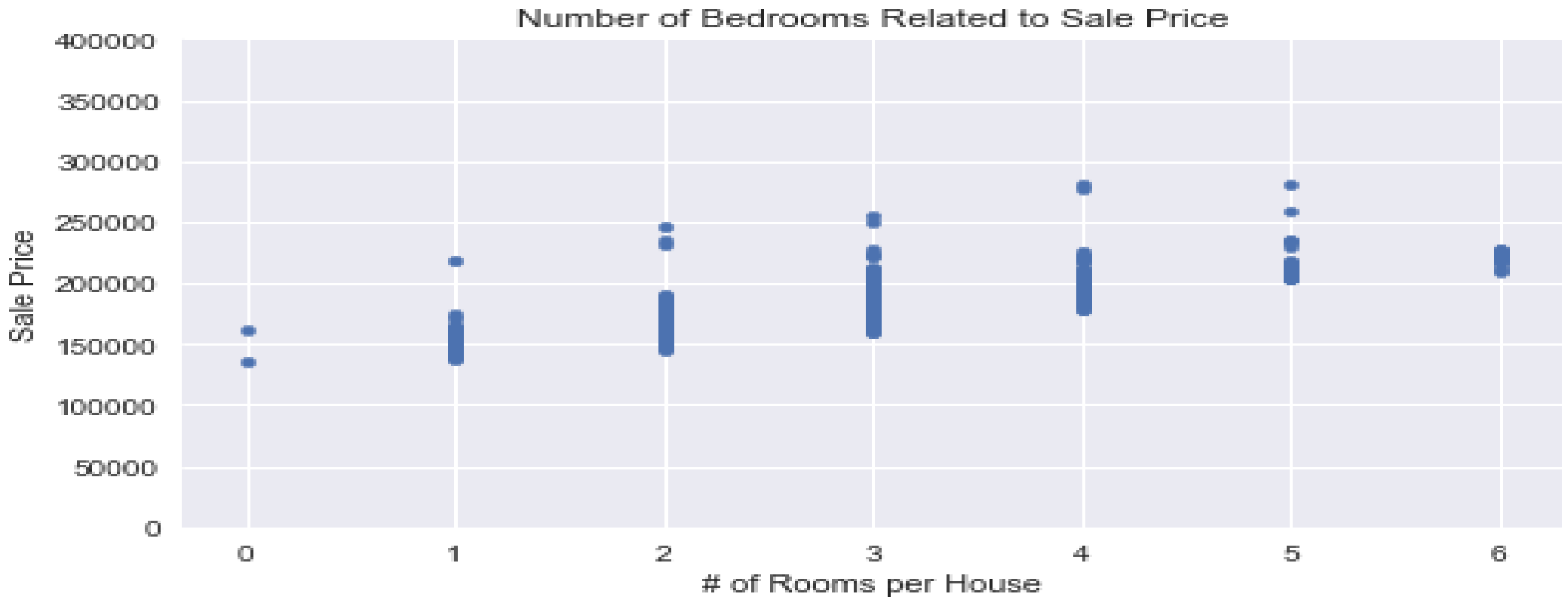

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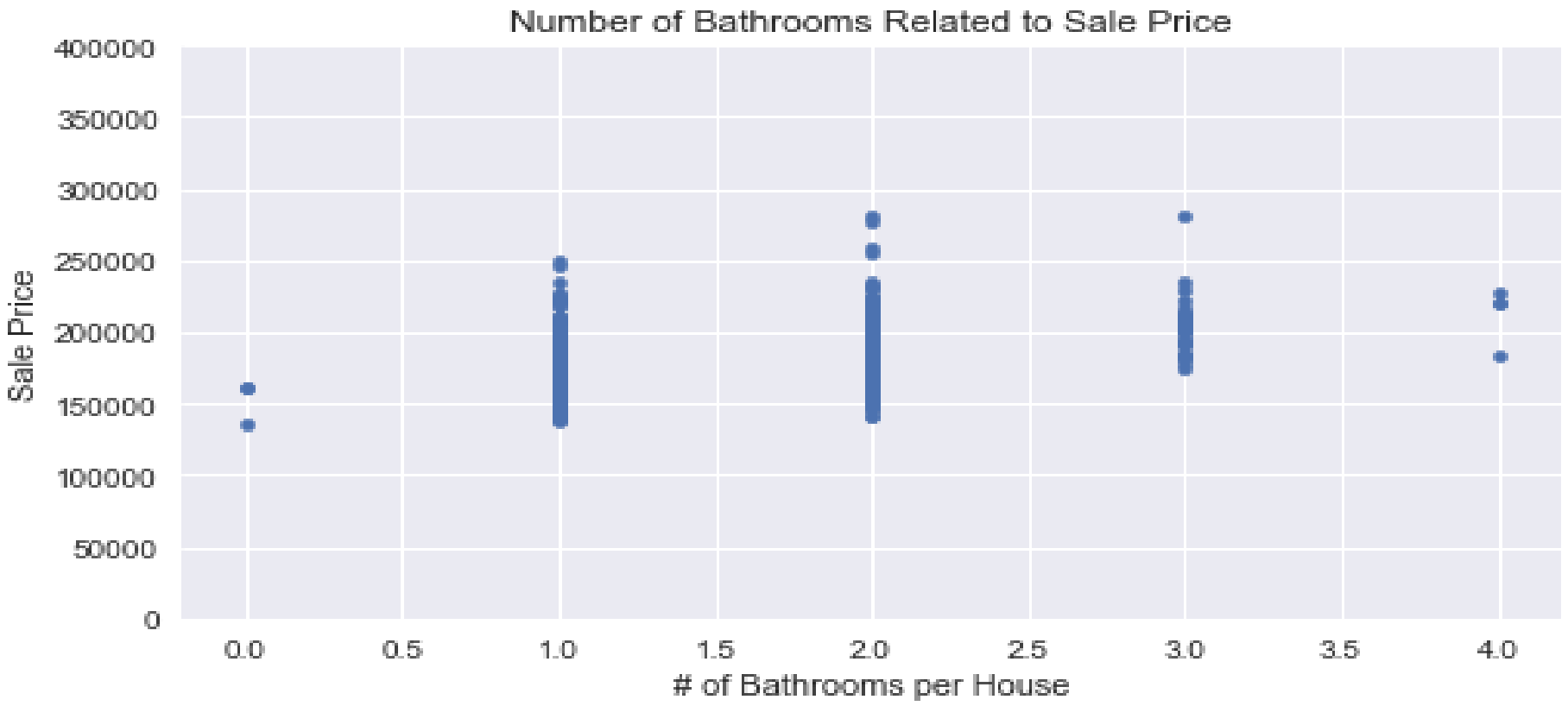

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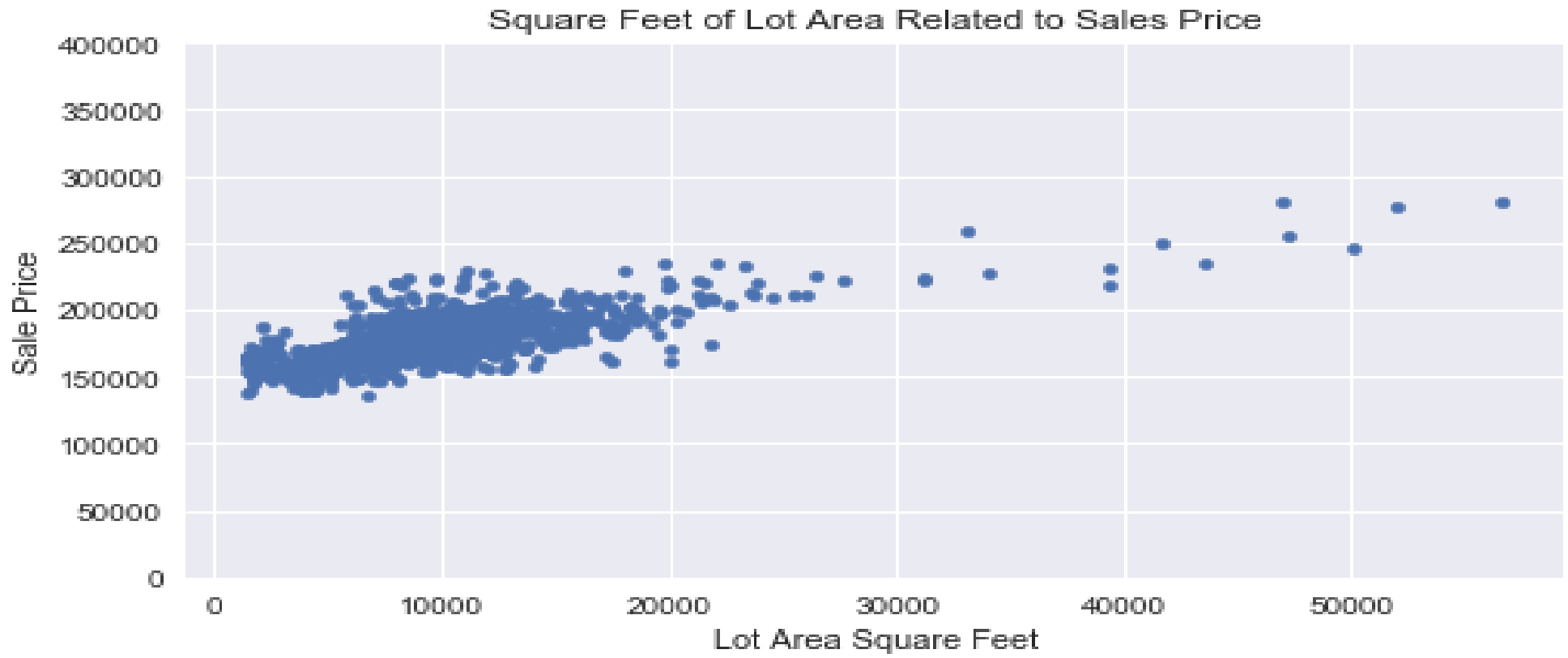

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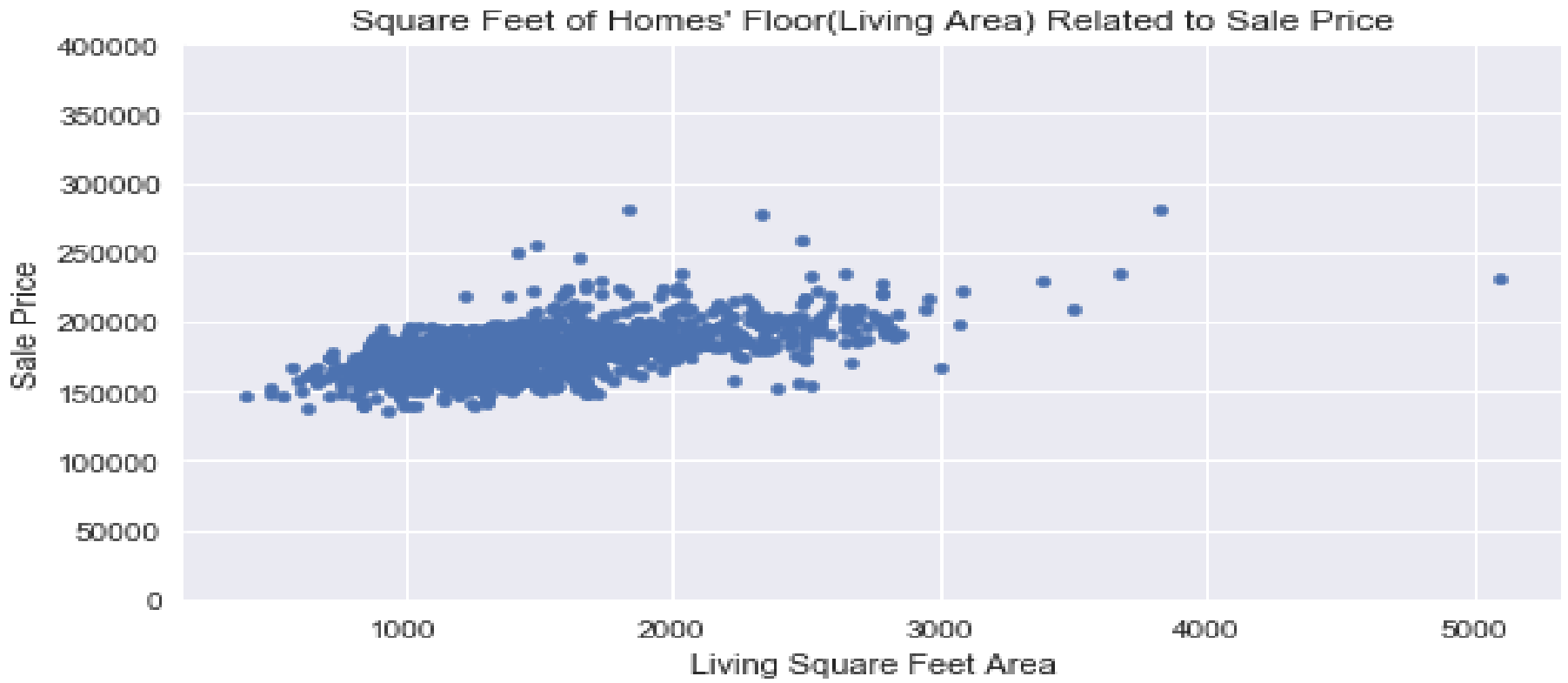

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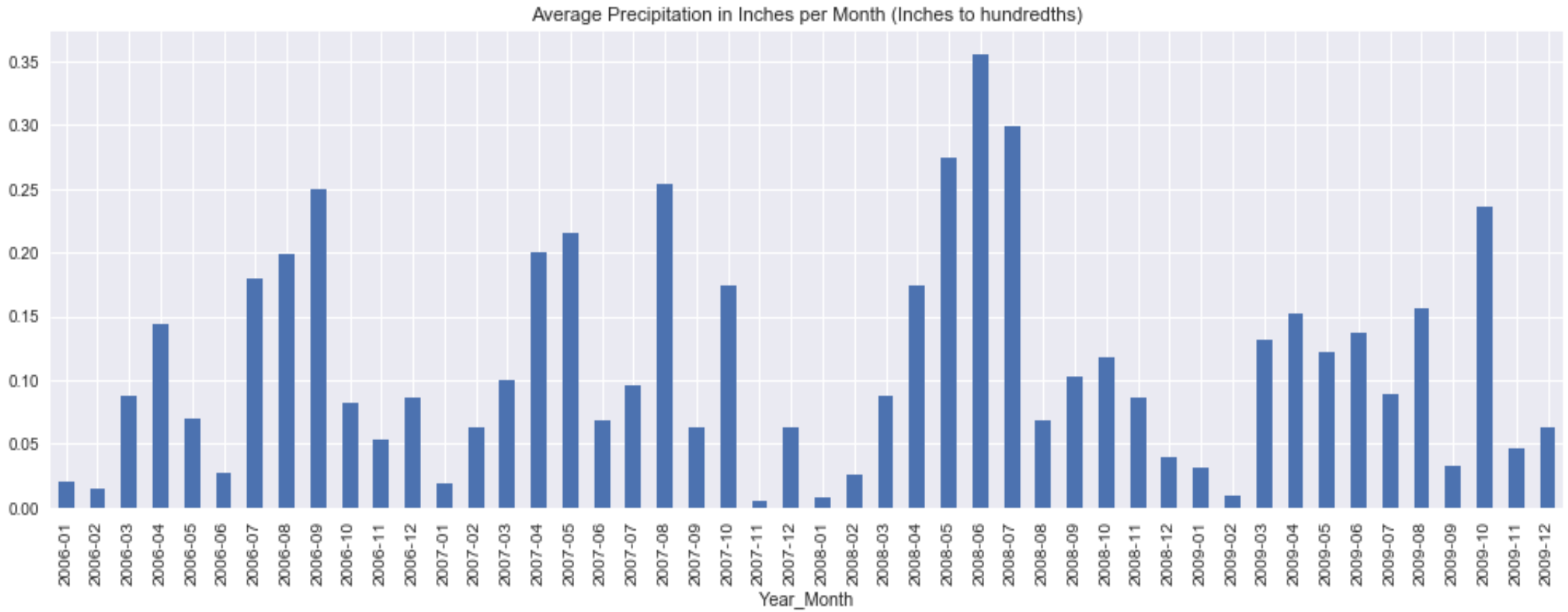

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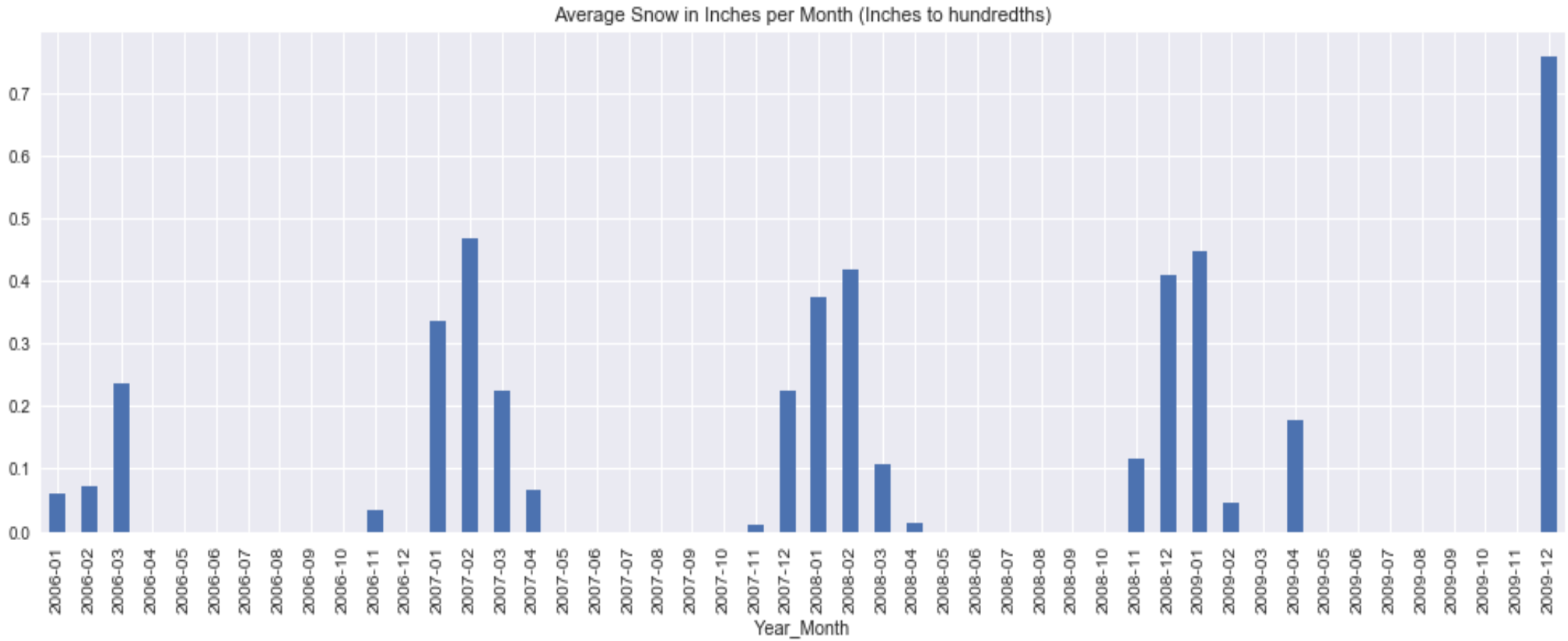

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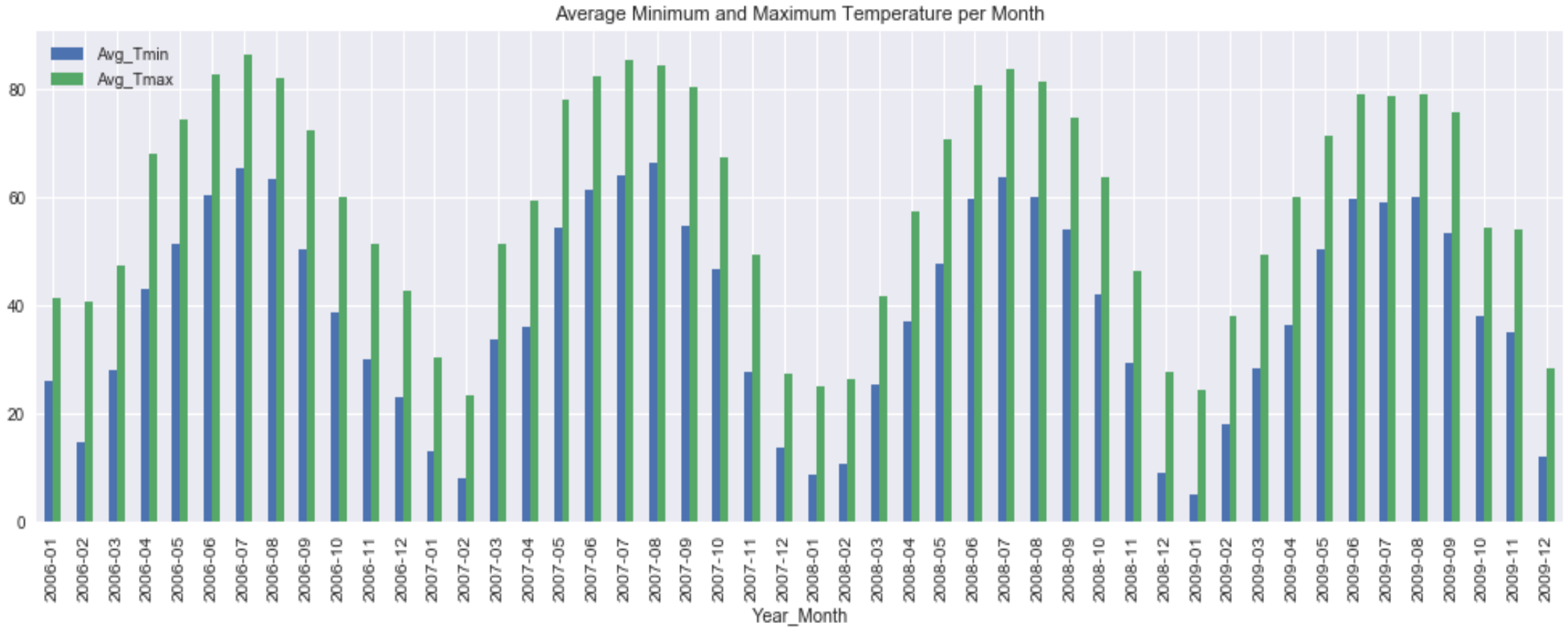


Inferential Analysis

Alpha set at .05

Significant price difference analysis about population.

Central unit vs not a central unit

P-value: 0.0100906212171866 81

One story houses vs Two story houses

P-value: 3.5535259636604621e-13

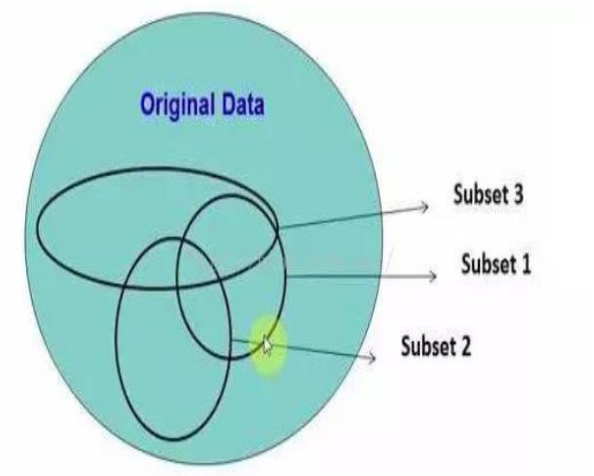
Good privacy fence vs minimum privacy fence

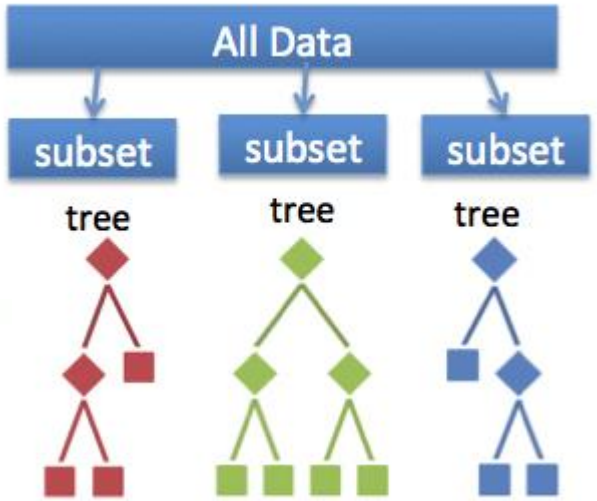
P-value: 0.3700349495497005 1

Modeling and Analysis

Random Forest Predictive Algorithm

- Continues Target variable(Regression)
- Based on Decision Trees Models
- Bootstrapping
- Root Mean Square Error Accuracy
- Feature Importance





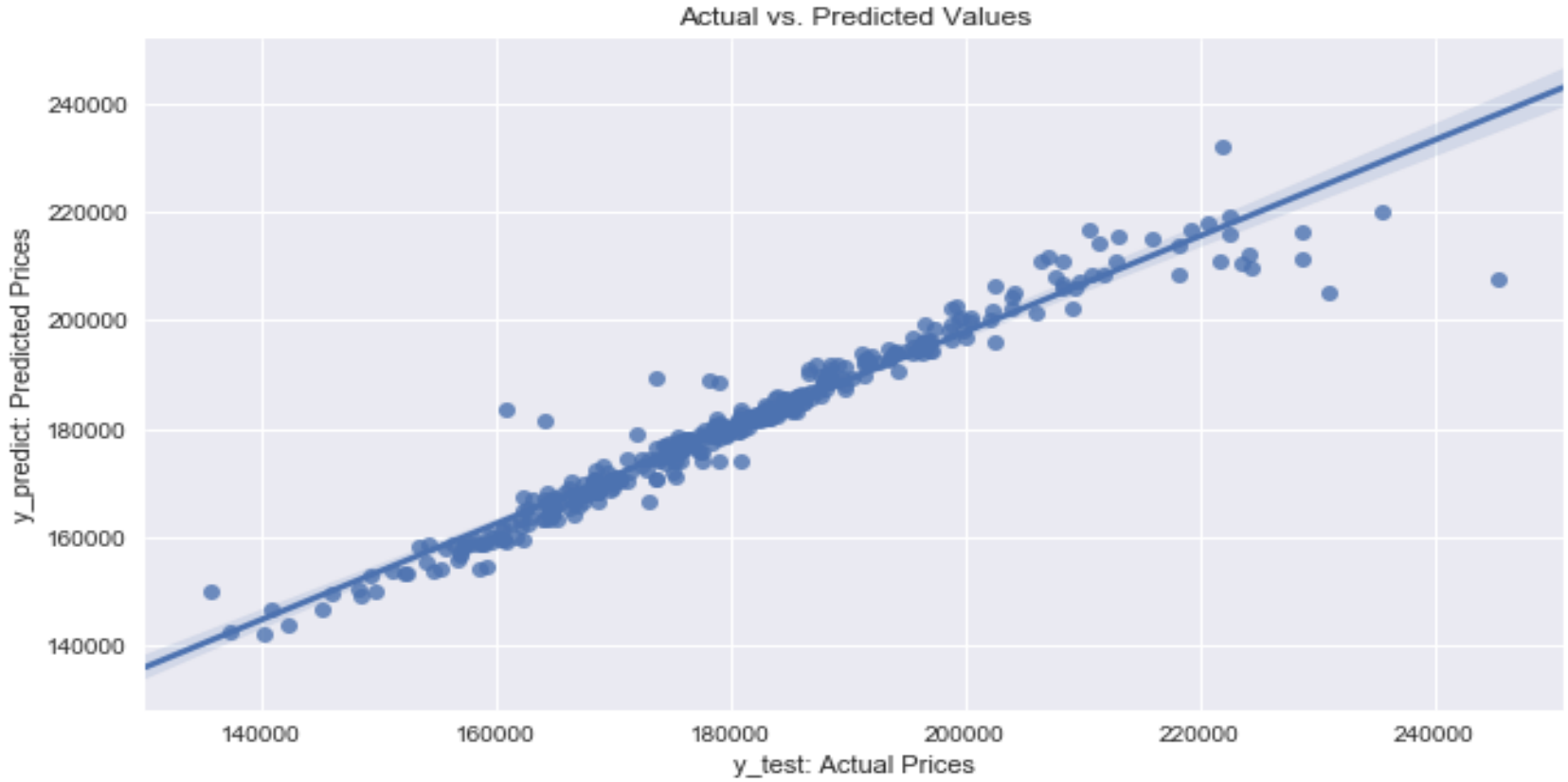
Modeling and Analysis

Main packages and libraries

Scikit-learn and math

- RandomForestRegressor()
- Param_grid(GridSearchCV)
- Fit()
- Best_estimators()
- Predict()
- RMSE = sqrt(mean_squared_error(y_test, y_predict)

Modeling and Analysis

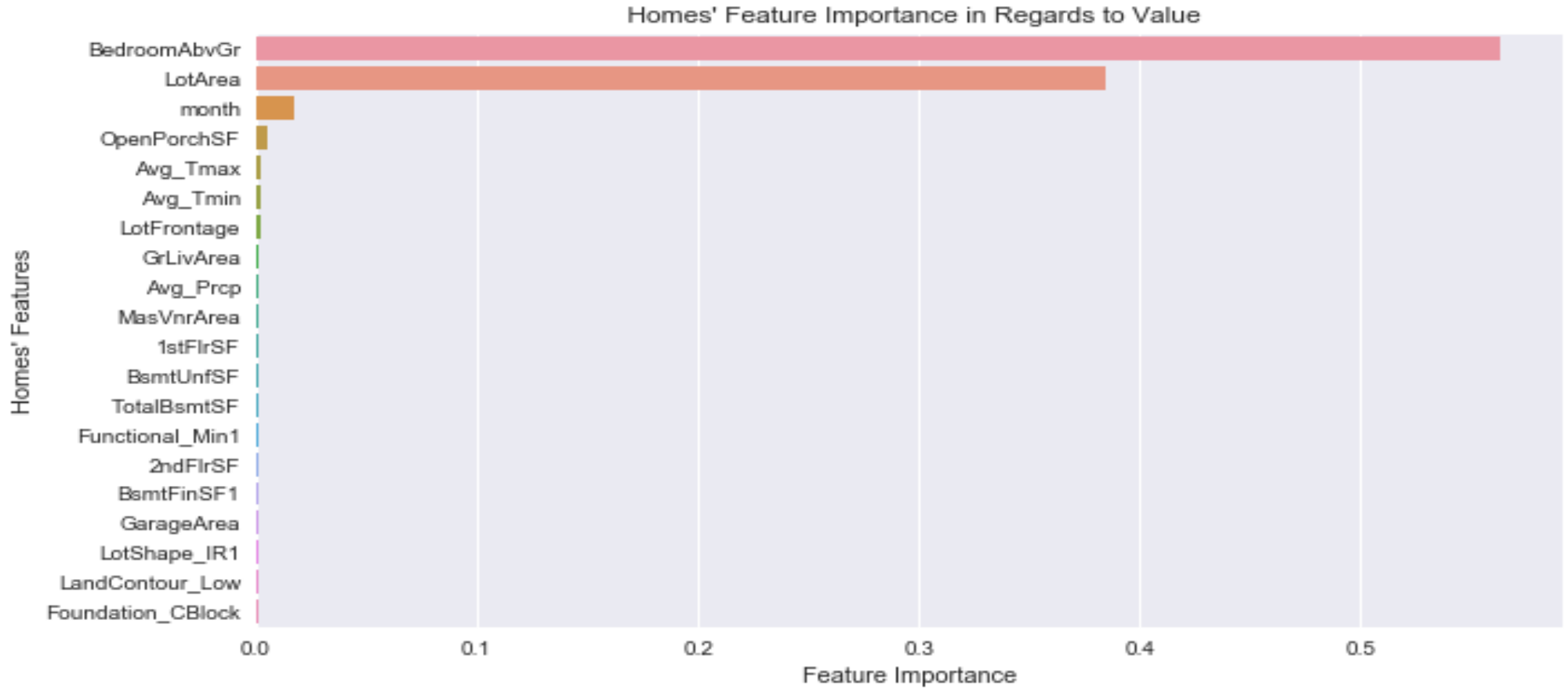


Modeling and Analysis

Feature Importance related to predicted price value

	Features	Importance
20	BedroomAbvGr	5.67e-01
2	LotArea	3.81e-01
34	month	1.72e-02
38	Avg_Tmax	2.60e-03
28	OpenPorchSF	2.22e-03
39	Avg_Tmin	1.96e-03
1	LotFrontage	1.77e-03
12	1stFlrSF	1.55e-03
215	Functional_Min1	1.42e-03
36	Avg_Prcp	1.35e-03

Modeling and Analysis



Thank you!

Any Questions?