Sales Price Prediction of King County, WA single-family homes

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Presentation Outline

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Business Problem

Client: Bon Jovi Real Estate Advisors

Industry: Residential real estate brokerage

Location: King County, WA

Needs: A tool to determine the best sales price of single-family homes.

Business Solution

- Develop a model to predict the potential sales price range from features of single family home properties in King County, WA.
- This model will eventually be implemented in a dashboard application for Bon Jovi real estate agents.
- Use this model to make cost-benefit analysis of improvements to a home.

King County, WA
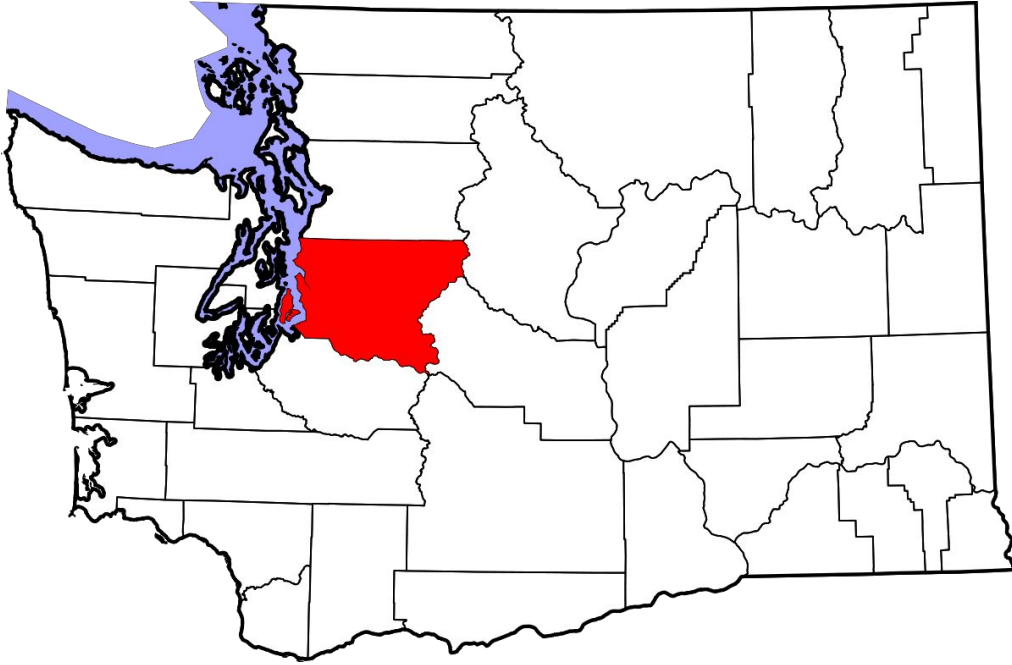
- Population: ~ 2.25 million
  - Largest populated area in Washington state
  - 13th most populous county in the United States
- Median income: $99,000
  - United States median income: $67,000
- 2,307 square miles (5,980 km^2)
  - 8.3% is water

King County, WA home sales data

- Between 2014 to 2015
- Total of 21,597 records
  - Median: $450,000
  - $78,000 - $7,700,000
- Data was cleaned and made tidy
- 17 Variables used
  - Sale price
  - Bed / Bath number
  - Size of area
  - Condition
  - Grade …

King County, WA home sales between May 2014 - May 2015
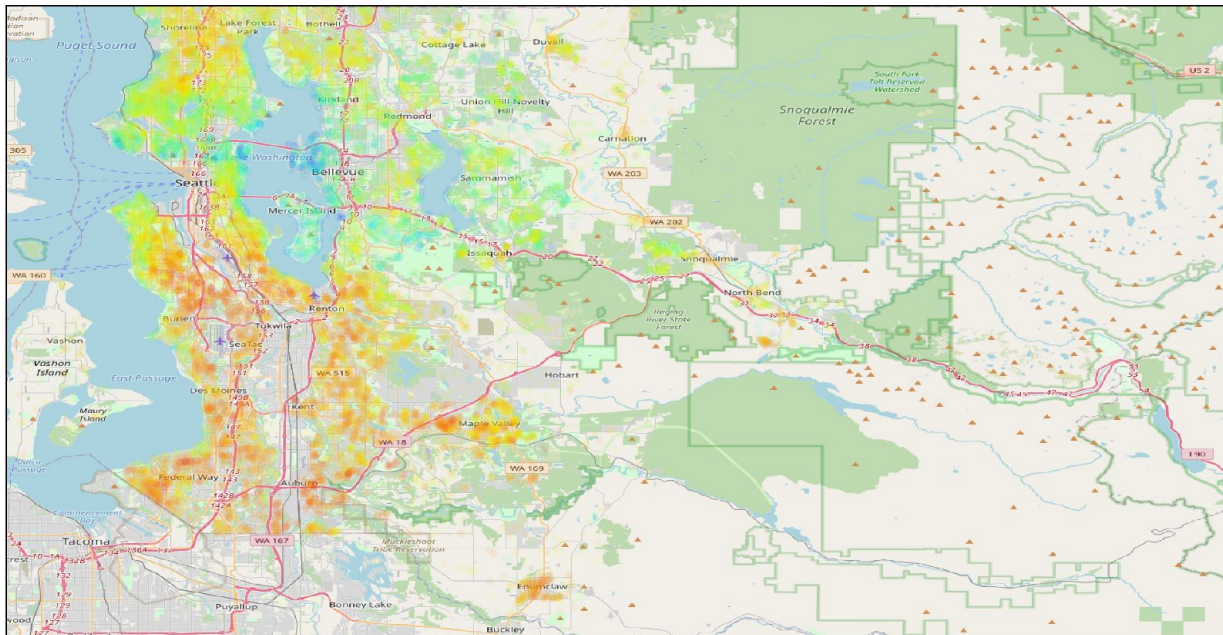
Regression Models

Model 1

- **Price predicted by:**
  - **Square feet of living space**
  - **Grade of property**
- **R^2 0.55**
- **RMSE: 0.35**
- **PI: 0.69**

Model 2

- **Price predicted by:**
  - **All variables except some specific zip codes**
- **R^2 0.88**
- **RMSE: 0.18**
- **PI: 0.35**

Model 3

- **Price predicted by:**
  - **M1 with interactions between variables**
- **R^2 0.63**
- **RMSE: 0.32**
- **PI: 0.63**

- Predictive models should have an adjusted R-squared greater than 0.7
- The lower the RMSE and PI the better

Inputs for Predictions

House 1

- **Sqft living: 2450ft^2**
- **Bedrooms: 4**
- **Bathrooms: 2.5**
- **Zip code: 98023**
- **Age: 25 years**
- **Grade: 8**
- **Floors: 2**

House 2

- **Sqft living: 1950ft^2**
- **Bedrooms: 3**
- **Bathrooms: 1**
- **Zip code: 98055**
- **Age: 55 years**
- **Grade: 7**
- **Floors: 1**

House 3

- **Sqft living: 2,580ft^2**
- **Bedrooms: 4**
- **Bathrooms: 2.25**
- **Zip code: 98027**
- **Age: 38 years**
- **Grade: 8**
- **Floors: 2**

Prediction Results

House 1	House 2	House 3

House 1

- $2450ft^2$ | 4-2.5
- Predictions:
  - M1: $528,000
  - M2: $324,000
  - M3: $497,000
- Actual: $300,000

House 2

- $1160ft^2$ | 3-1
- Predictions:
  - M1: $325,000
  - M2: $352,000
  - M3: $319,000
- Actual: $422,000

House 3

- $2450ft^2$ | 4-2.25
- Predictions:
  - M1: $538,000
  - M2: $558,000
  - M3: $542,000
- Actual: $588,000

Model Summary

- Model 2 is the best model to continue with as it has the best predictive capabilities.
  - R-squared: 0.88
  - Lower RMSE and PI

Actionable Recommendations

1. M2 could be used for a client dashboard prototype for Bon Jovi real estate agents to predict sales price.
2. M2 can be used to measure the cost-benefit analysis of making improvements to a house. For example, a one-unit increase in the condition of the home will increase the sale price by about 5%.
3. M2 can help Bon Jovi real estate agents locate customers and properties that have the highest sale price potential. For example, homes in zip code 98039 sold for over 200% more than homes in zip code 98003 so those customers in 98039 likely have a higher sales price.

Next Steps

- Create an user-friendly dashboard that allows real estate agents to input home features and returns the predicted price range.
- Gather more data such as school rankings or crime rates to improve the model's predictive power.
- Communicate with client about internal data that can be used to train the model.

Thank You!

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References

1.