

# Predicting Price of King's Estate

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# Initial Thoughts

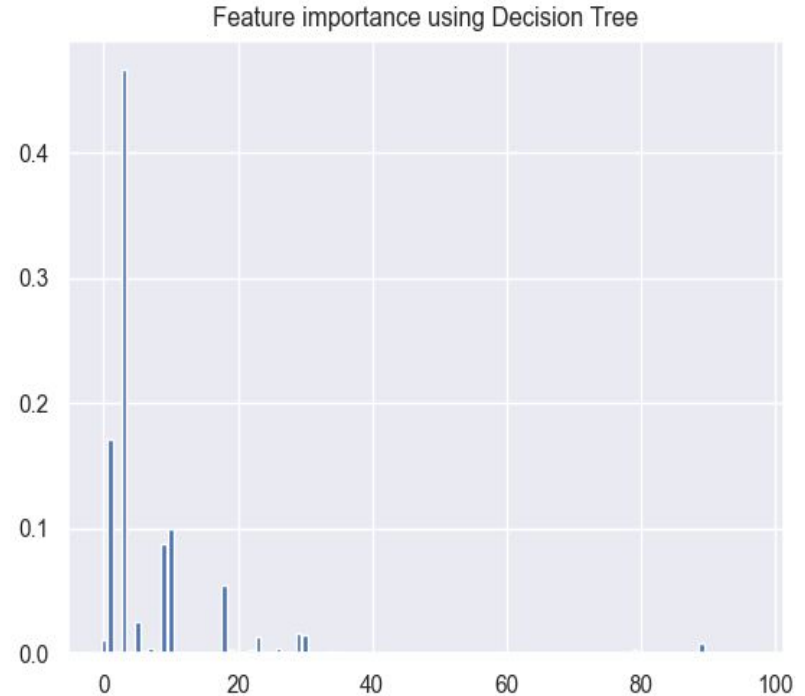
- Particularly difficult to determine market price because:
  - Limitations of data (comparable properties)
  - Historical designation
  - Fair market value and market price are drastically different in 1994
- Some potential approaches:
  - Regression
  - Clustering
  - Comparable cities
  - Forecasting demand (missing component between value and price)

# Data Cleaning

- Removed lots of variables with high cardinality
  - Simplified categorical variables
  - Made year and month variables (annual and seasonal effects)
  - Dropped agriculture and utility buildings
  - Created dummy variables
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- Ran OLS model as baseline: predicted price of \$984,945

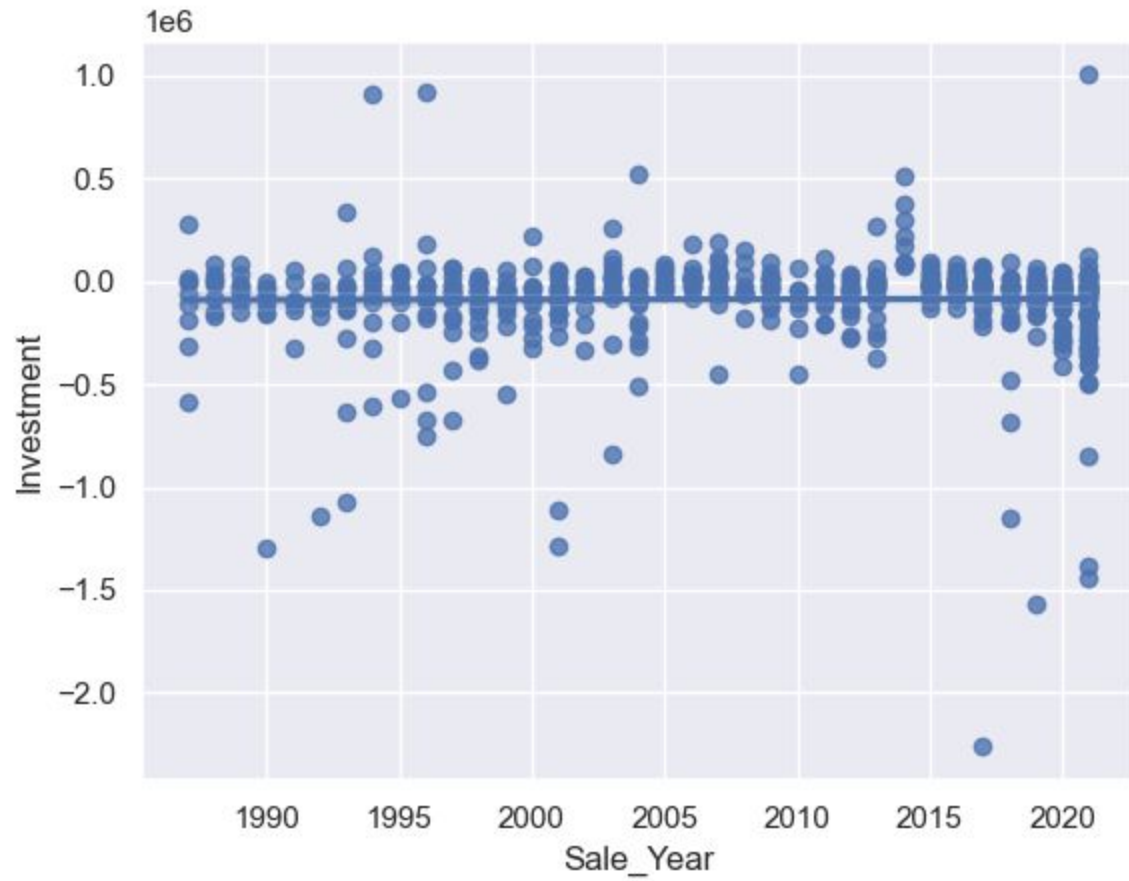
# First Approach: Regression Tree

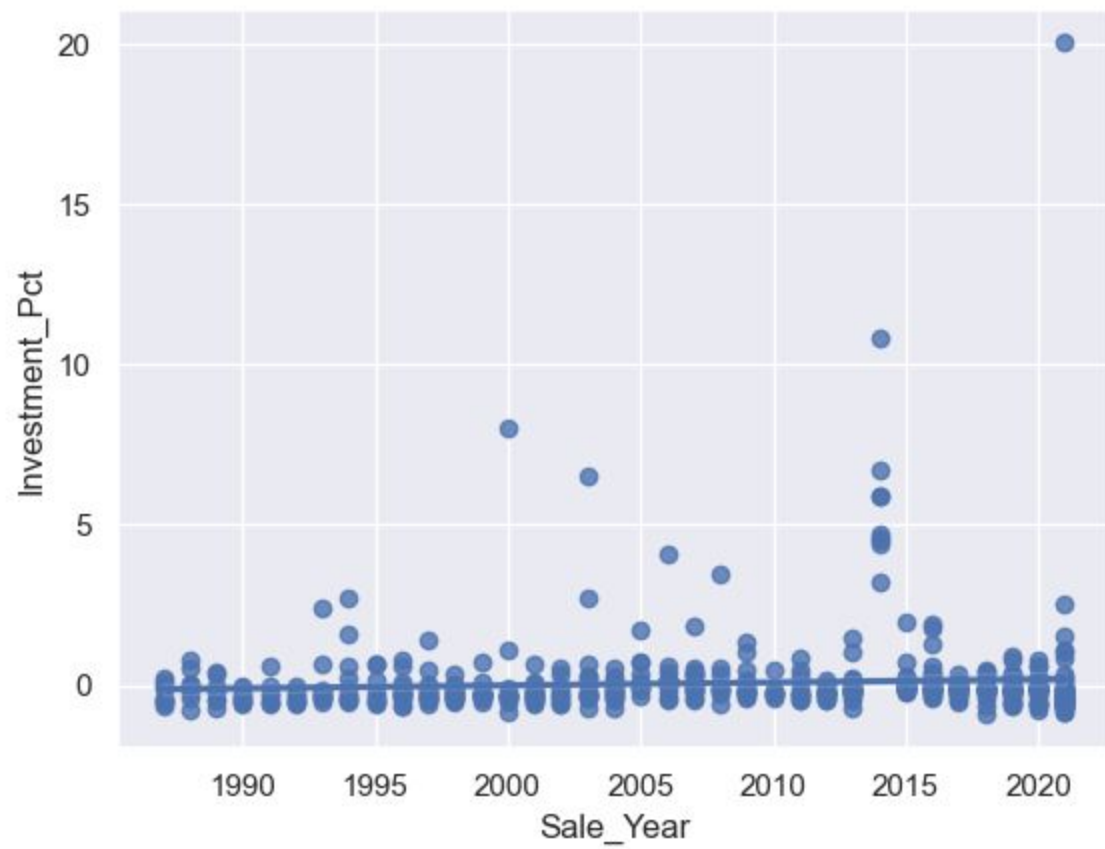
- Square Root MSE of ~\$200,000 (not bad for mansions?)
- King's Estate estimate: \$2.2 mil
- Top predictor: Fair market value (0.42)
  - Year of sale (didn't control for inflation)
  - Sale in the month of August (seasonal effects?)
  - Previous sale year (how
  - Homestead vs investment
  - Owner is a corporation
- Improvements:
  - Narrow down sample data to more similar properties
  - Feature selection ahead of time
  - Control for inflation



## Second Approach: Forecasting Demand

- Fair Market value as a strong predictor \* Demand = Market Price
- Forecast demand in 2022 to predict market price
- Problems:
  - Don't have access to the fair market value assessment at time of purchase (only 2021 assessment)
- ROI variable
  - Calculate difference between sales price (indexed to 2021 dollars) and fair market value, divided by sales price
- Trim down df to more similar homes
- Predict average ROI gain (as a percent) in 2022





# Moving Forward

- Complete time series regression to predict 2022 demand and calculate estate price based on prediction and fair market value
- Refine features used in decision tree
- Further filter observations used in sample