Housing Construction Recommendation

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Overview

Current Trend 2020-2021
Millennials are taking the housing market by storm.

Facts
- 48% aged 25-35 currently own their home, ¼ purchased a property during COVID-19 pandemic*

- Historically low mortgage rate*

- Millennials moving from cities to suburb*

Dataset Used
Ames, IA residential properties sold from 2006 to 2010

Objective

The WHY's

How do we, as a real estate developer company, take advantage of this trend to maximize our sale price?

Objective

- This project aims to identify the top 5 areas to prioritize when constructing our blueprints & the new houses to stand out from our competitors

- Maximize sale price

- Targeted Demographic: Millennials (Age 25-35)

```
bsmt_full_bath       0.265240
half_bath            0.265973
garage_qual          0.268746
lot_area             0.307944
mas_vnr_type         0.309310
wood_deck_sf         0.317351
bsmtfin_type_1       0.320017
open_porch_sf        0.334210
bsmt_exposure        0.407503
bsmtfin_sf_1         0.407623
garage_type          0.410072
heating_qc           0.438726
fireplaces           0.458081
mas_vnr_area         0.508712
totrms_abvgrd        0.512327
fireplace_qu         0.527627
year_remod/add       0.535276
full_bath            0.543535
garage_finish        0.547285
year_built           0.560386
total_bsmt_sf        0.625281
1st_flr_sf           0.628322
garage_cars          0.648644
garage_area          0.649373
bsmt_qual            0.674195
kitchen_qual         0.684225
gr_liv_area          0.699348
exter_qual           0.705936
overall_qual         0.794754
saleprice            1.000000
Name: saleprice, dtype: float64
```

Topic 1 - Correlation

Observation - High Correlation

(Features & Sale Price)

- Positive Correlated (> 0.5):

  - Masonry Veneer Area, Total Room Above Grade, Fireplace Quality, Year Remodel, Full Bath Above Grade, Garage Finish, Year Built, Total Basement sq, 1st Floor sq, Garage Cars, Garage Area, Basement Quality, Kitchen Quality, Above Ground Living Area sq, External Quality, & Overall Quality

- Negative Correlated (< -0.5):

  - Closest is Foundation (-0.49)

```
bsmt_full_bath      0.265240
half_bath           0.265973
garage_qual         0.268746
lot_area            0.307944
mas_vnr_type        0.309310
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exter_qual          0.705936
overall_qual        0.794754
saleprice           1.000000
Name: saleprice, dtype: float64
```

Topic 1 - Correlation

Observation - Low Correlation

(Features & Sale Price)

- Positive Correlated (< 0.5):
  - Fireplaces or not (0.46), Heating Quality, Garage Type, Basement Finished sq, Basement Exposure, Open Porch sq, Basement Finished Type, Wood Deck sq, Masonry Veneer Type, Lot Area, Garage Quality, # of Half Bath, Basement Full Bath (0.27)... etc.

- Negative Correlated (> -0.5):
  - Lot Shape (-0.29), Fence, Land Contour, Neighborhood, Enclosed Porch, Exterior Conditions, Overall Condition, Lot configuration, # of Kitchen above ground, Roof Materials, Basement half bath, building type (-0.04)
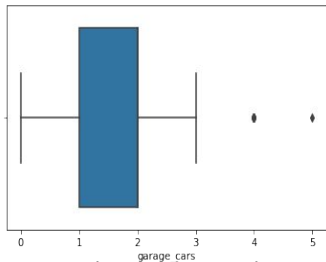
Topic 2 - Building our model
(with the highest correlation)

Top 16 Features

- Positive Correlated (> 0.5):
  - Masonry Veneer Area, Total Room Above Grade, Fireplace Quality, Year Remodel, Full Bath Above Grade, Garage Finish, Year Built, Total Basement sq, 1st Floor sq, Garage Cars (0.65), Garage Area (0.65), Basement Quality, Kitchen Quality (0.68), Above Ground Living Area sq (0.70), External Quality, & Overall Quality

Drop / Add Features

- Drop
  - Garage Area

- Add
  - Garage Cars * Kitchen Quality (0.78)
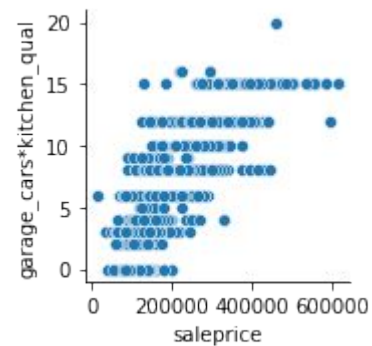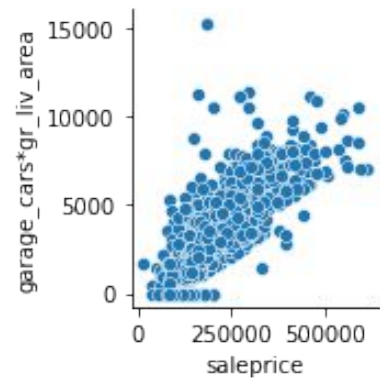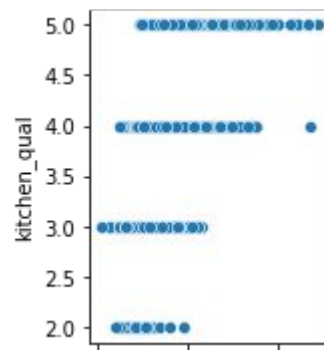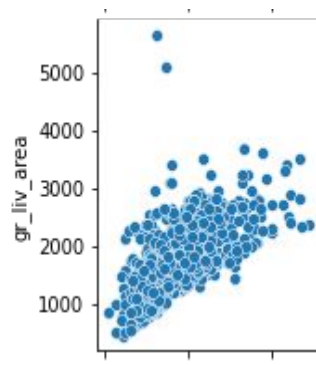 - Garage Cars * Above Ground Living Area (0.80)
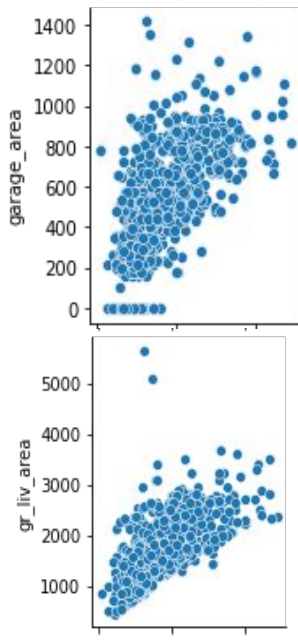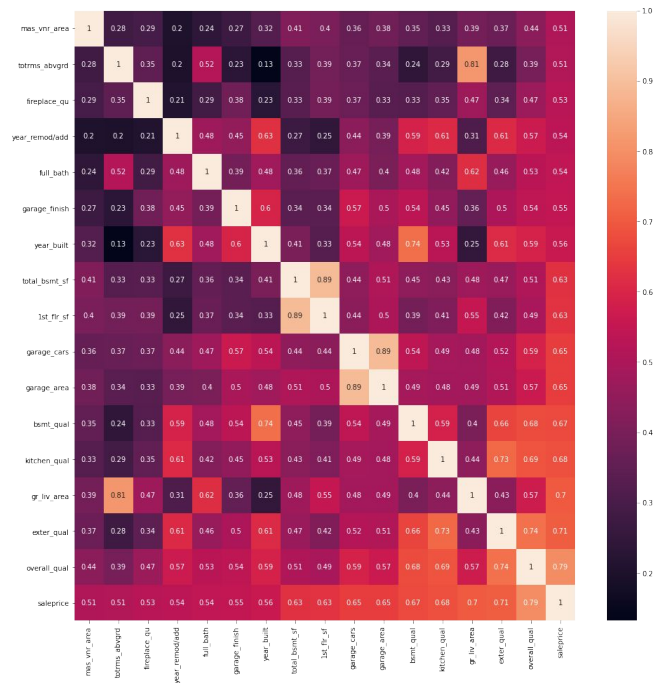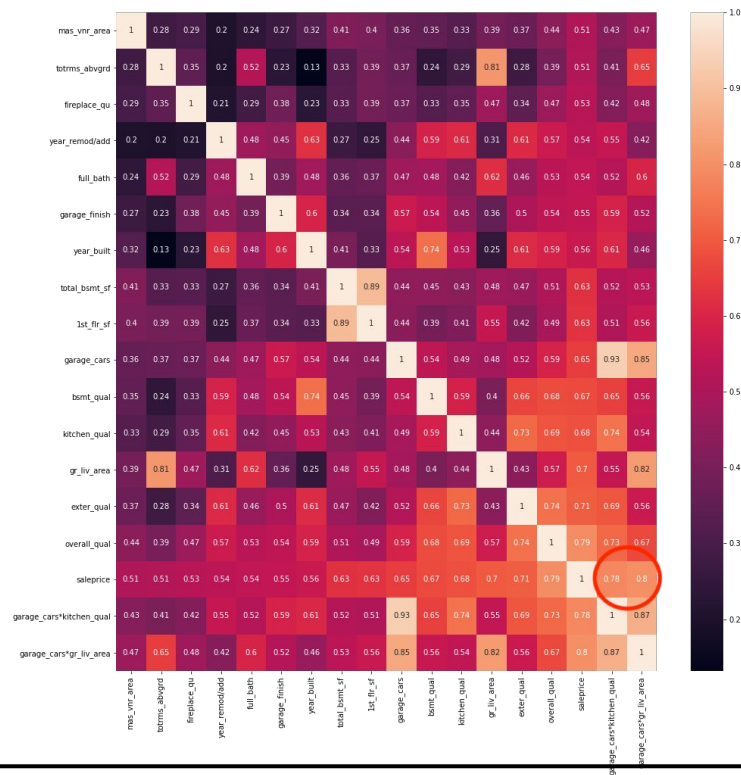
Fig 1. Top 16 Features

Fig 2. Top 16 Features + 2 Additional Polynomial Features

Topic 3 - Model Performance
(in predicting the sale prices)

Model Performance

83.0%

R2 score for Train Data

Model Performance

80.0%

R2 score for Train Data using 5-fold cross validation

Model Performance

85.0%

R2 score for Test Data

Model Performance

85.0%

R2 score for Test Data using 5-fold cross validation

Conclusion

Prioritization areas

Top 5 Features

1. Kitchen Quality
2. Garage Finish
3. Fireplace Quality
4. # of Full Bathroom (above ground)
5. # of Rooms (above ground exl. bathroom)

Size Features

- Size of ==Living Area== above ground (in square feet)
- Size of ==Garage Area== (in square feet)

Conclusion

In order to maximize sale price of our newest project, it's best to choose a suburb area that we can maximize above ground living area and garage area sizes. In addition, put emphasis on *kitchen quality*, *garage finish*, *fireplace quality*, *the numbers of full bathrooms*, and *the numbers of total rooms above ground*. This should put us above our competitors while increasing Sale Price and, thus, our total revenue.
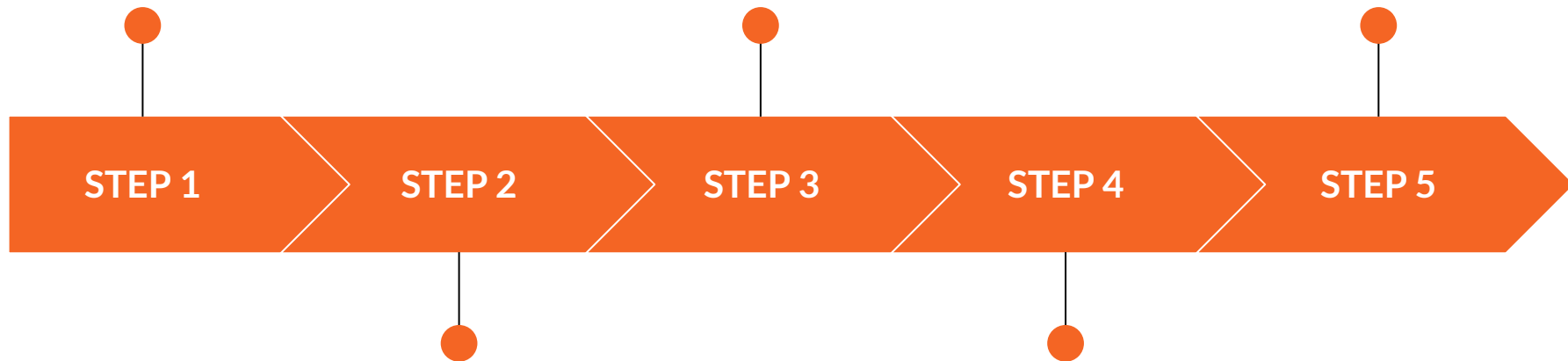
False Combination: Big Yard Size + Small House

Planning Process

Create a blueprint that maximize above ground living area & garage area of the lot size.

Determine a budget that optimize the kitchen quality

Depending on the demand, set your sale price 5-10% higher than your competitors

STEP 1   **STEP 2**   **STEP 3**   **STEP 4**   **STEP 5**

Determine the optimal blueprint to maximize the number of full bathrooms and rooms above ground

Pay attention to garage finish, & fireplace quality

Sources:

Ames Housing Data

(http://jse.amstat.org/v19n3/decock/DataDocumentation.txt)

Quicken Loans - 'What do Millennials look for in a home? A seller's guide'

(https://www.quickenloans.com/learn/what-do-millennials-look-for-in-a-home-a-sellers-guide)

Global News - 'How the pandemic pushed Canadian millennials to home ownership'

(https://globalnews.ca/news/7662252/cda-millennials-homes-real-estate-pandemic/)