# King County House Prices

## Recommendations for Thomas Hansen

Kristin Sander, KS Real Estate, 27th January 2022

# Outline

- Introduction

- General information about the data

- Data overview

- Hypotheses

- General results

- Insights and recommendations for the stakeholder

- Summary

# Introduction
## Kristin Sander

- Founder of KS Real Estate in 2020

- 3 employees, still increasing

- Characteristic: recommendations on data science basis

- Our motto: We don't want to work for you again!

# Introduction
## Thomas Hansen

- Wants to buy a house in King County

- Requirements:

  - Not to expensive

  - Enough space for 5 kids

  - Nice (social) neighborhood

- Questions:

  - When to buy?

  - Where to buy?

# General information about the data

- Topic: House sale prices

- Origin: kc_house.data.csv at www.kaggle.com

- Time span: May 2014 to May 2015

- Location: King County, including Seattle

- Size:

  - 2.52 MB

  - 21597 house sales

  - 21 information per house sale
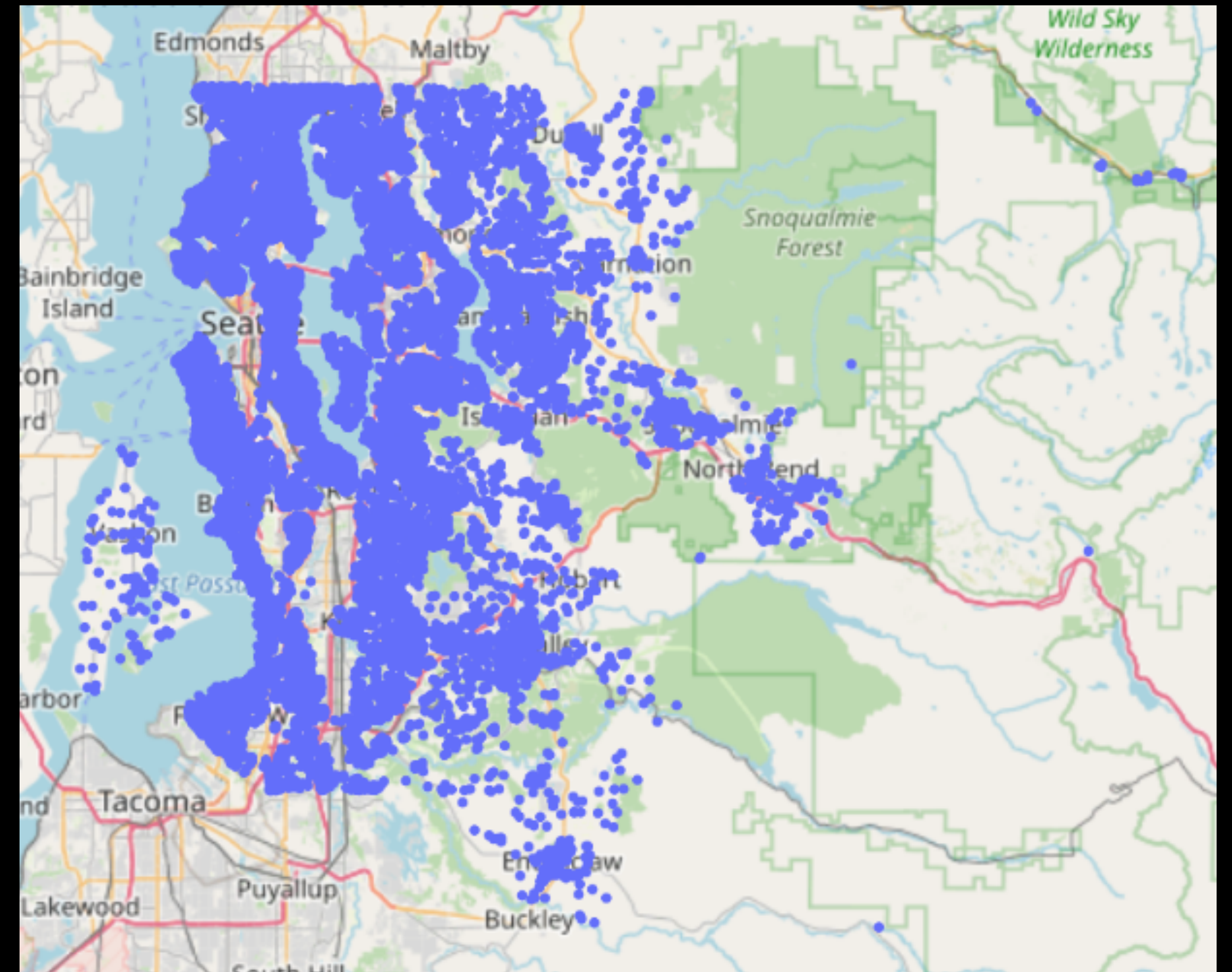
# Data overview

## Kind of data

| Category | Column name | Unity | Description |
|---|---|---|---|
| agency-related | id | - | unique identified for a house |
| | view | - | how often has the house been viewed |
| price | price | USD | is prediction target |
| time | date | - | date the house was sold |
| | yr_built | - | year when house was built |
| | yr_renovated | - | year when house was renovated |
| footage | sqft_living | squarefeet | square footage of the home |
| | sqft_lot | squarefeet | square footage of the lot |
| | sqft_above | squarefeet | square ootage of house apart from basement |
| | sqft_basement | squarefeet | square footage of the basement |
| | sqft_living15 | squarefeet | square footage of interior housing living space for the nearest 15 neighbors |
| | sqft_lot15 | squarefeet | square footage of the land lots of the nearest 15 neighbors |
| comfort | bedrooms | - | # of bedrooms |
| | bathrooms | - | # of bathrooms |
| | floors | - | # of floors (levels) in house |
| | waterfront | bolean | house which has a view to a waterfront |
| evaluation | condition | - | how good the condition is ( Overall ) (1-5) |
| | grade | - | overall grade given to the housing unit, based on King County grading system (3-13) |
| location | zipcode | - | zip |
| | lat | - | latitude coordinate |
| | long | - | longitude coordinate |

- Missing data for:
  - waterfront
  - view
  - yr_renovated
- Cells with no information for:
  - sqft_basement
- Not optimal data types for:
  - Date: str
  - Price: float
  - sqft_basement: str
  - yr_renovated: float
  - Waterfront: float
  - View: float
- Some unexpected data types for:
  - bathrooms: e.g. 1.25
  - floors: e.g. 1.5

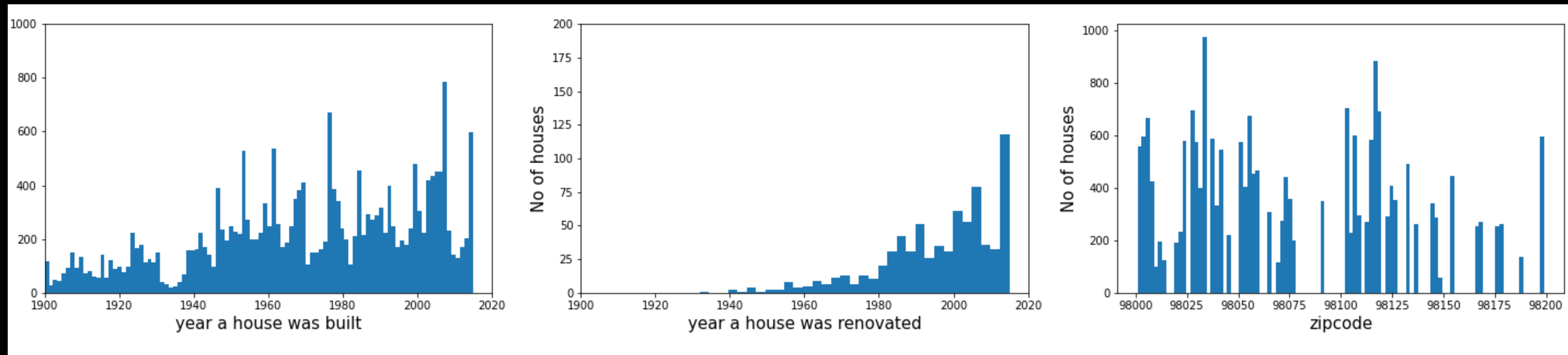# Data overview
## Something unexpected?
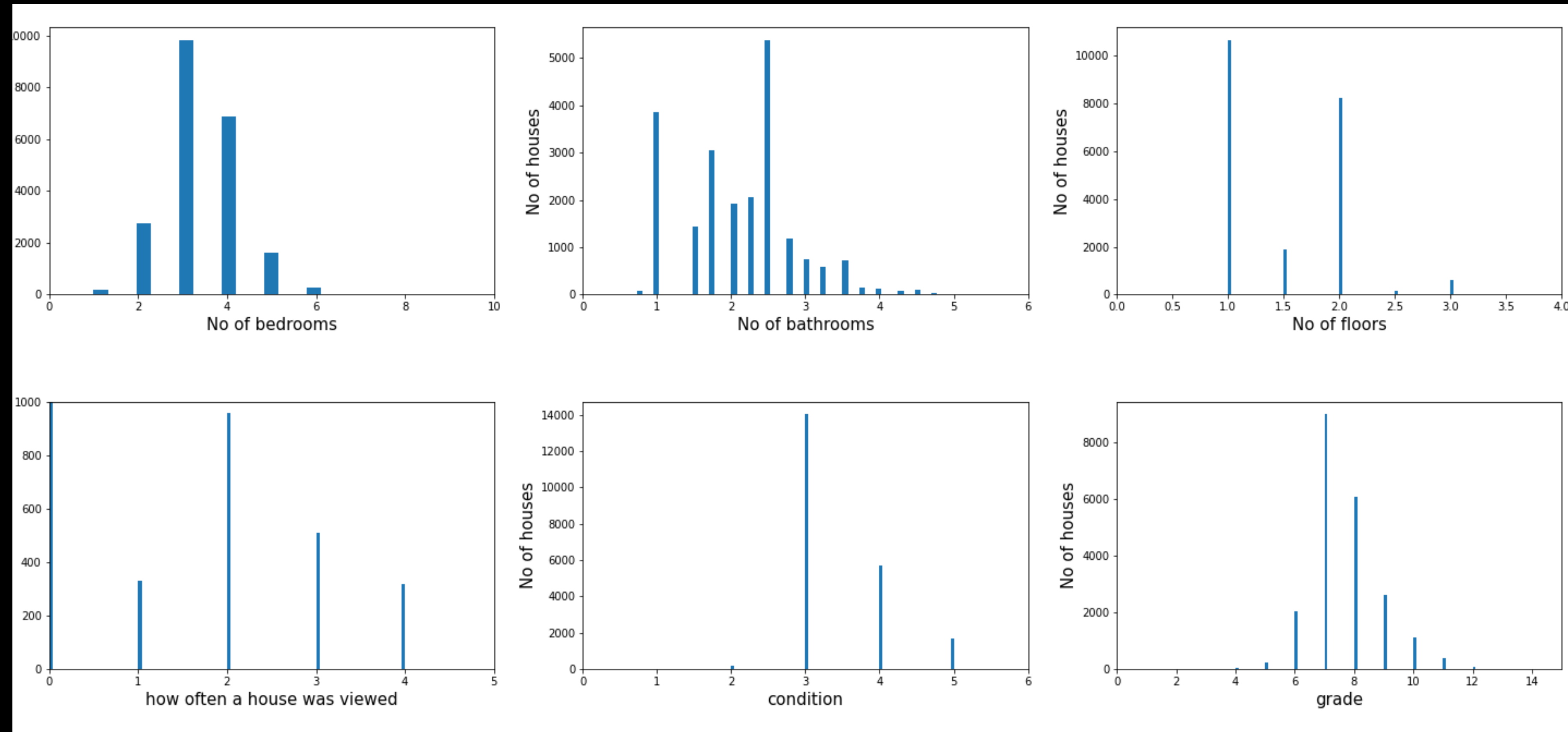


- Everything looks reasonable

- Many (19422) new houses on the market

- condition and grade show a comparable distribution

# Data overview
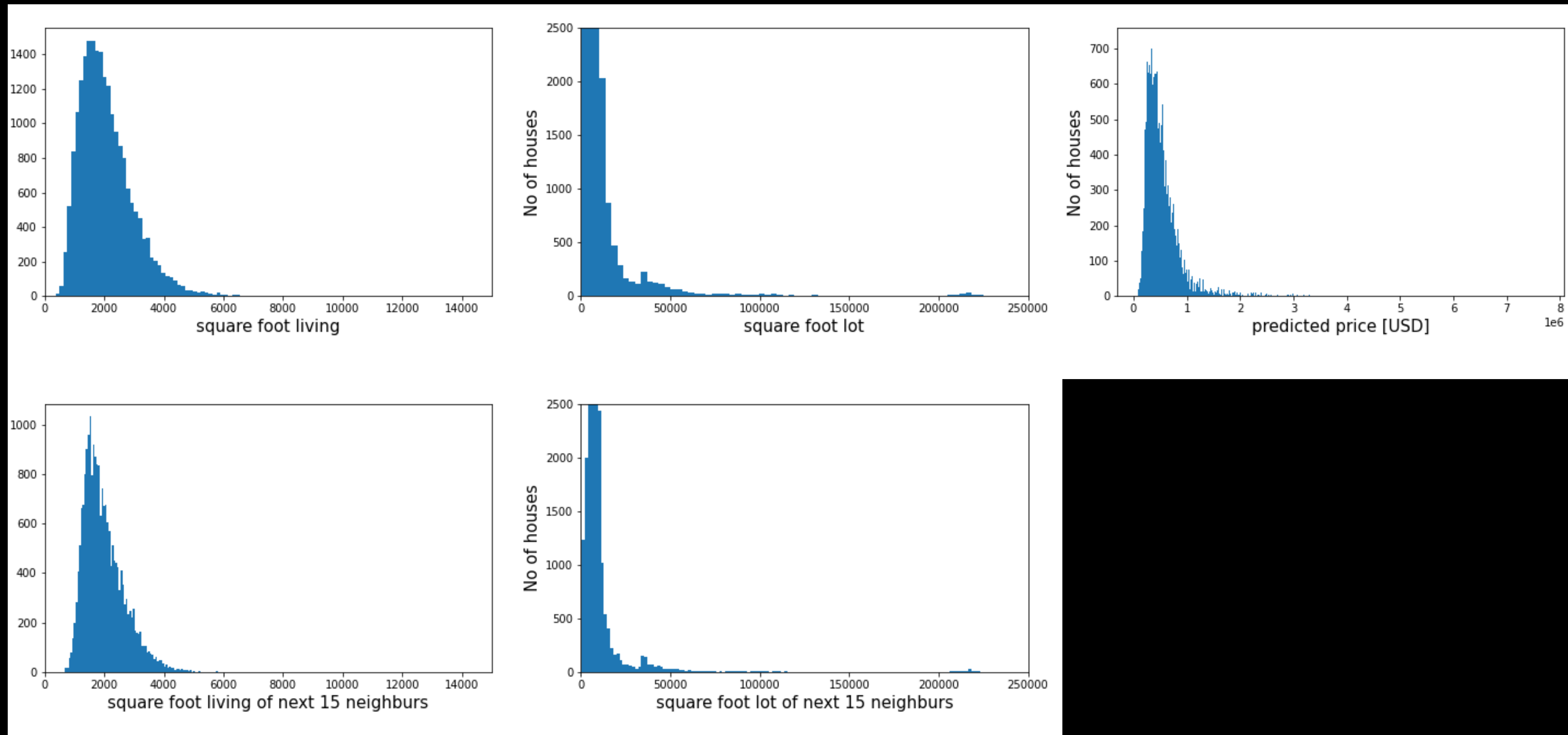## Something unexpected?



- Everything looks reasonable

- Number of new and renovated houses increases with time

# Data overview
## Something unexpected?



- Everything looks reasonable

- Comparable distribution for footages and price

- Only few really big houses / lots on the market

# Hypotheses
## General

- Increasing house price with increasing square footage of house and lot?

- Decreasing house price with increasing distance to Seattle's center?

- Higher prices for newer and renovated houses?

# Hypotheses
## for Thomas Hansen

- Cheap houses with more than 2 bathrooms and 3 bedrooms available?

- To have a nice neighborhood with many children:
  Cheap houses with large neighboring houses available?
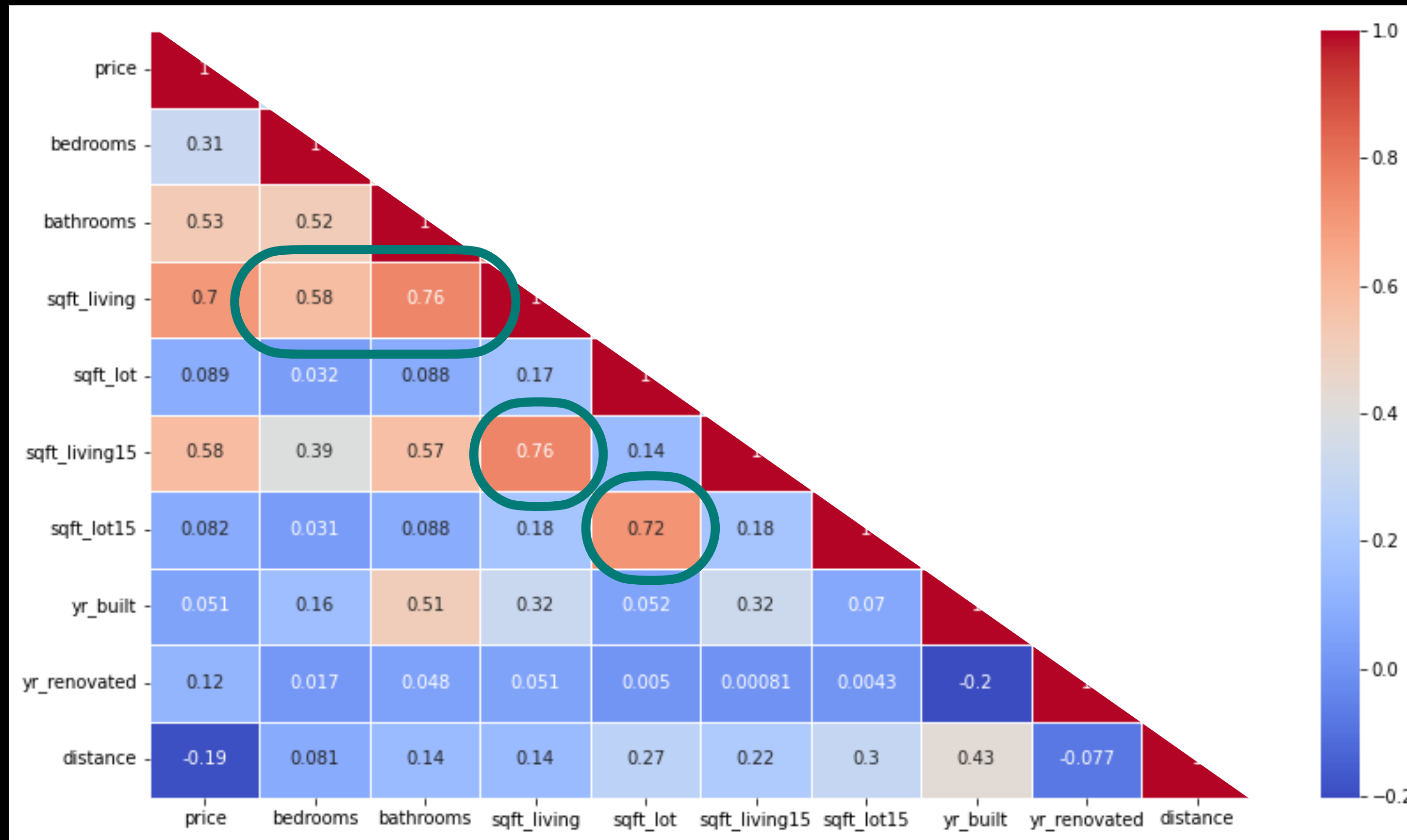
- Houses cheaper at a specific month?

# General results
## Correlation heat map
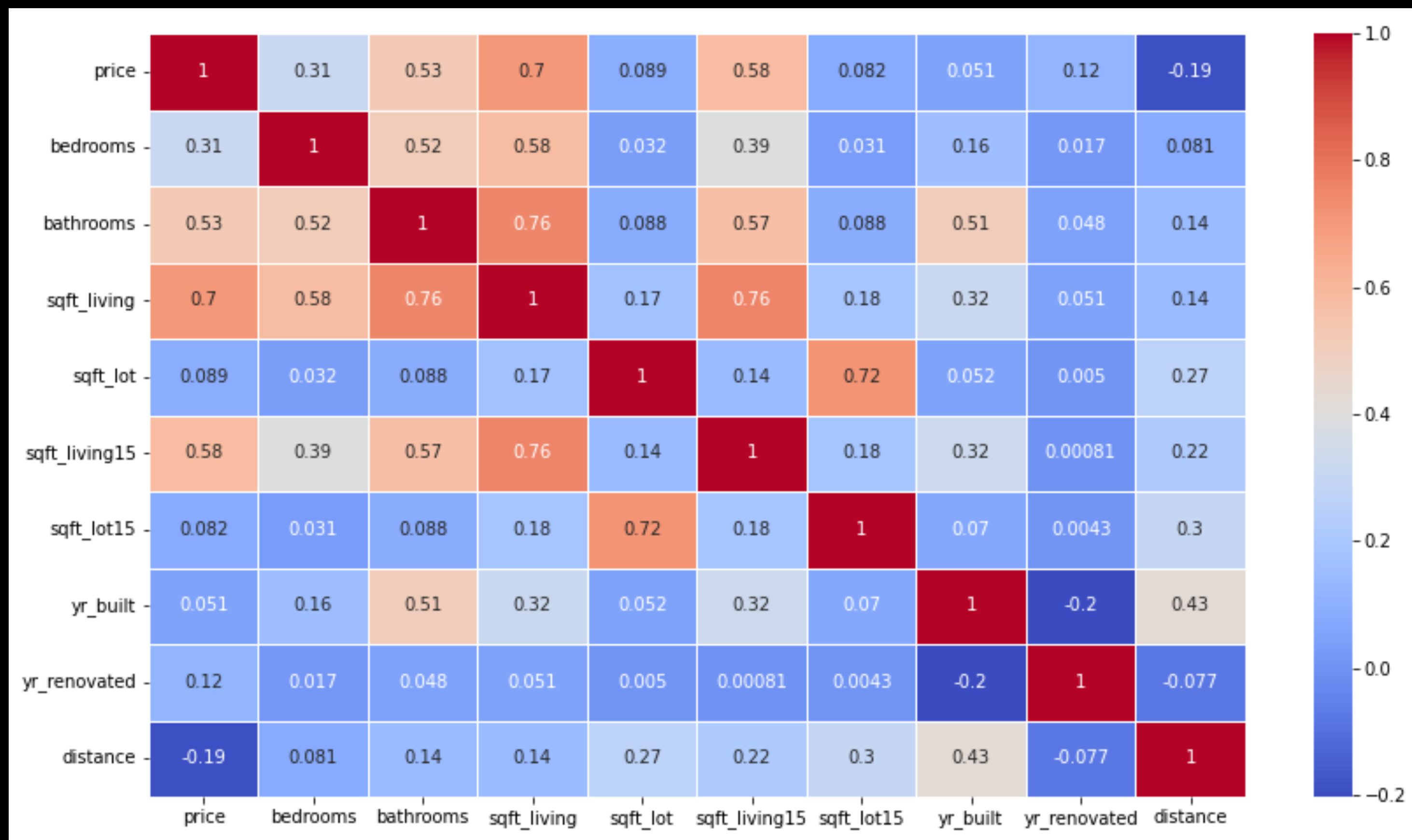
# General results
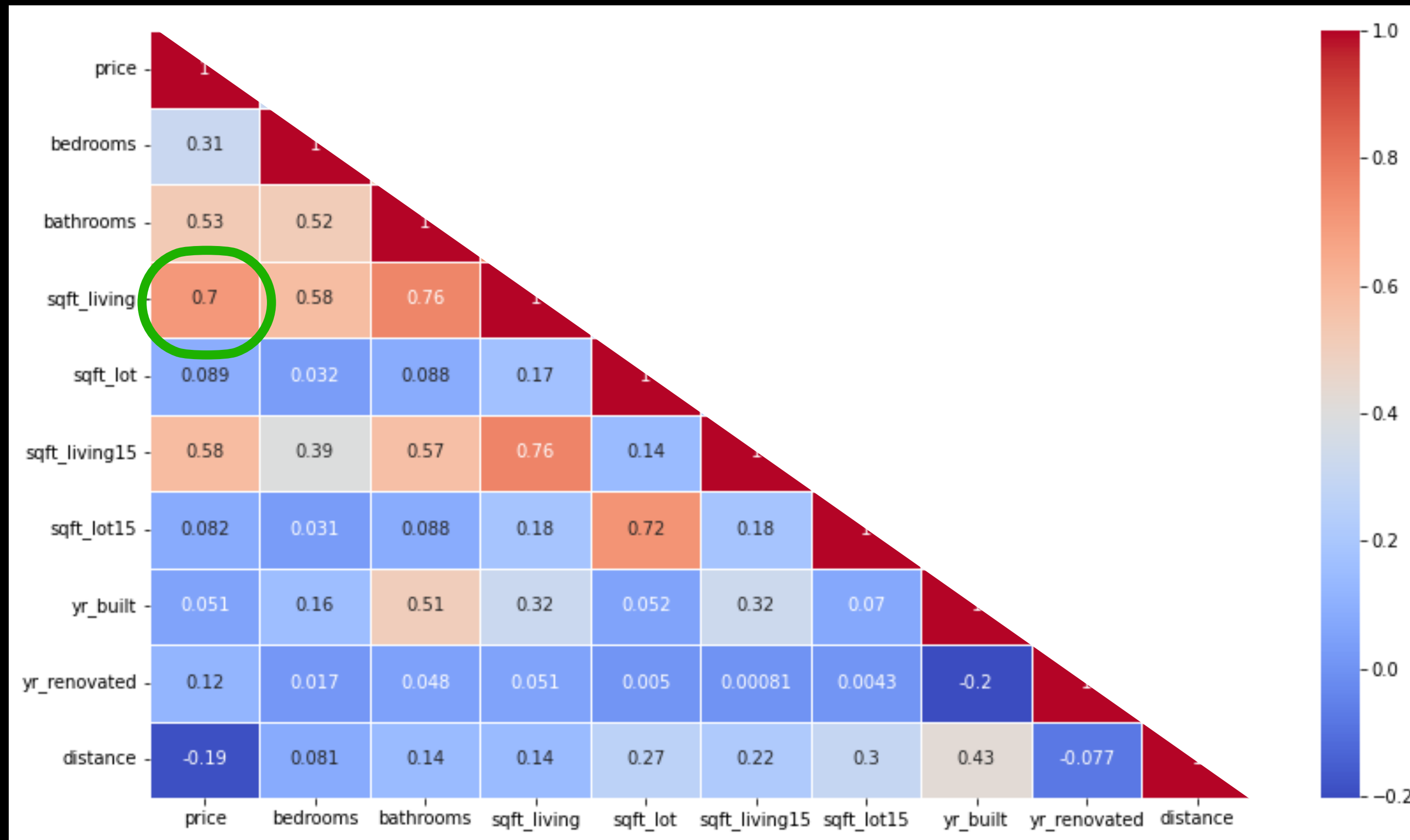
## Correlation heat map - general



- Neighborhoods seem to be uniform concerning house and lot size > maybe bad news for Thomas Hansen

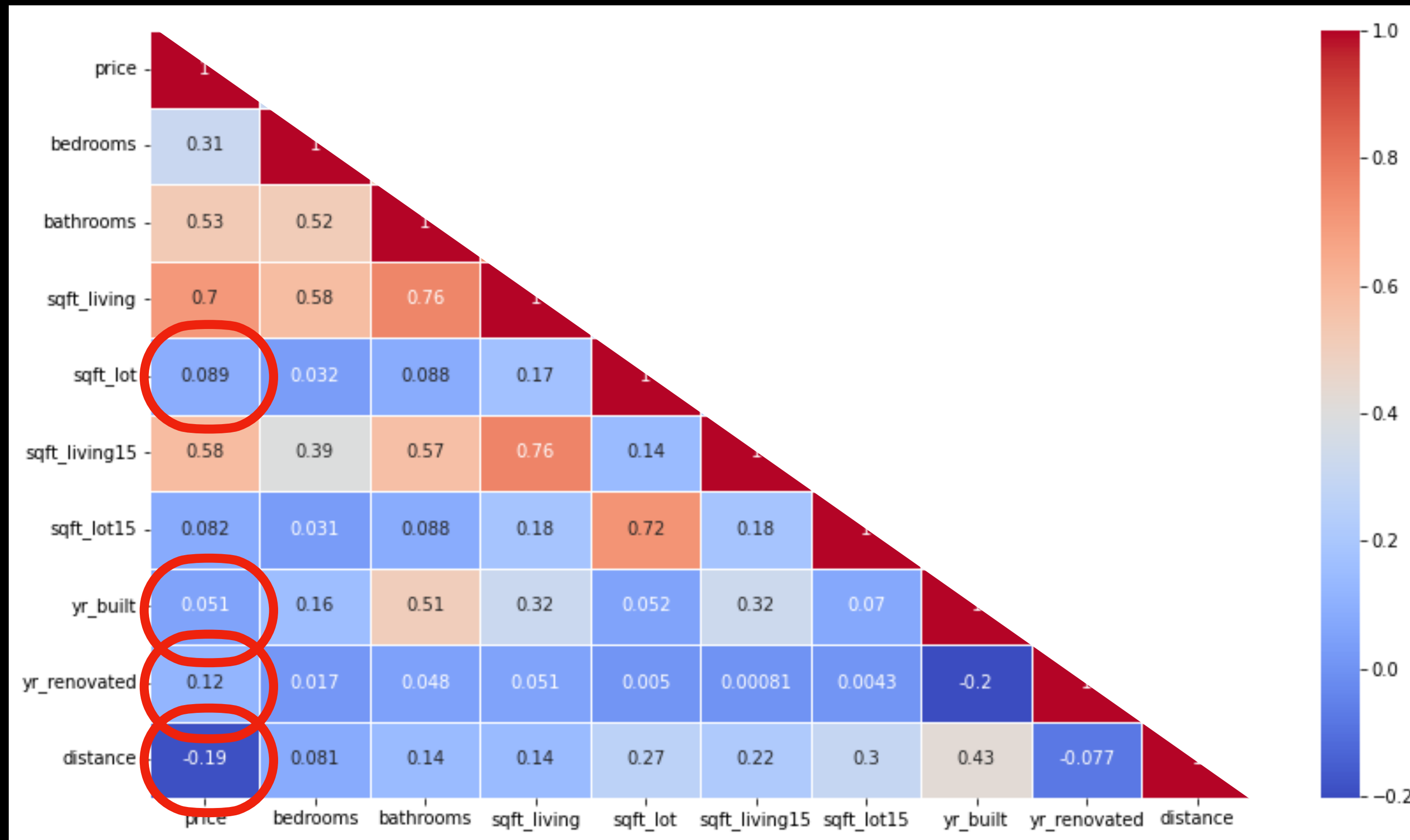- Large houses have many bed- and bathrooms

# General results
## Correlation heat map - expected



- Neighborhoods seem to be uniform concerning house and lot size
  > maybe bad news for Thomas Hansen

- Large houses have many bed- and bathrooms

- Correlation between price and footage of the house

# General results
## Correlation heat map - unexpected



- Neighborhoods seem to be uniform concerning house and lot size > maybe bad news for Thomas Hansen

- Large houses have many bed- and bathrooms

- Correlation between price and footage of the house

- No correlation between price and

  - lot size

  - distance to Seattle's center

  - year of renovation > data cleaning needed

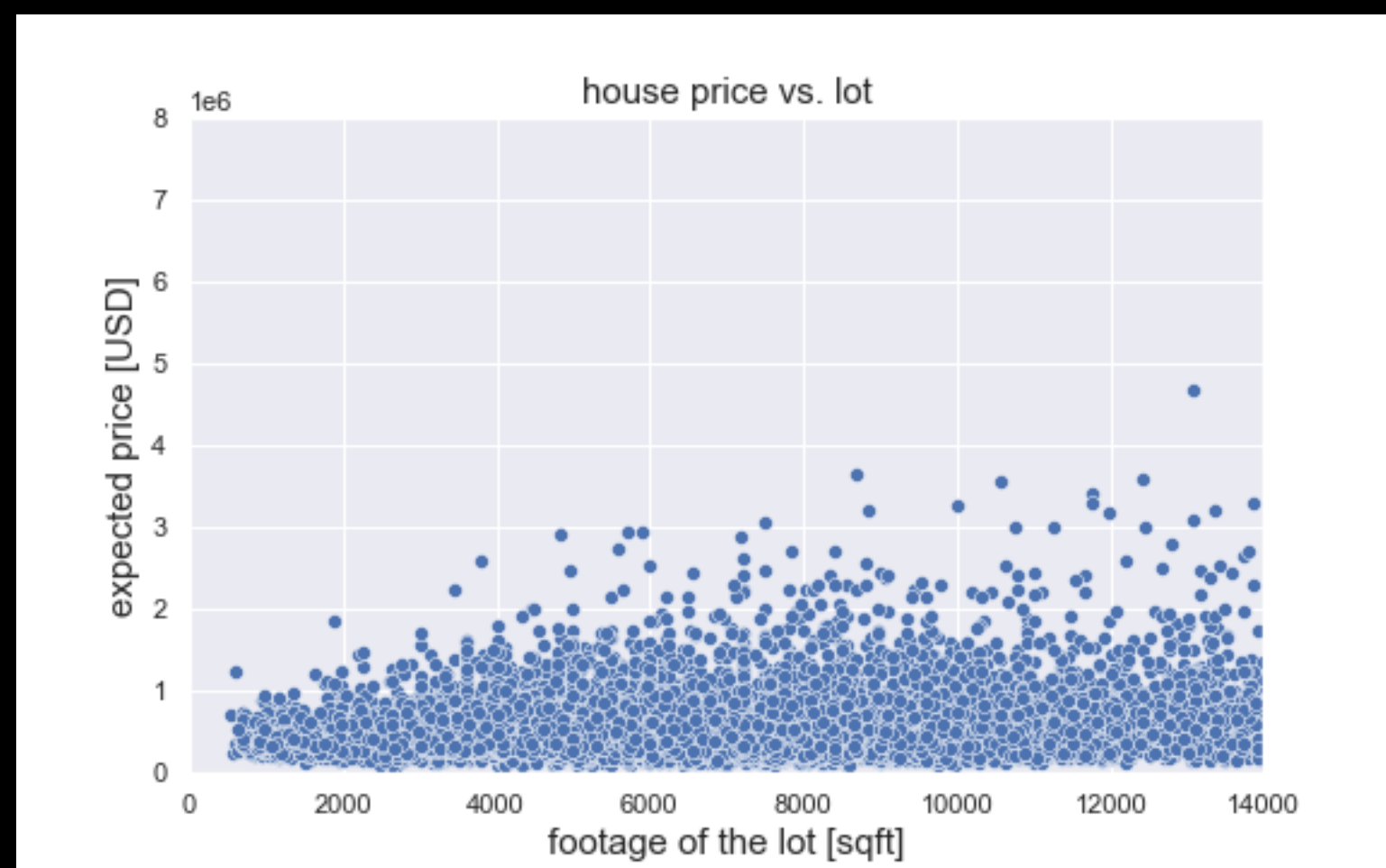  - age of the house > deeper look into the data needed

# General results - Hypothesis testing
**Increasing house price with increasing square footage of home and lot?**
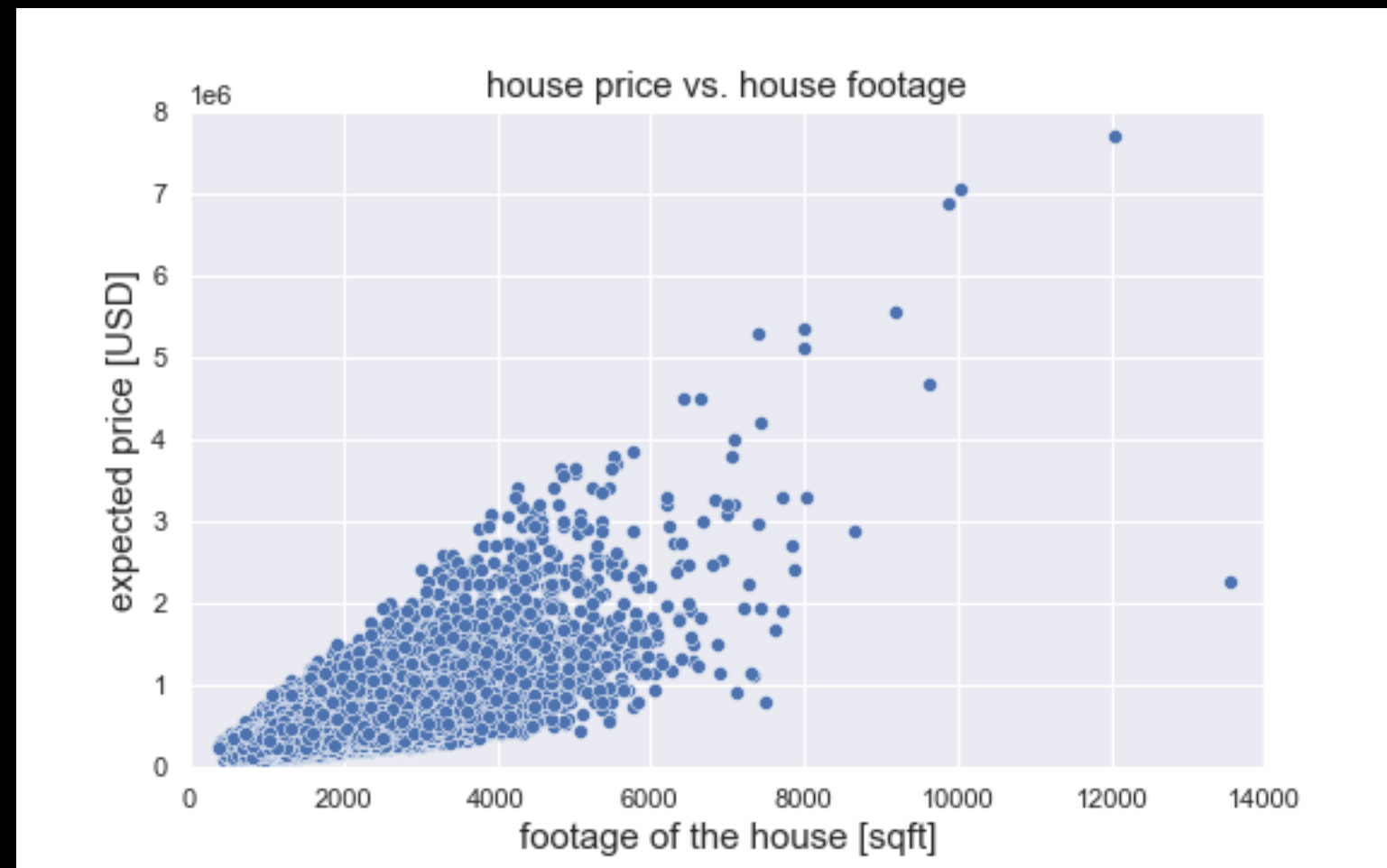


- Increasing house price with increasing house footage
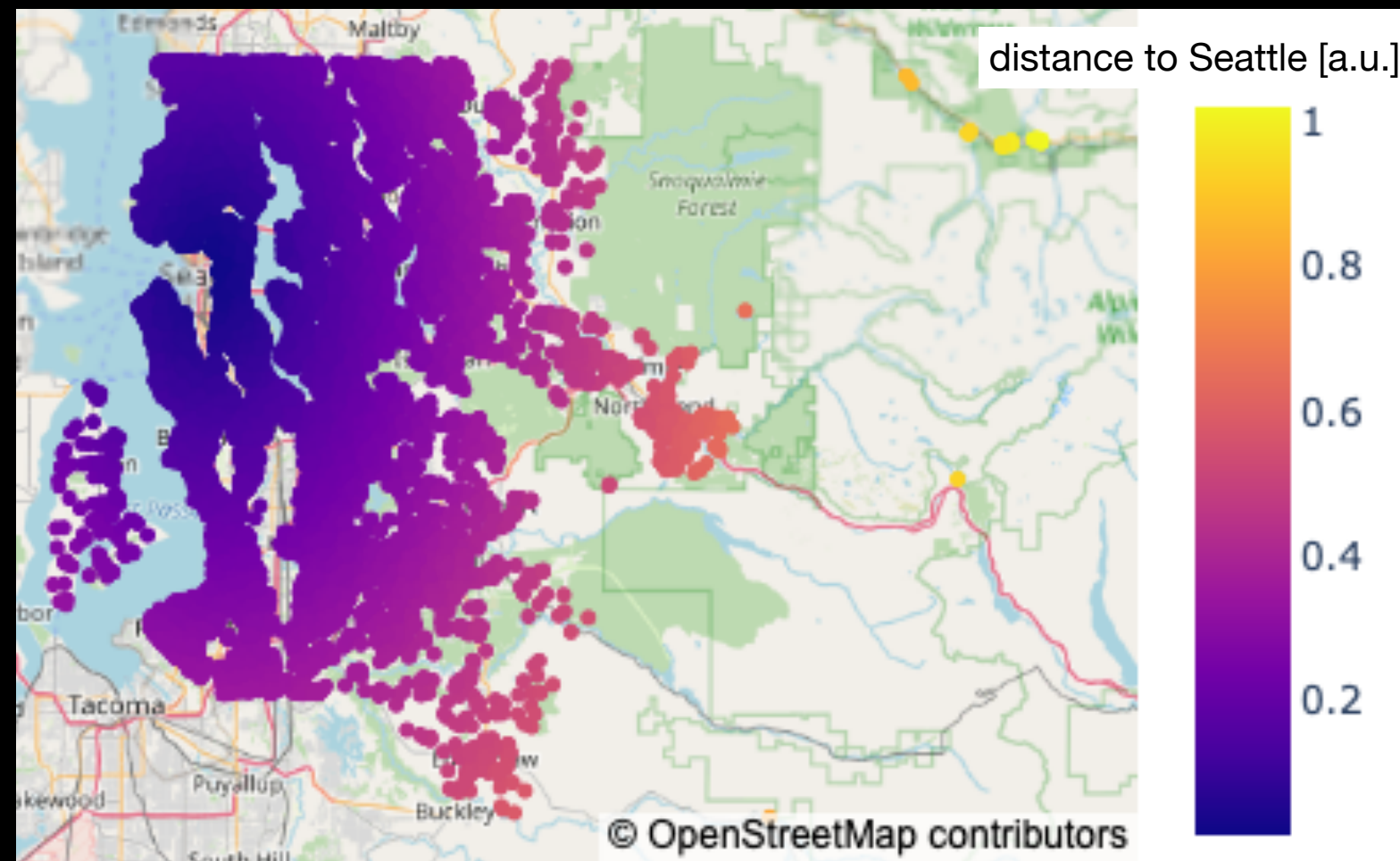
- But there are more impacts



- No correlation between price and lot footage
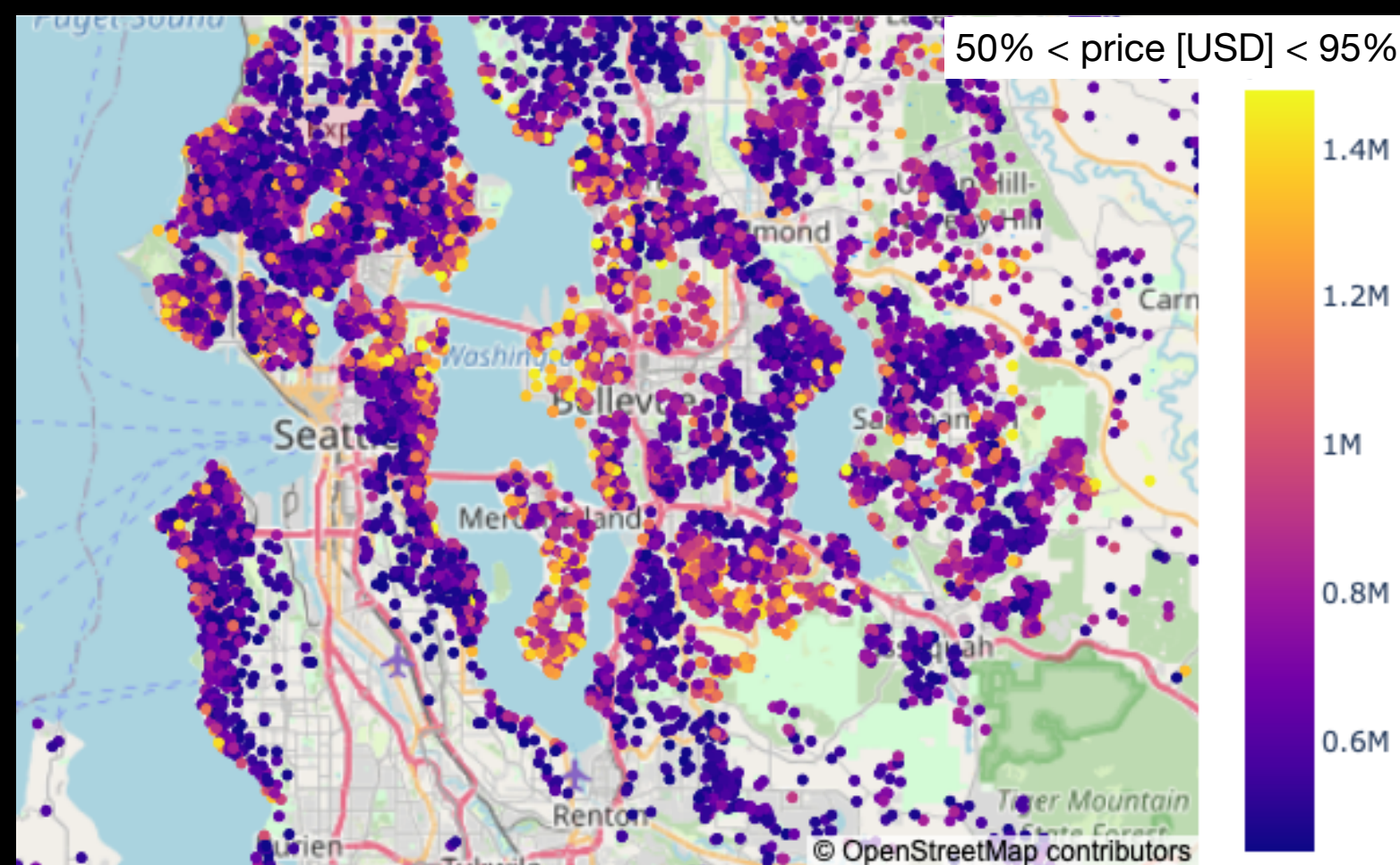
- Houses are more valuable than lots!

# General results - Hypothesis testing
## Decreasing house price with increasing distance to Seattle? ❌
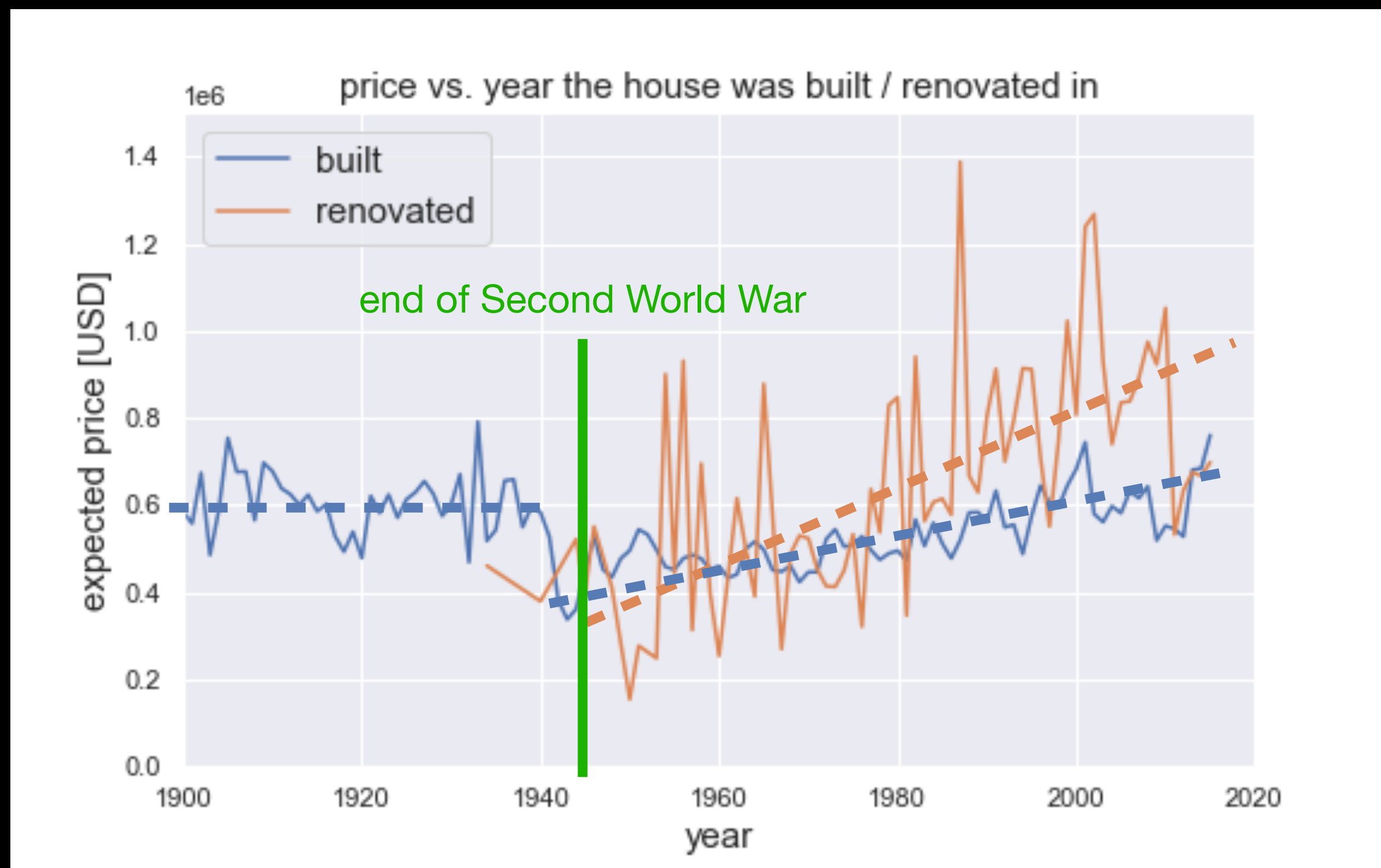


- Calculation was done properly

- Living close to the water, especially on an isle, is most expensive! ❗

# General results - Hypothesis testing
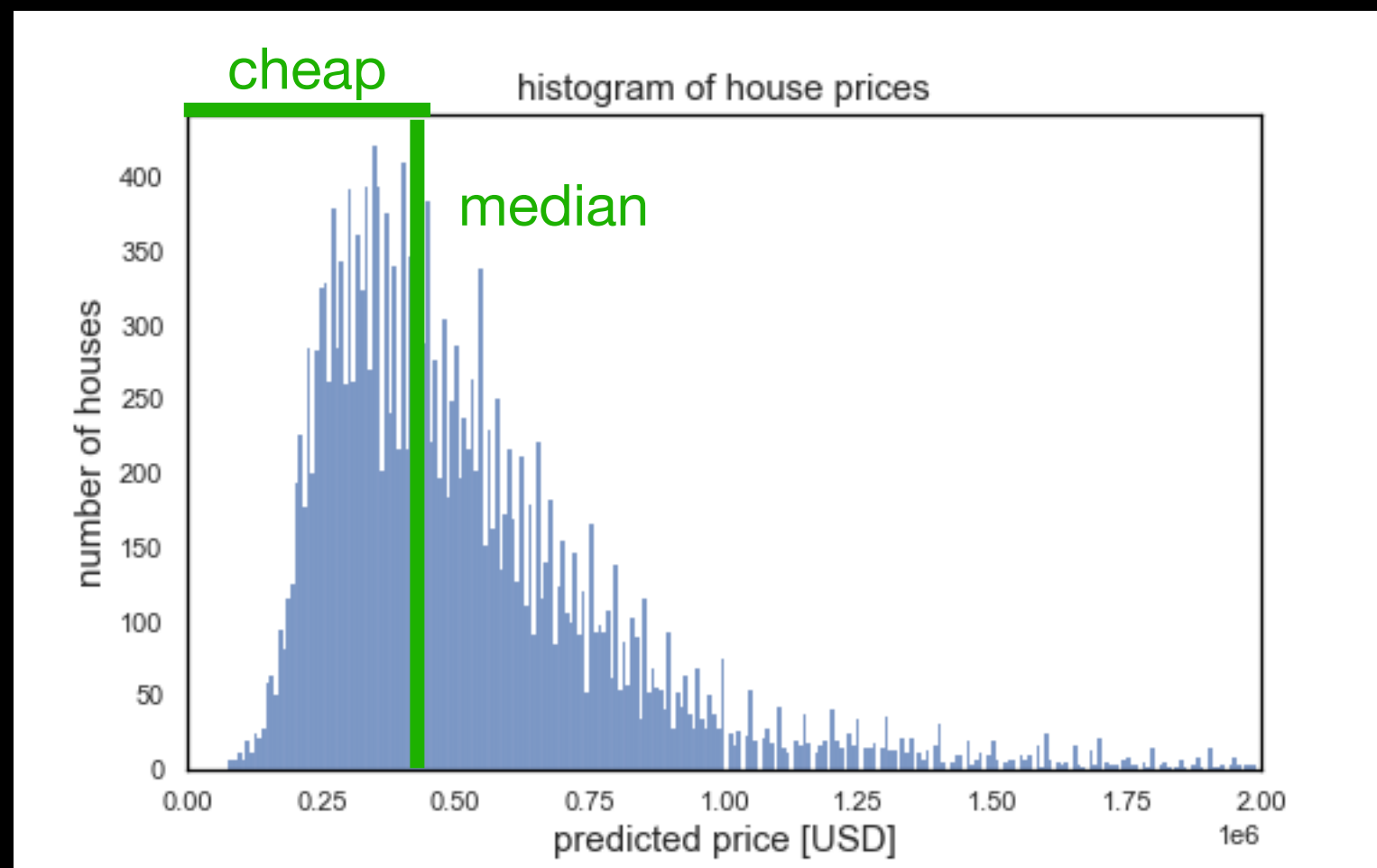## Higher prices for newer and renovated houses?



- After Second World War: increasing prices with increasing year the house was built and renovated, respectively

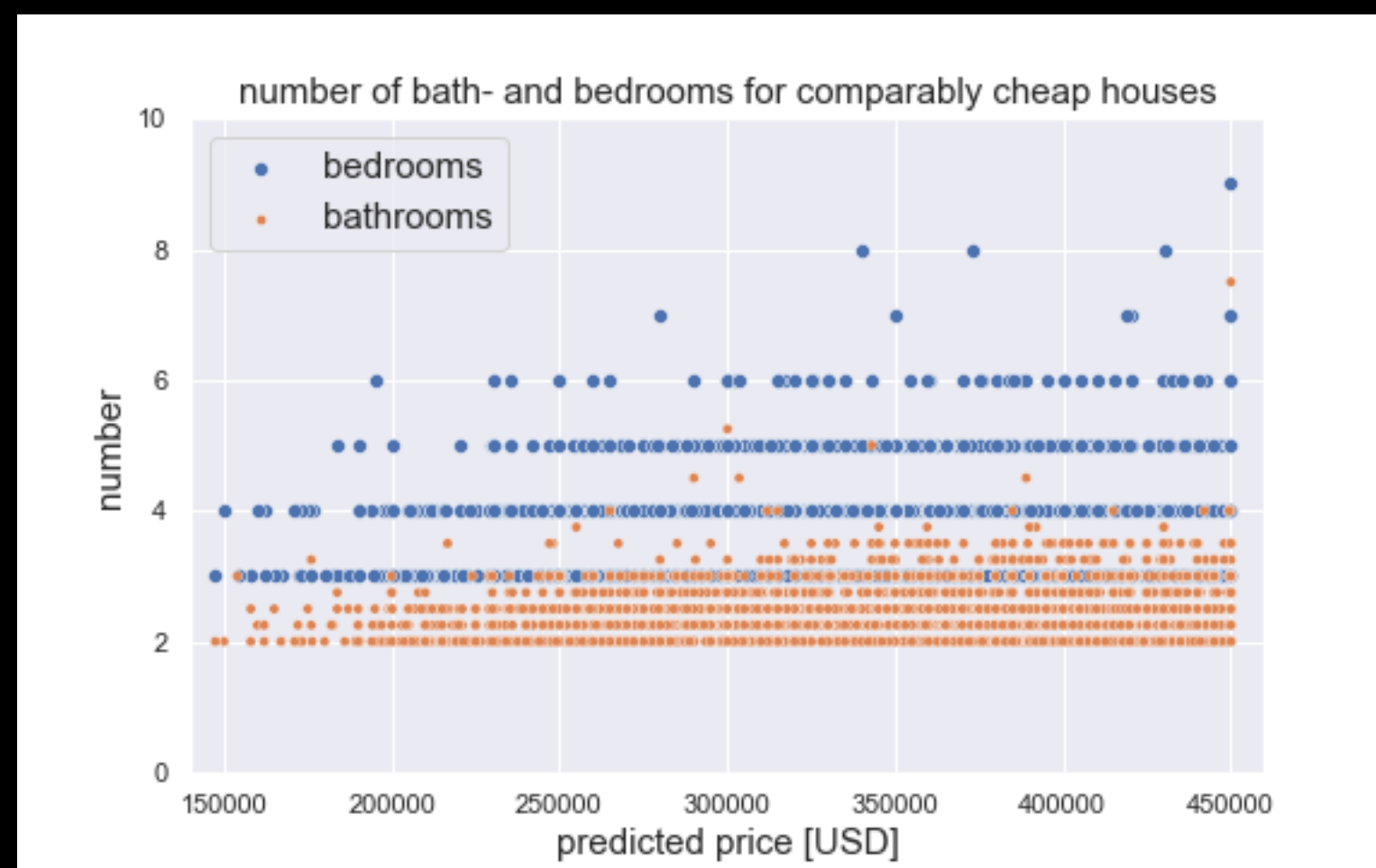- Old houses (built before 1945) achieve continuously high prices!

# Insights and recommendations for Thomas Hansen

## Cheap houses with more than 3 bedrooms and 2 bathrooms?



- Overall price range for houses in King County: (78.000 - 7.770.000) USD

- Price histogram is right skewed

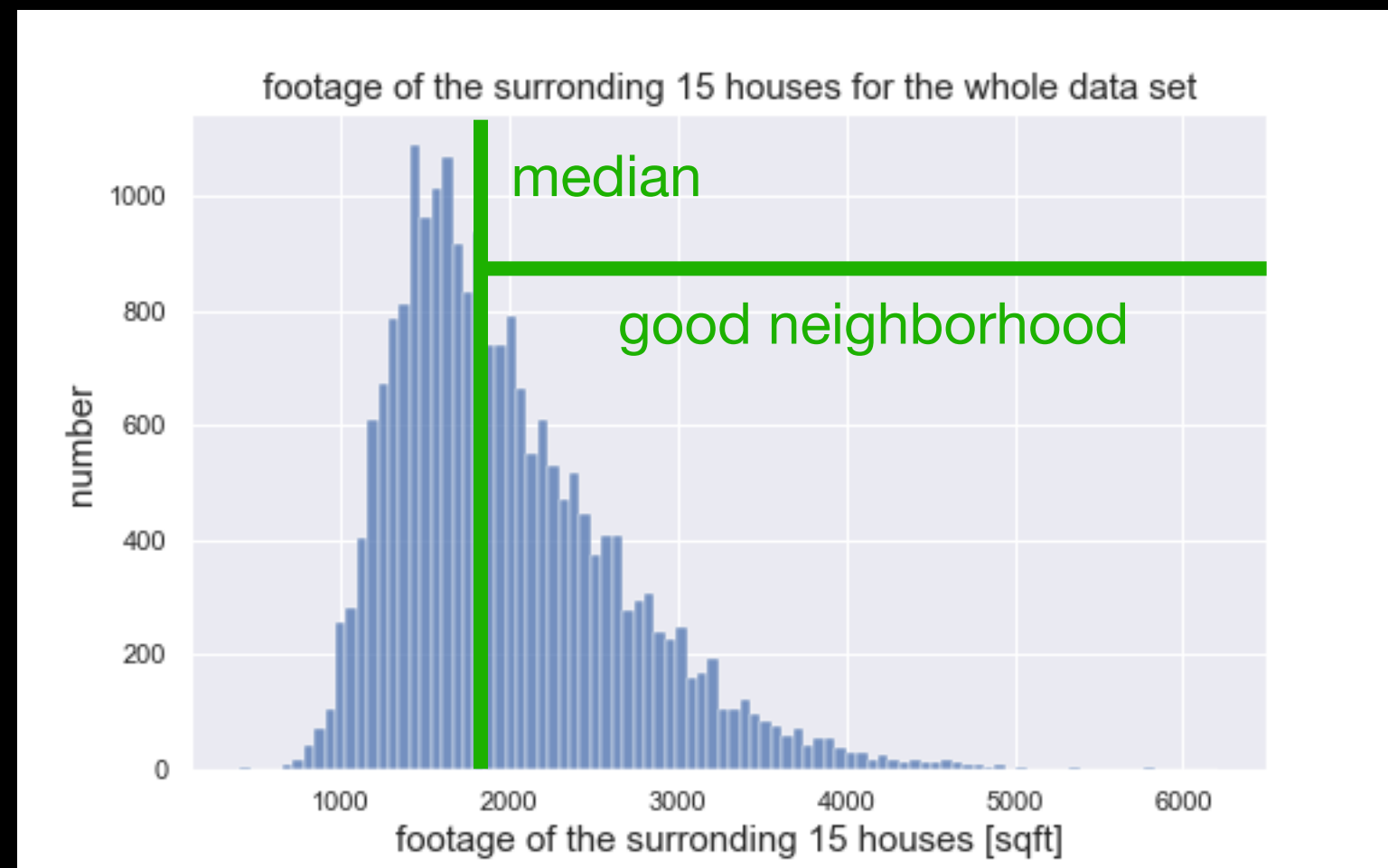-> Focus on prices below median (450.050 USD) to keep a large selection

- 4650 comparable cheap houses with at least 3 bedrooms and 2 bathrooms available ✔
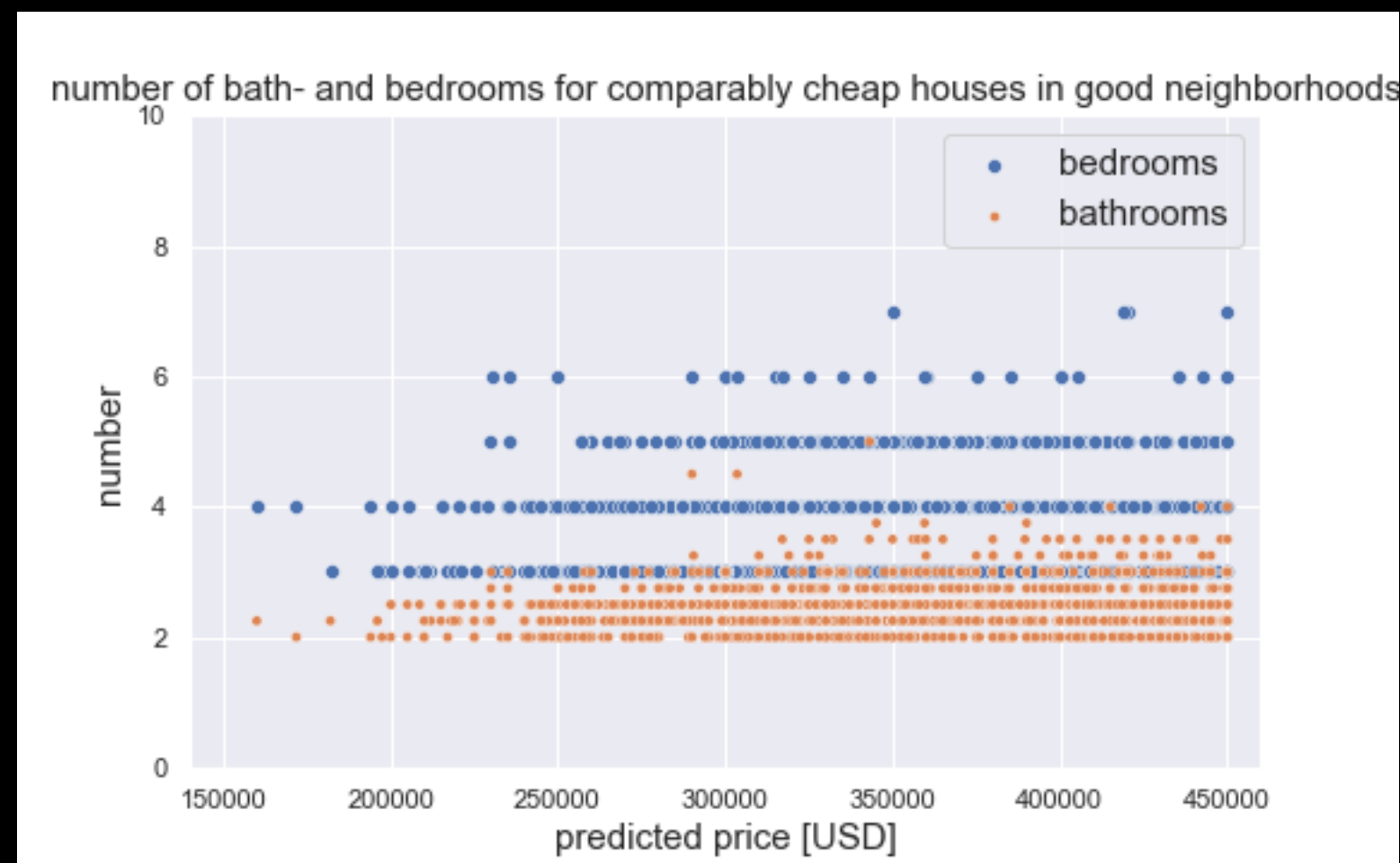
# Insights and recommendations for Thomas Hansen

## Cheap houses with good neighborhood?



- Overall footage of surrounding 15 houses: (399 - 6.210) sqft

- Price histogram is right skewed

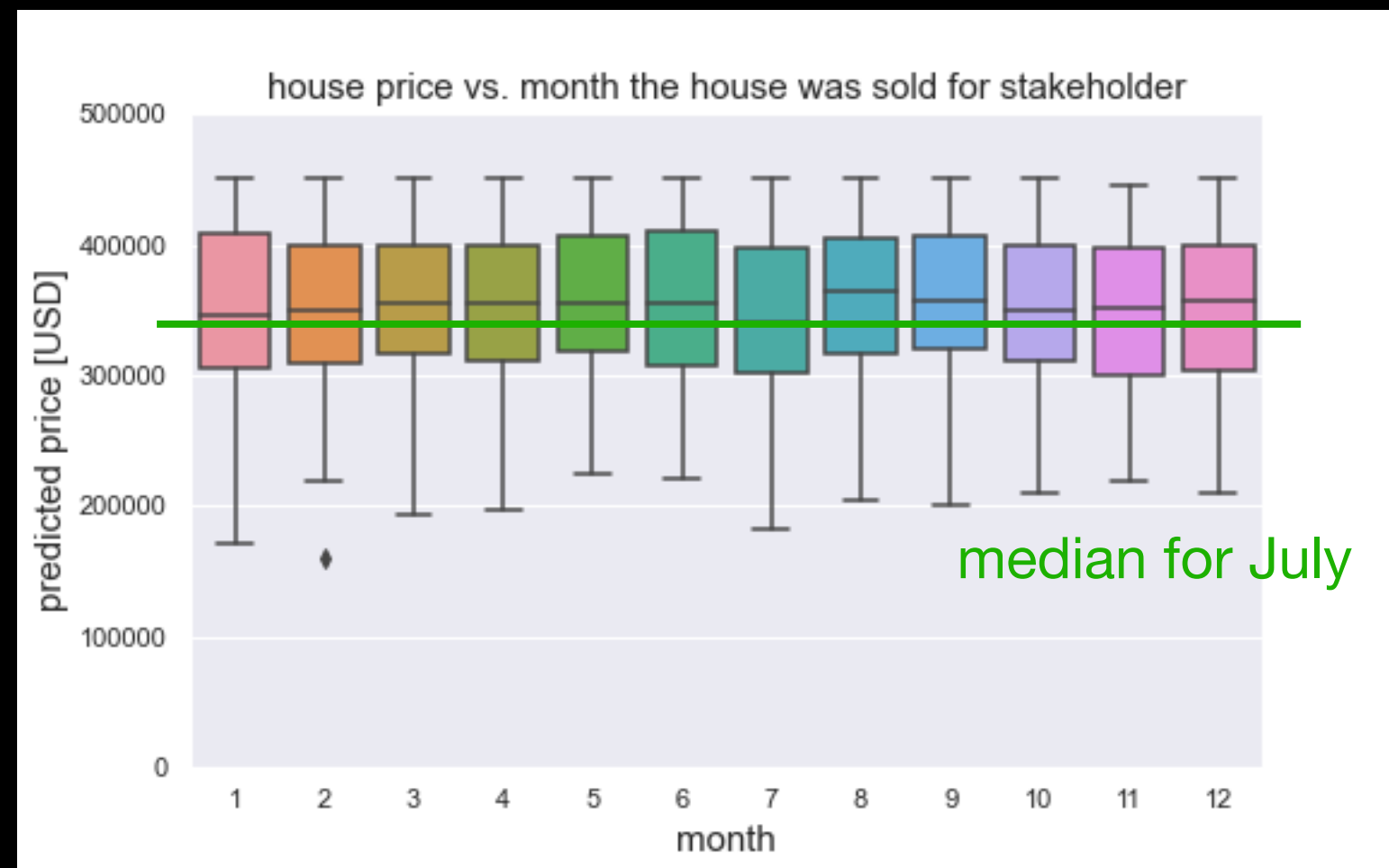-> Focus on footages above median (1.840 sqft) to have an extraordinary good neighborhood

- 2364 comparable cheap houses with at least 3 bedrooms and 2 bathrooms available in a good neighborhood

- But less really cheap houses

# Insights and recommendations for Thomas Hansen

## When to buy?



house price vs. month the house was sold for stakeholder

median for July

- Small impact of season on house price

-> Buy in July or January

# Summary

## General

- House prices depend on footage of the house, not of the lot

- House prices depend on closeness to water, not to Seattle's center

- Newer, renovated and very old houses are more expensive

## Thomas Hansen

- 4650 houses for comparable prices with at least 3 bedrooms and 2 bathrooms

- 2321 of these houses have a good neighborhood with presumably many children

- Buy in January or July is recommended