Zillow

ZESTIMATE

Zillow’s Home Value Prediction

Presented by Dương Tiến Thành
Trần Sơn Tùng
Mai Ngọc Hiếu

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OVERVIEW

1. Introduction
2. Data Preprocessing
3. Exploratory Data Analysis
4. Feature Engineering
5. Building Regression Model
6. Result Evaluation

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INTRODUCTION

- Zillow is an online real estate marketplace.
- Connect and support buyers, sellers, renters, etc.
- Find and share important information related to homes, real estate, mortgages.

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- Zestimates: automated home valuation tool
- Provides quick property value estimates for user reference
- predict the log-error between Zestimate and the actual sale price

logerror = log(Zestimate) - log(SalePrice)

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OUR TARGET

1. Improved accuracy of Zestimates
2. Better user experience
3. Optimized business processes
4. More effective risk management

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DATA

1. properties_2016.csv, properties_2017.csv
2. train_2016_v2.csv, train_2017.csv
3. Zillow_data_dictionary.xlsx

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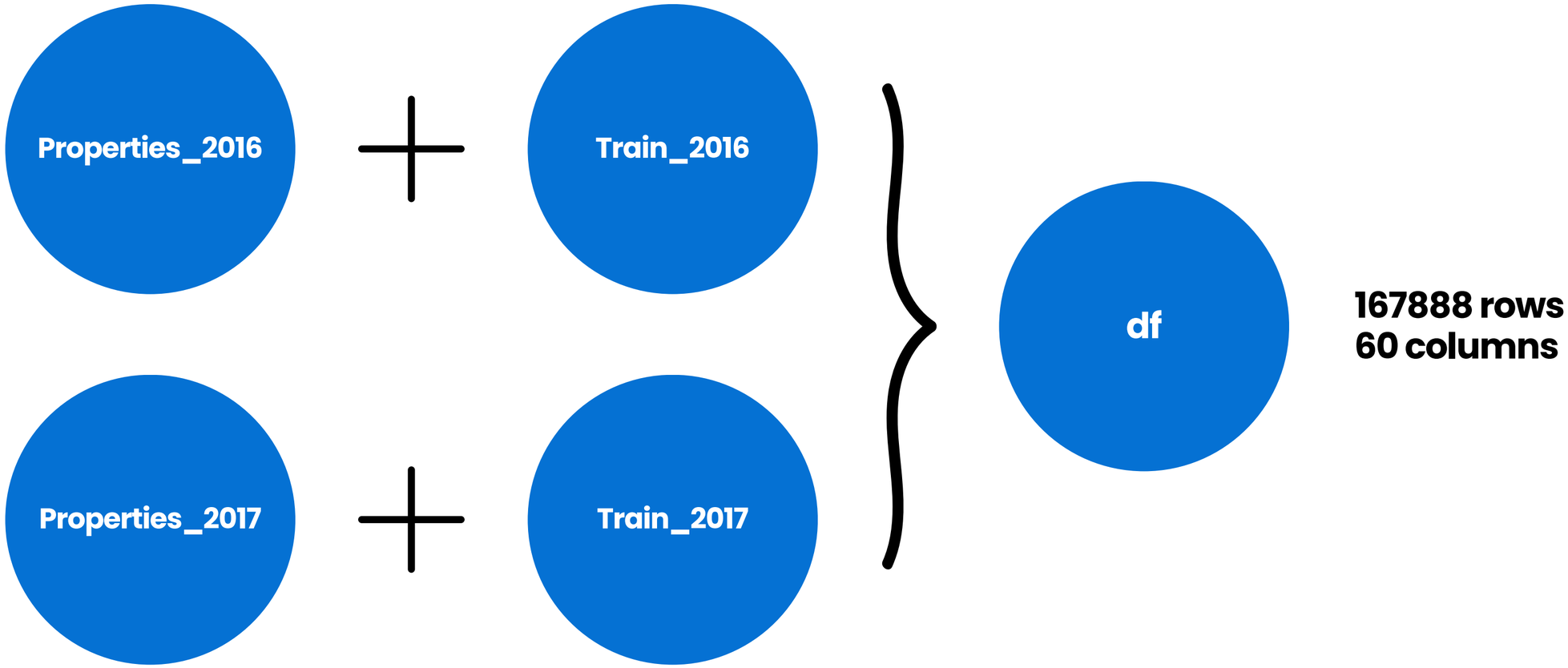
Data Preprocessing



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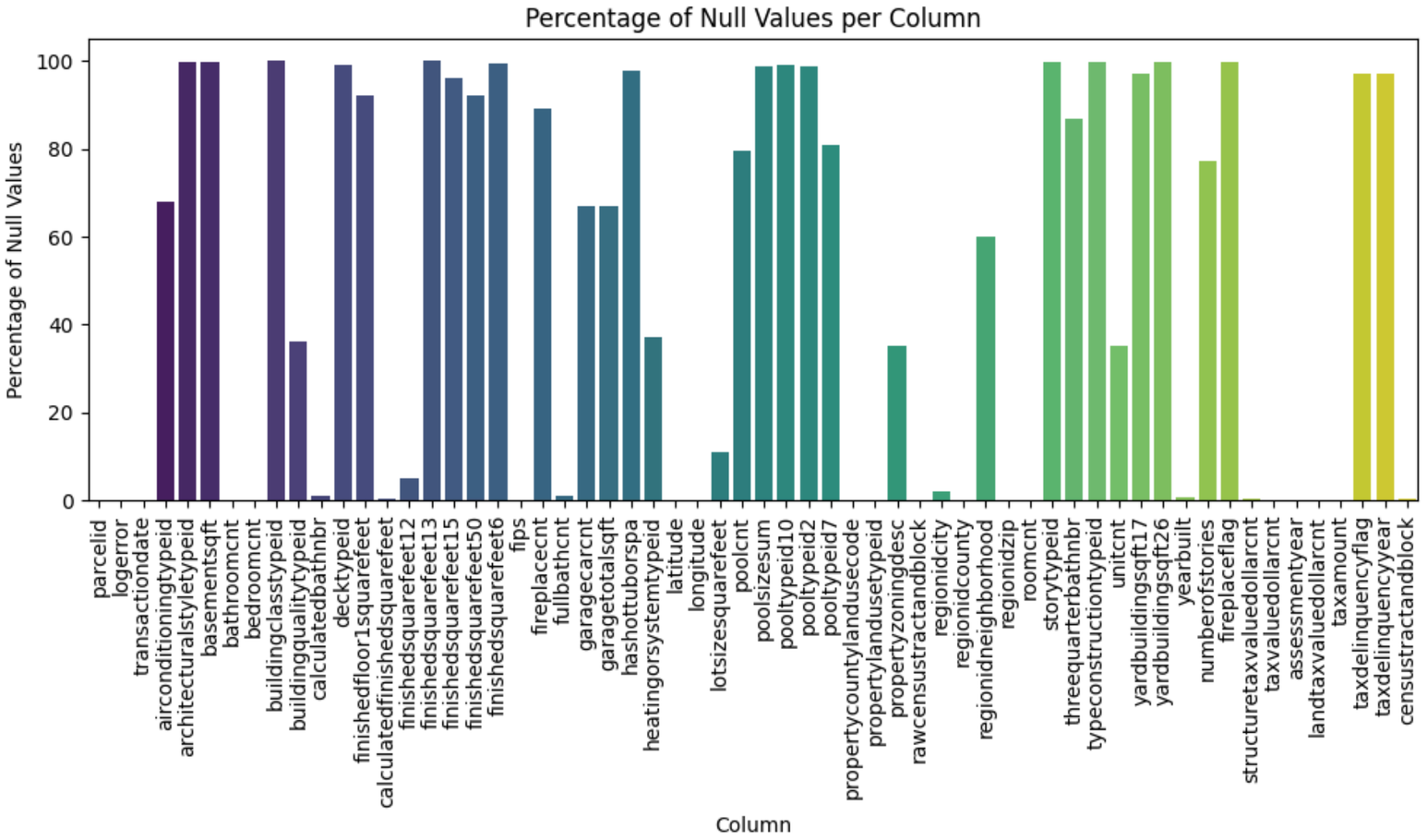
Null and Duplicate Values



- 2678 duplicate rows
- Remove columns with Null >= 60%
- Remain columns with Null <= 2%
  -> Remove rows
- The others:
  - Replace with mean value
  - Replace with mode value

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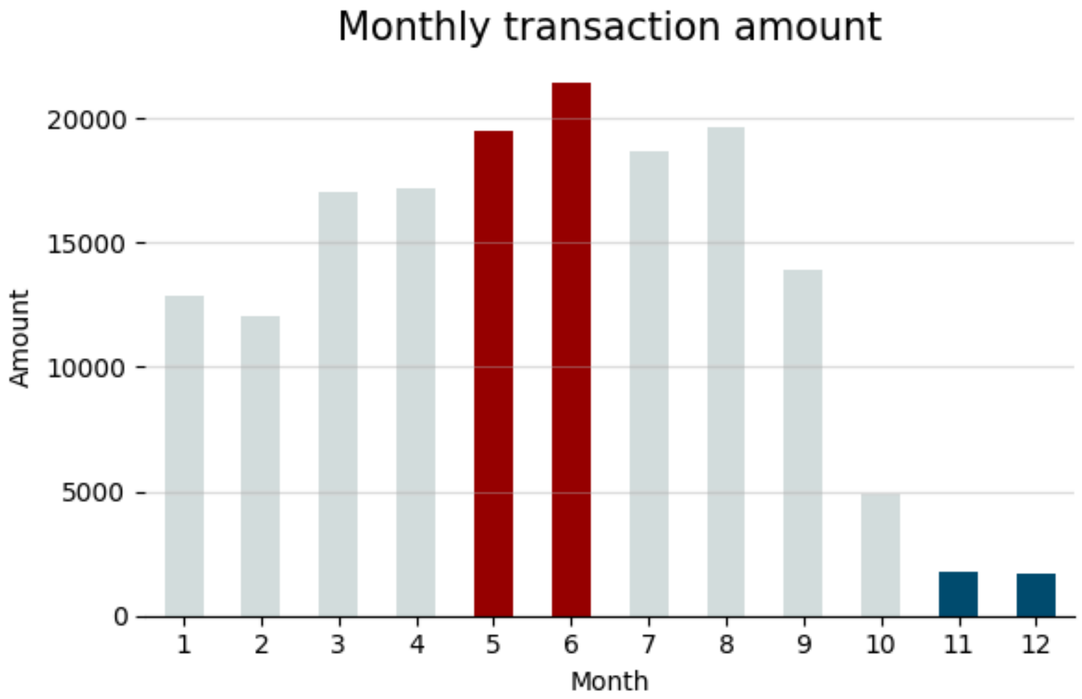
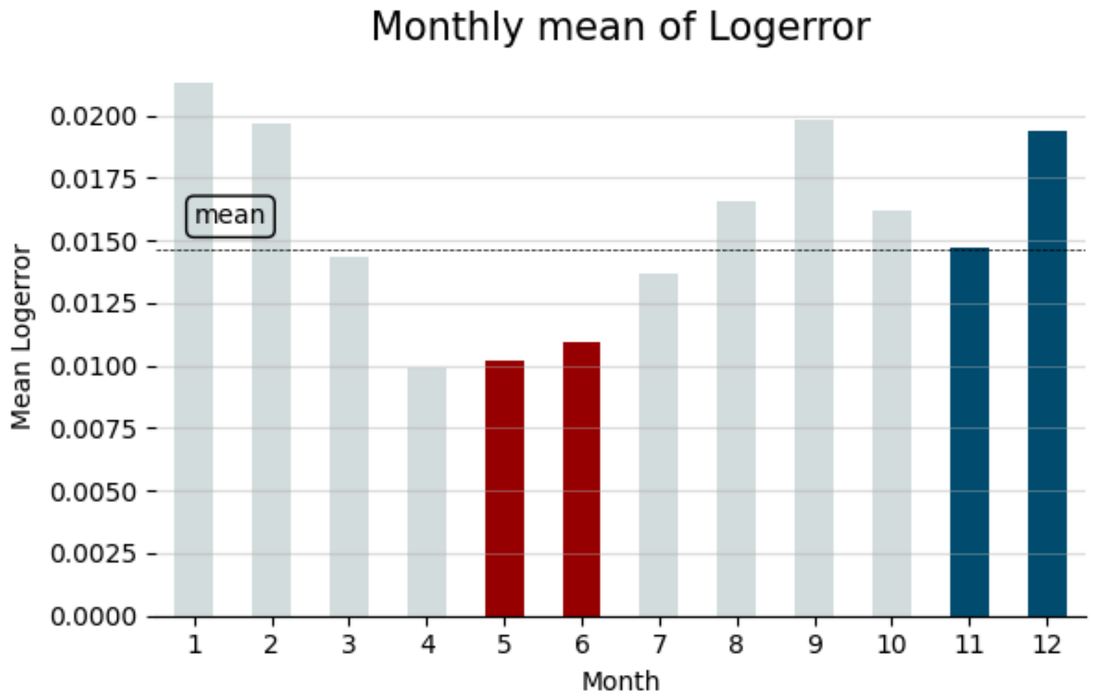
Exploratory Data Analysis





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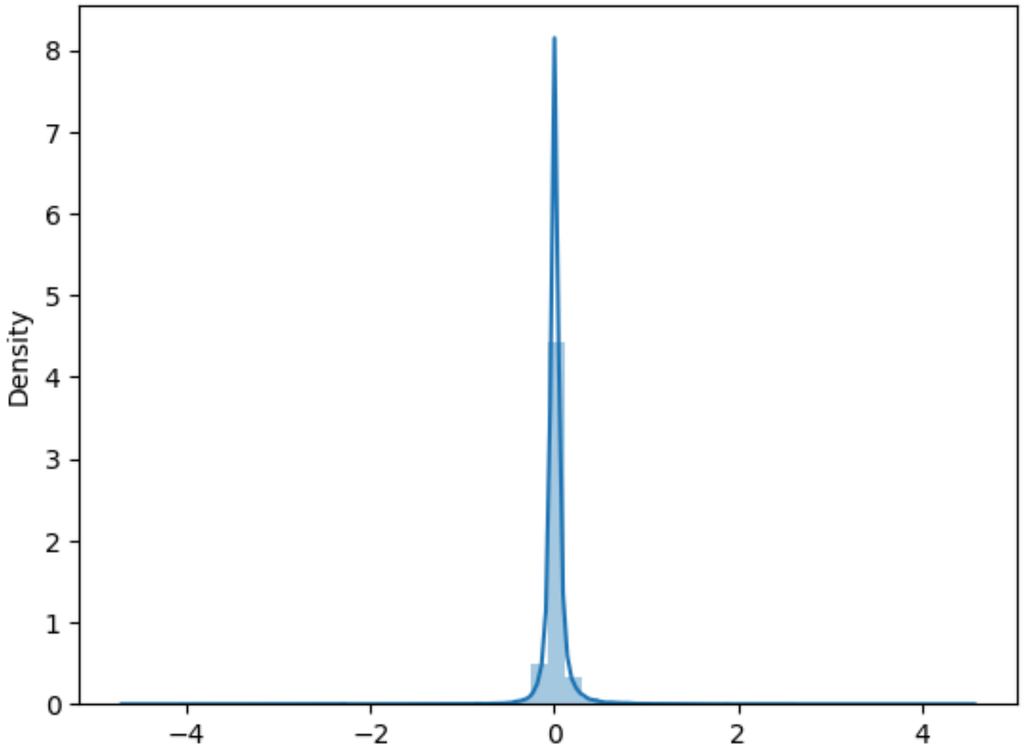
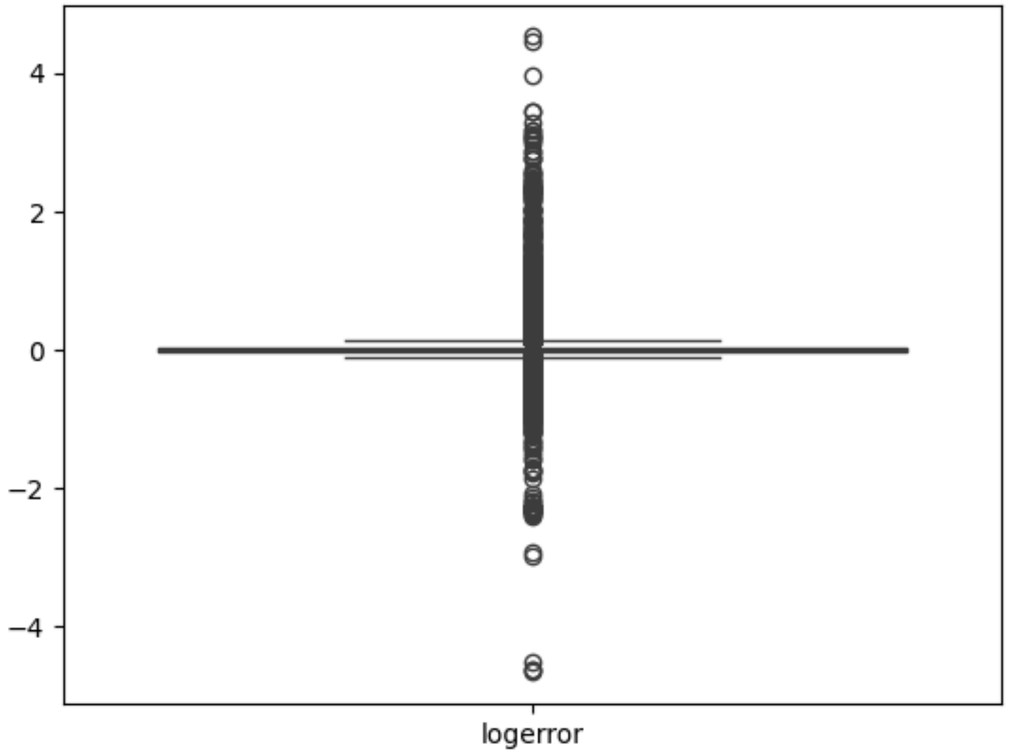
Exploratory Data Analysis





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Feature Engineering

- ***Creating features from transaction dates*:**
  Columns related to year, month, day, and weekday are derived from the property transaction date.
- ***Calculating the age of the house:***
  The house age is calculated by finding the difference between the year it was built and the transaction year.
- ***Total number of rooms:***
  The total number of rooms is calculated by adding the number of bathrooms and bedrooms.
- ***Garden area:***
  The garden area is computed by subtracting the finished living area from the total lot size.
- ***Living area ratio:***
  Another important feature is the living area ratio, which is the proportion of finished living space relative to the total lot size.

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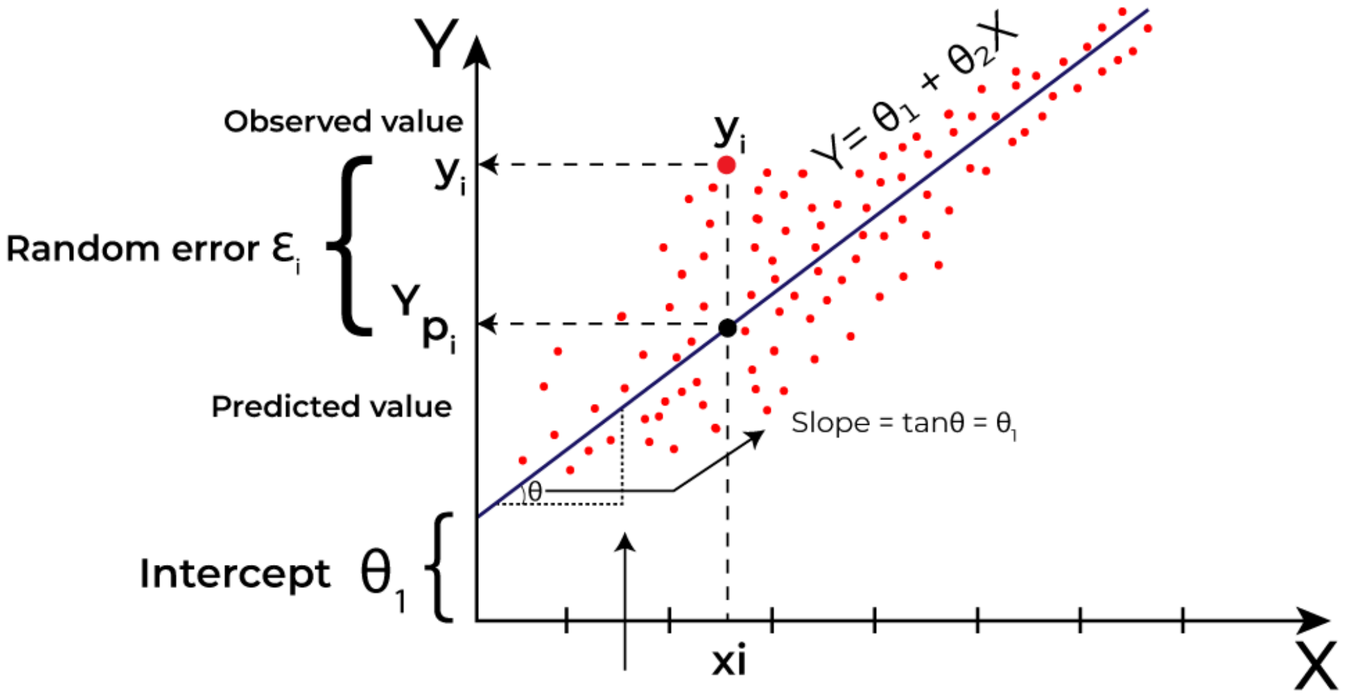
Linear Regression



- Simple and Easy to Understand
- Easy to Deploy
- Resource-Efficient

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Model evaluation method

- **Root Mean Squared Error (RMSE):**
  - Simplicity
  - Sensitive to Outliers
- **Mean Absolute Error (MAE):**
  - Easy to Calculate and Implement
  - Handle Outliers well

$$RMSE(X,h) = \sqrt{\frac{1}{m}\sum_{i=1}^{m}(h(x^{(i)}) - y^{(i)})^2}$$

$$MAE(X,h) = \frac{1}{m}\sum_{i=1}^{m}\left|h(x^{(i)}) - y^{(i)}\right|^2$$

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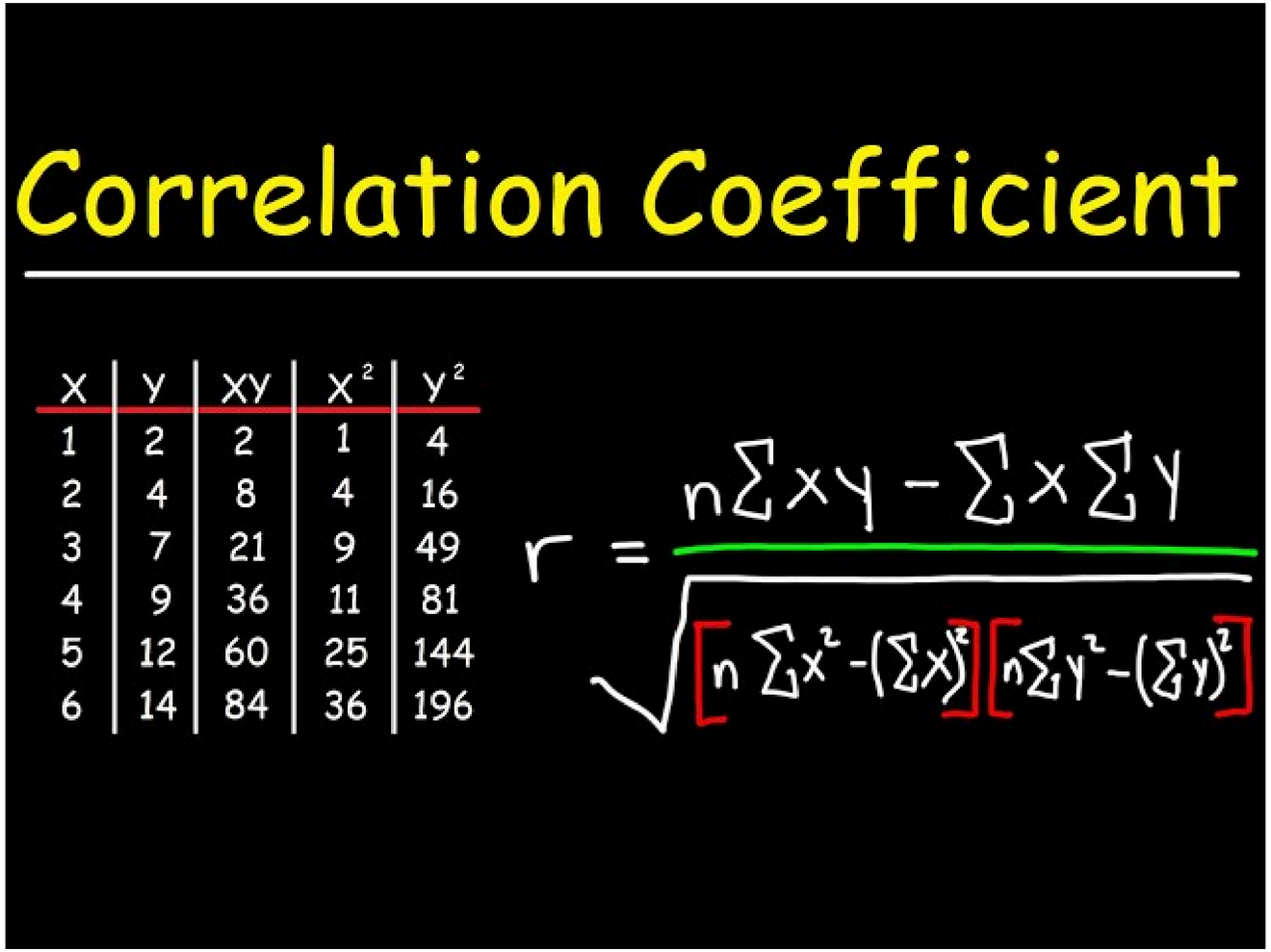
Correlation



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Selected input variable

- *"bedroomcnt',*
- *'buildingqualitytypeid',*
- *'calculatedbathnbr',*
- *'finishedsquarefeet12',*
- *'heatingorsystemtypeid',*
- *'lotsizesquarefeet',*
- *'rawcensustractandblock',*
- *'roomcnt',*
- *'unitcnt'*
- *‘yearbuilt'*
- *'structuretaxvaluedollarcnt'*
- *'assessmentyear',*
- *'landtaxvaluedollarcnt',*
- *'censustractandblock',*
- *'house_age',*
- *'total_room',*
- *'garden',*
- *'living_area_ratio'*
- *‘yearbuilt',*
- *'structuretaxvaluedollarcnt’*

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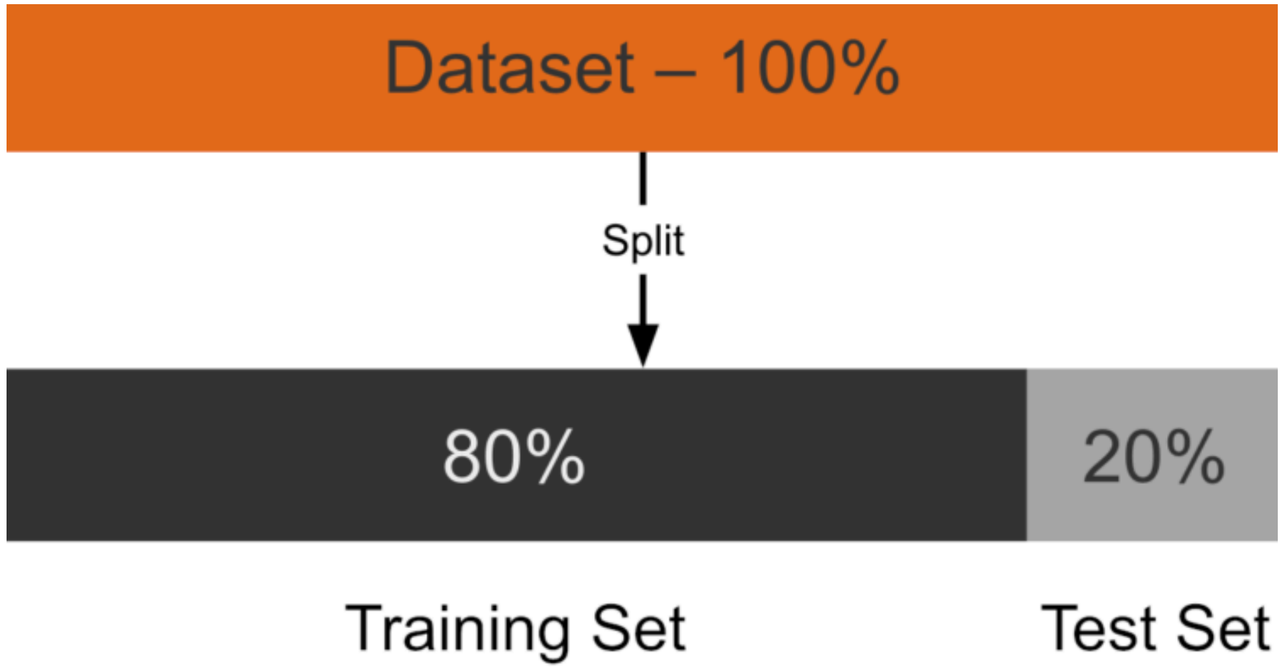
Building Regression Model

Target variable

Logerror

Split data set



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The linear regression model combined with Cross-Validator.

Mean Absolute Error(MAE)	*Root Mean Squared Error(RMSE)*
0.0566296	0.0959415

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Suggestions for improving the model

- **Collect more Data from other resources**
- **Utilize the Data that were given to gain more insight**
- **Dive more into Feature Engineering**
- **Applying Advanced Machine Learning Techniques**

THANK YOU