Ames, IA Home Sale Prices: A Prediction Model

A Special Presentation for IOAWANAHOME
10/10/2020

The Goal - Sale Price Prediction

The Iowa Neighbor's Association of Homes (IOWANAHOME):

- Regional Realty Group
- Provided historical data from their extensive library of listings
- Requested model that predicts sale price in Ames with a focus on key categorical features and how zoning/geography may or may not affect home prices

Looking Ahead

- Numerical Features
  - Correlation Heatmap
- Categorical Features
  - Neighborhood
  - External Condition
  - Heating
  - Kitchen
  - Zoning
- Conclusion

Feature	Ten Highest Coefficients (rounded to 2 decimals)
Floating Village Zone	0.32
Res Low Density Zone	0.30
Res High Density Zone	0.30
Res Medium Density Zone	0.28
Good/Excellent Exterior	0.21
Excellent Kitchen	0.19
Steam Heating	0.19
Forced Air Heating	0.18
Typical/Average Exterior	0.17
Stone Brook Neighborhood	0.14

Numerical Features

- Easiest to model immediately and get an initial sense of the data (no dummies required)
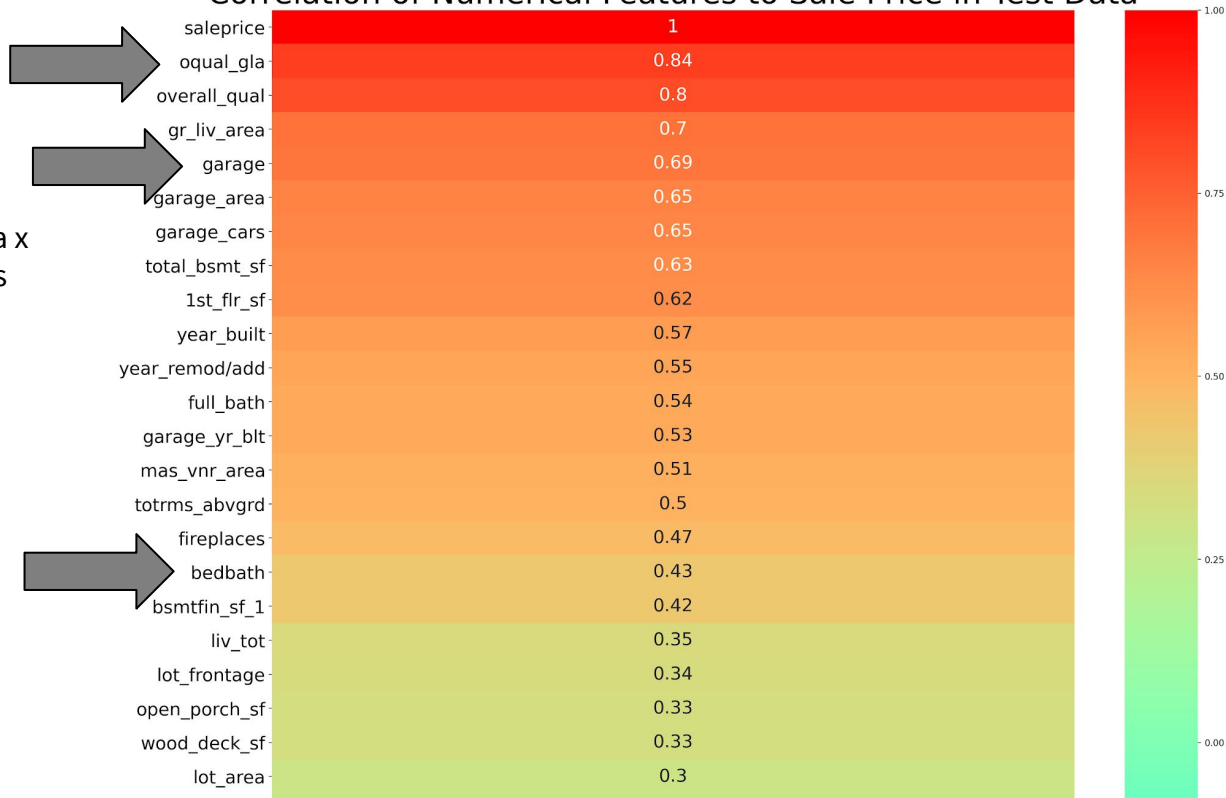

- Readily available (39 numerical features)

"Taking the Temperature"

‘Overall Quality’ x ‘Above Grade Living Area’

Garage Area x Garage Cars

(Half Bath + Full Bath) / Bedrooms Above Grade

Correlation of Numerical Features to Sale Price in Test Data

| Feature	Correlation
saleprice	1
oqual_gla	0.84
overall_qual	0.8
gr_liv_area	0.7
garage	0.69
garage_area	0.65
garage_cars	0.65
total_bsmt_sf	0.63
1st_flr_sf	0.62
year_built	0.57
year_remod/add	0.55
full_bath	0.54
garage_yr_blt	0.53
mas_vnr_area	0.51
totrms_abvgrd	0.5
fireplaces	0.47
bedbath	0.43
bsmtfin_sf_1	0.42
liv_tot	0.35
lot_frontage	0.34
open_porch_sf	0.33
wood_deck_sf	0.33
lot_area	0.3

Categorical Considerations

- Harder to identify which will have relevance
- Harder to interpret Null or low quantity entries
- Often require "dummification" to model properly

Reimagining Neighborhood Categorization

Median Sale Price by Neighborhood
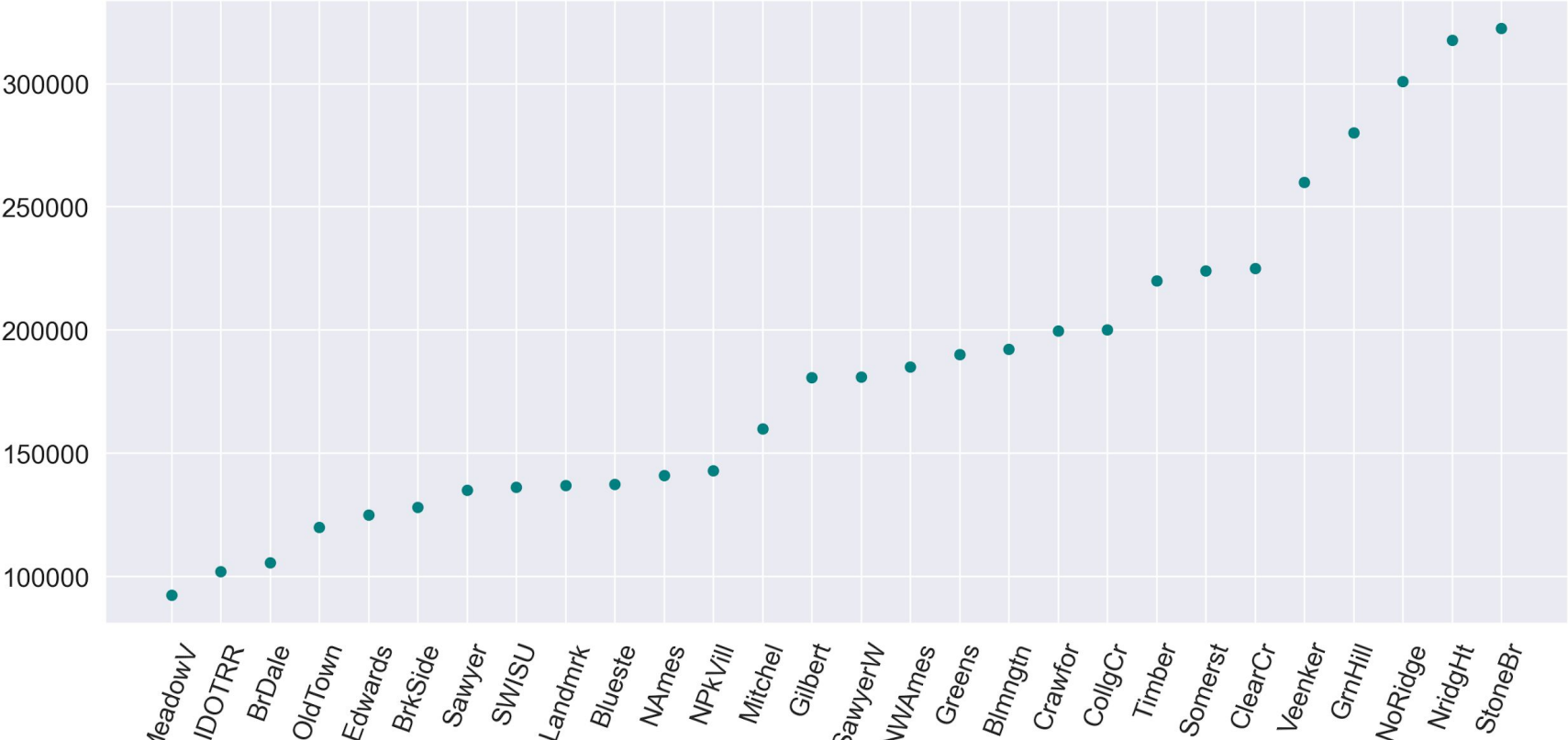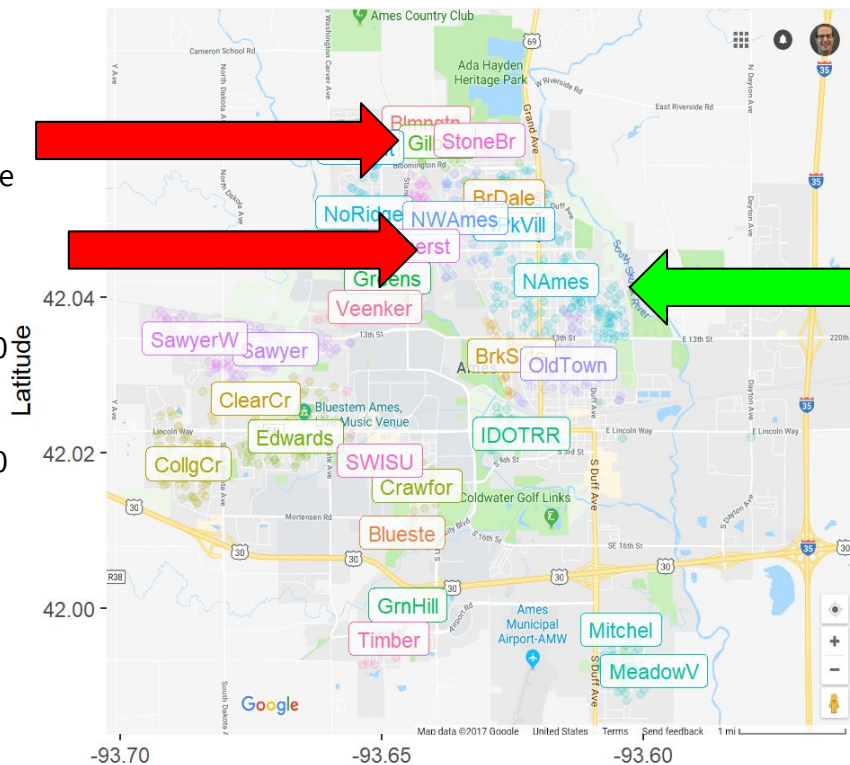
Geographic Proximity != Similar Pricing

Stone Brook*(x38):
Median Sale Price
$322,450

Gilbert(116): Median Sale
Price $180,750

North Park Villa (x17):
Median Sale Price $143,000

Northwest Ames(x87):
Median Sale Price $185,000

North Ames(x310):
Median Sale Price
$141,000

Neighborhoods of Ames, IA
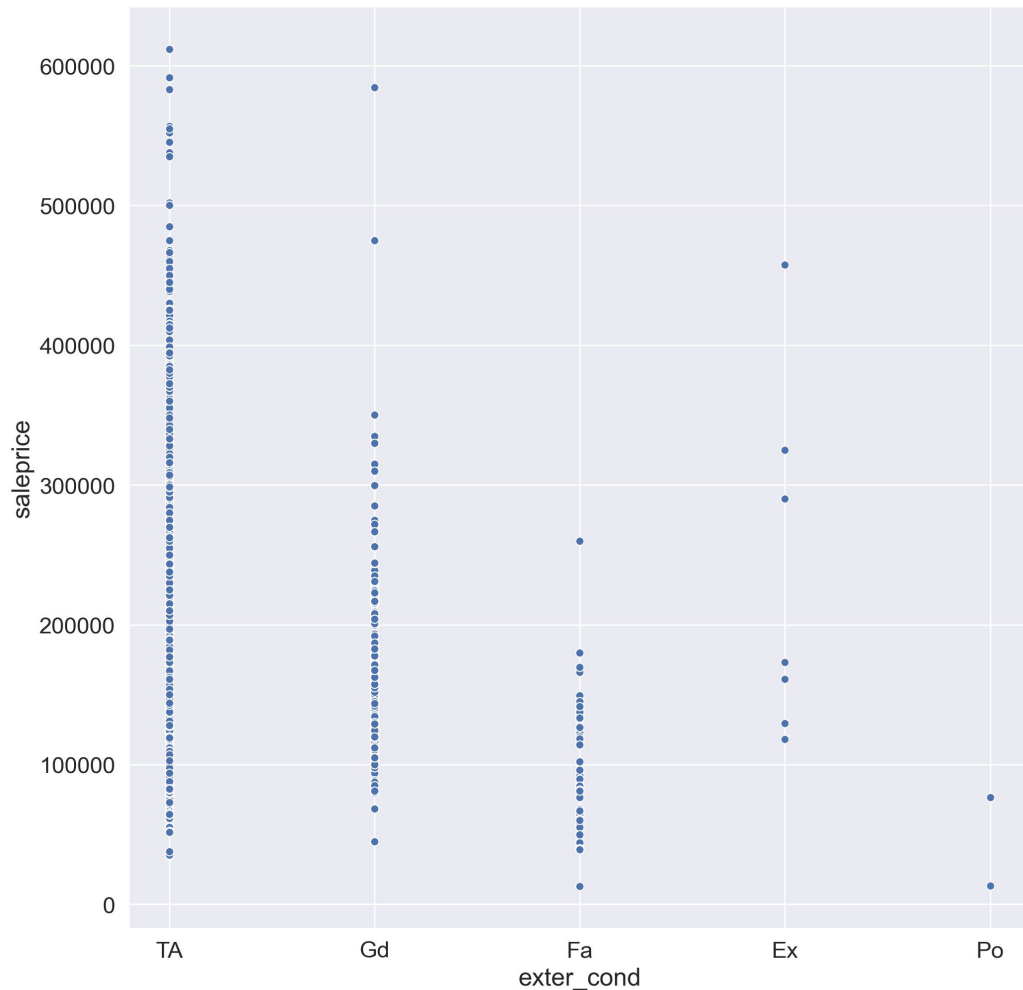
Exterior Condition

-Initially left out!

-Combined Fair/Poor and Good/Excellent to create grouped features, while Typical/Average was its own category (3 total)
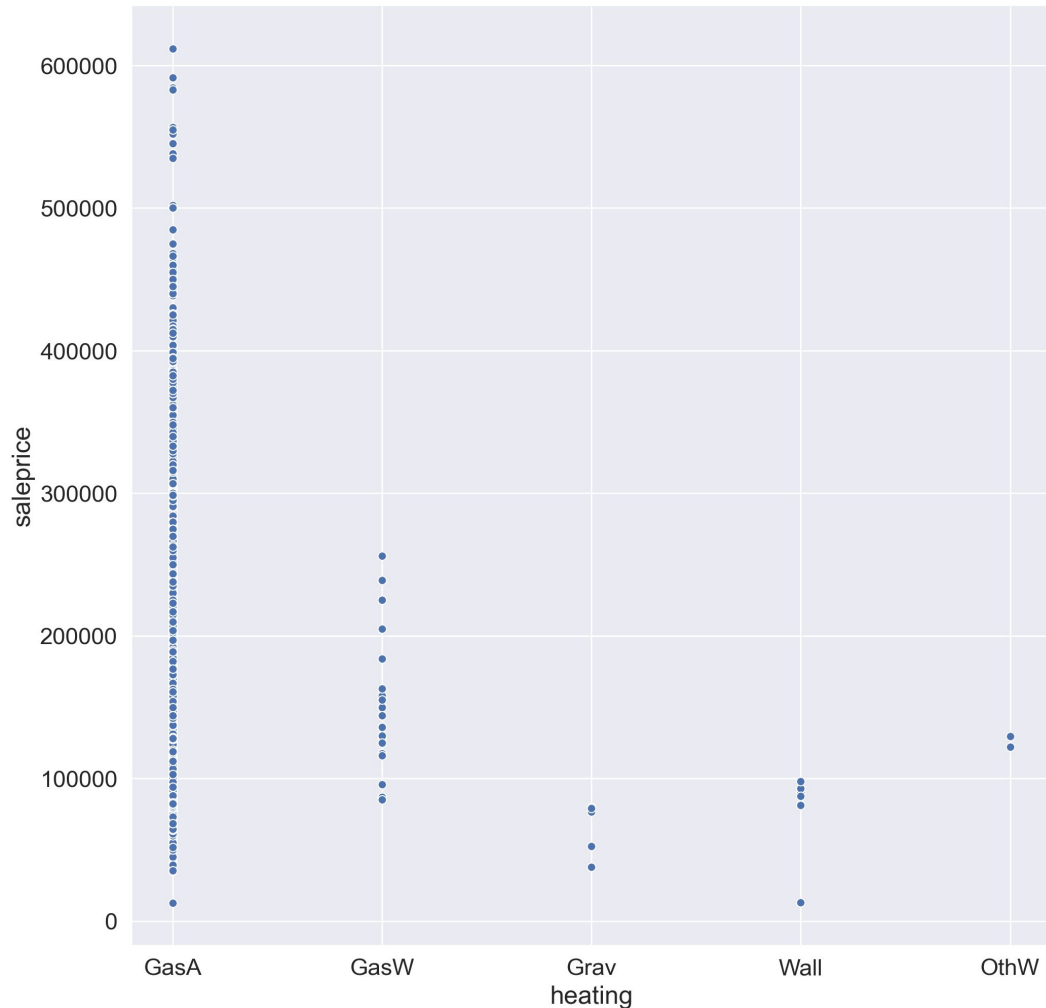
- Two of the three groups- TA(ex_cat_1) and Gd/Ex (ex_cat_2) were among my model's top 10 most significant coefficients!

Heating

- Strong, obvious groupings by price
- Combined Gravity furnace, Wall furnace, and Other into one category, while leaving GasW (steam) and GasA (forced air) as their own categories
- GasA (h_cat_2) and GasW (h_cat_3) were my 7th and 8th strongest coefficients!

Culinary Correlation

- Fairly linear trend - as Kitchen quality increases, Sale Price tends to be higher
- Excellent kitchens (k_cat_3) had the 6th largest coefficient in my model, suggesting they are an important factor in sale prices
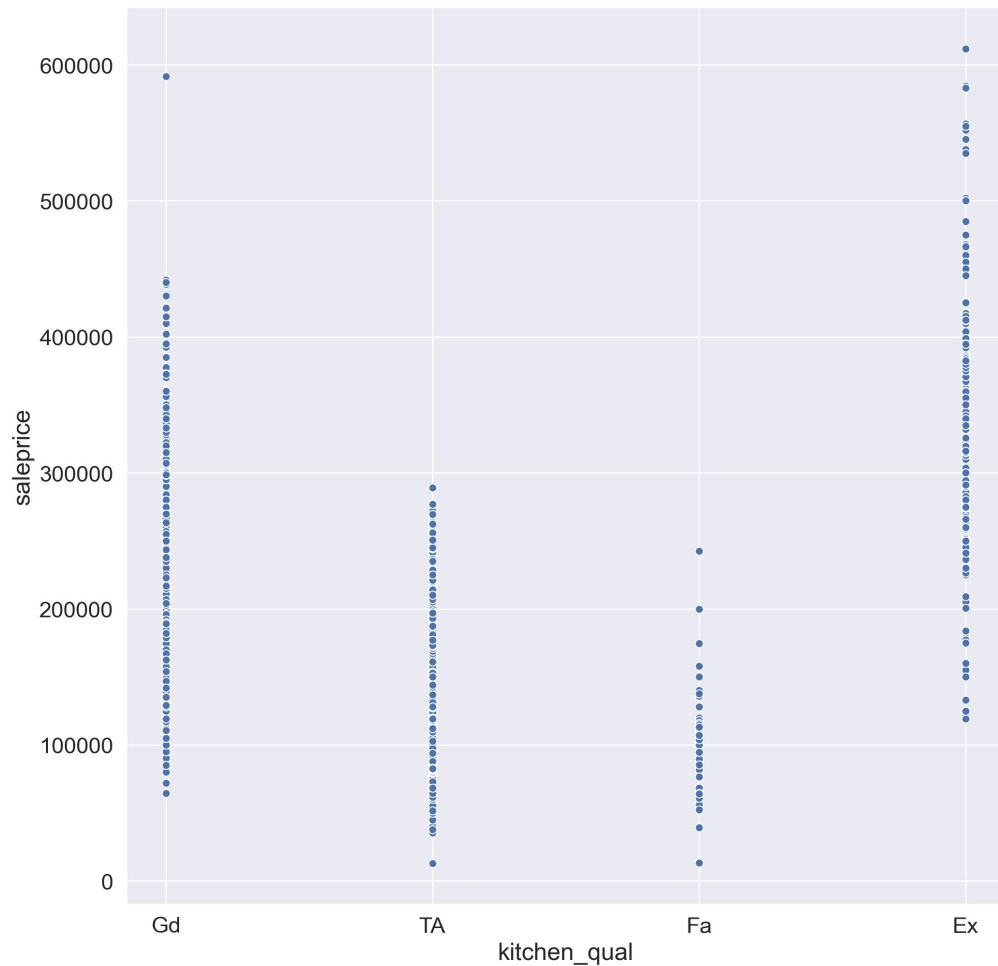
General Zoning

- Distinct price groupings evident in pair plot
- Combined I/A/C (Industrial, Agriculture, Commercial) into one group, left the others as their own categories
- My largest 4 coefficients!
  - Floating Village(ms_cat_ms3)
  - Res Low Density(ms_cat_other)
  - Res High Density(ms_cat_ms2)
  - Res Medium Density(ms_cat_ms4)
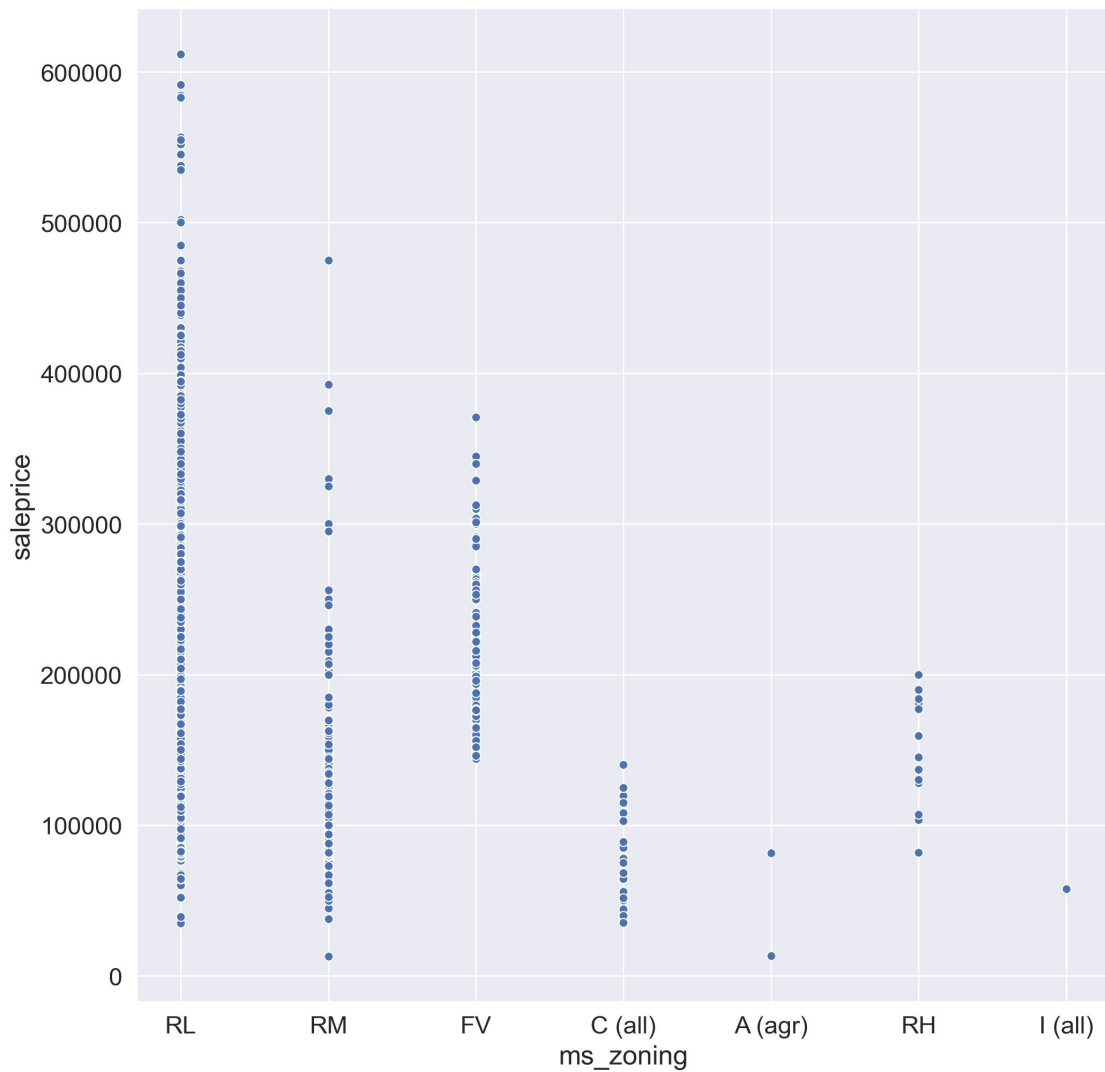
Conclusion

- A house's zoning is strongly correlated to its sale price
- External appearance and heating are also important factors for Ames, IA buyers
- An Excellent Kitchen can play a significant role in raising sale price!

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Thank you!