Smarter Renovations, Bigger Profits

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What home features best improve Sale Price per Square Foot for Renovators?

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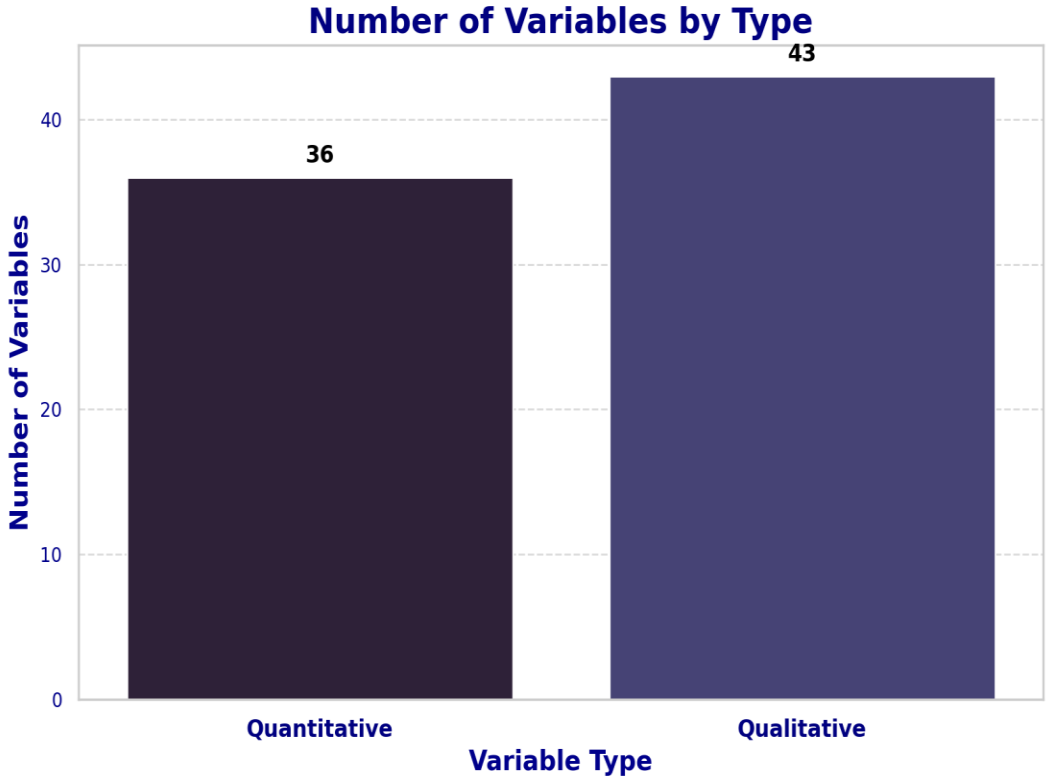
Introduction



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DATA CLEANING

Ensuring data sanity

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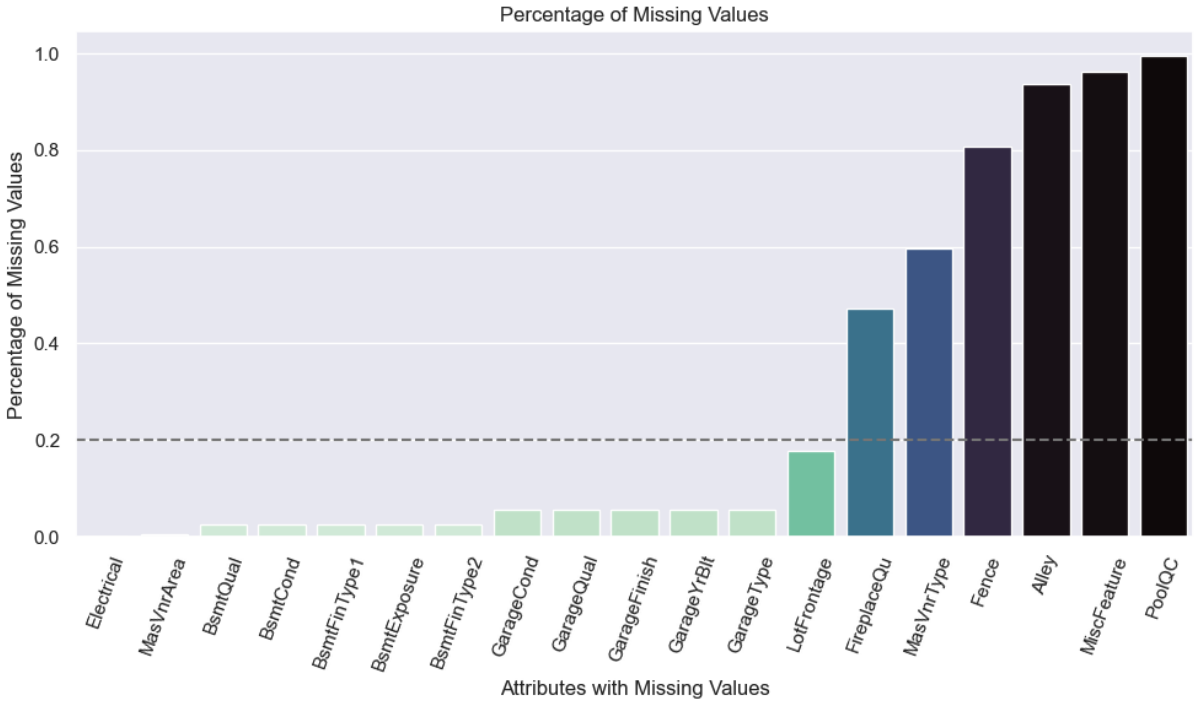
MISSING VALUES

Data Integrity

- Avoids data corruption

Lack of Value

- Only represent a small subset of population



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FEATURE SELECTION

Working with Numeric and Non-Numeric Data

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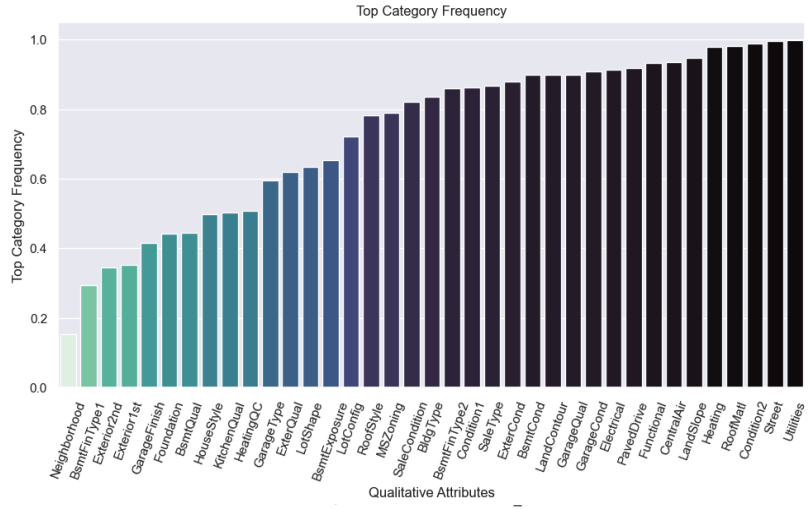
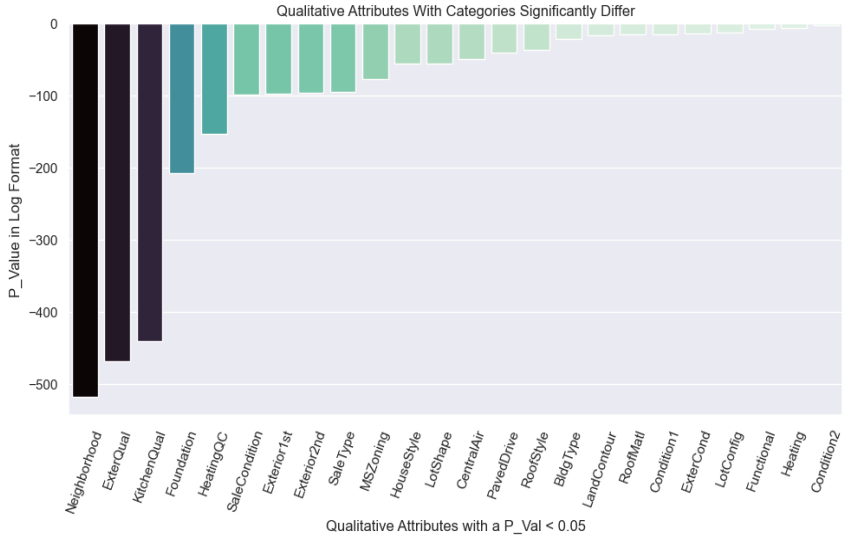
Qualitative Attributes

Are categories informative?

- Check for concentration
- Check for difference among groups are statistically significant (ANOVA)





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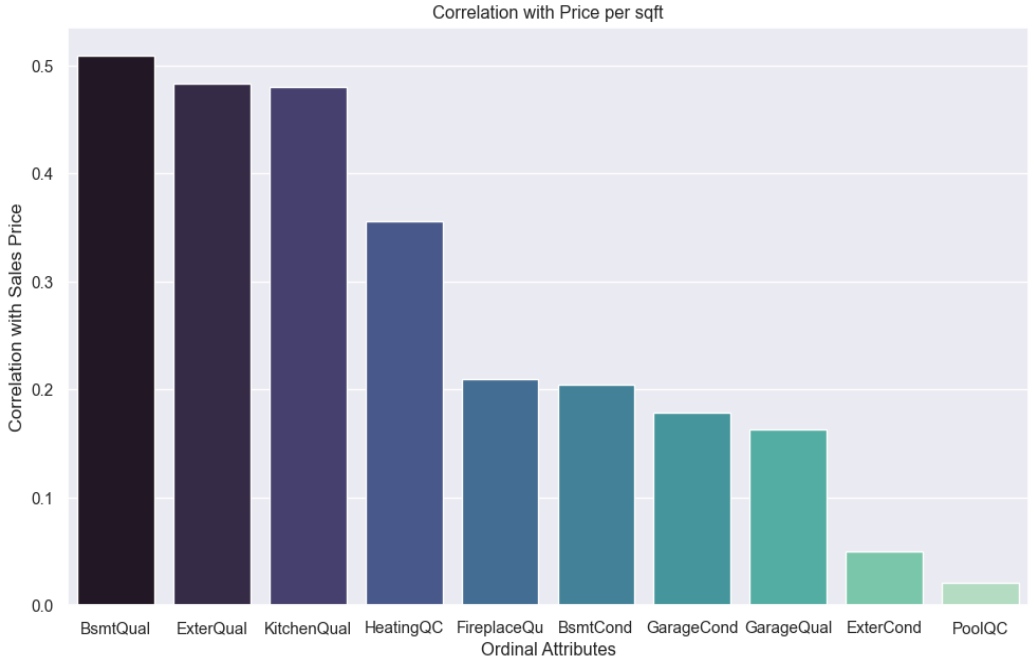
Quantifying Ordinal Data

Balanced Distribution +

Informative categories +

Correlation with price/sqft

External Quality, Kitchen Quality and Heating Quality



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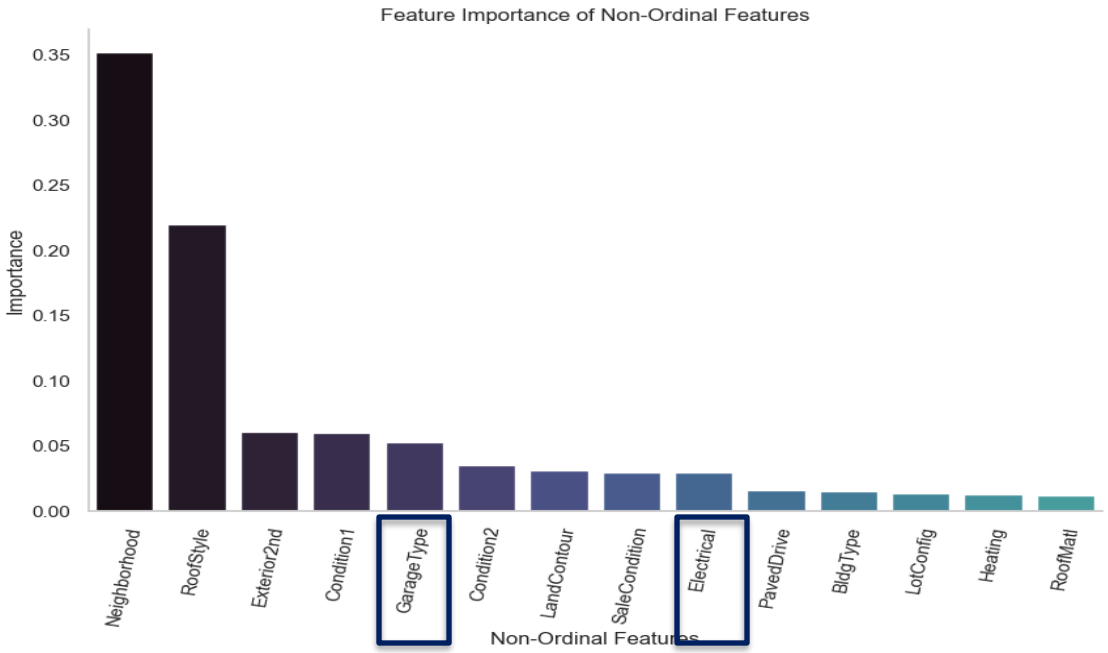
Quantifying Non-Ordinal Data

Feature Importance (95%)

- Neighborhood
- Roof Style
- Exterior Material
- … (8 in total)



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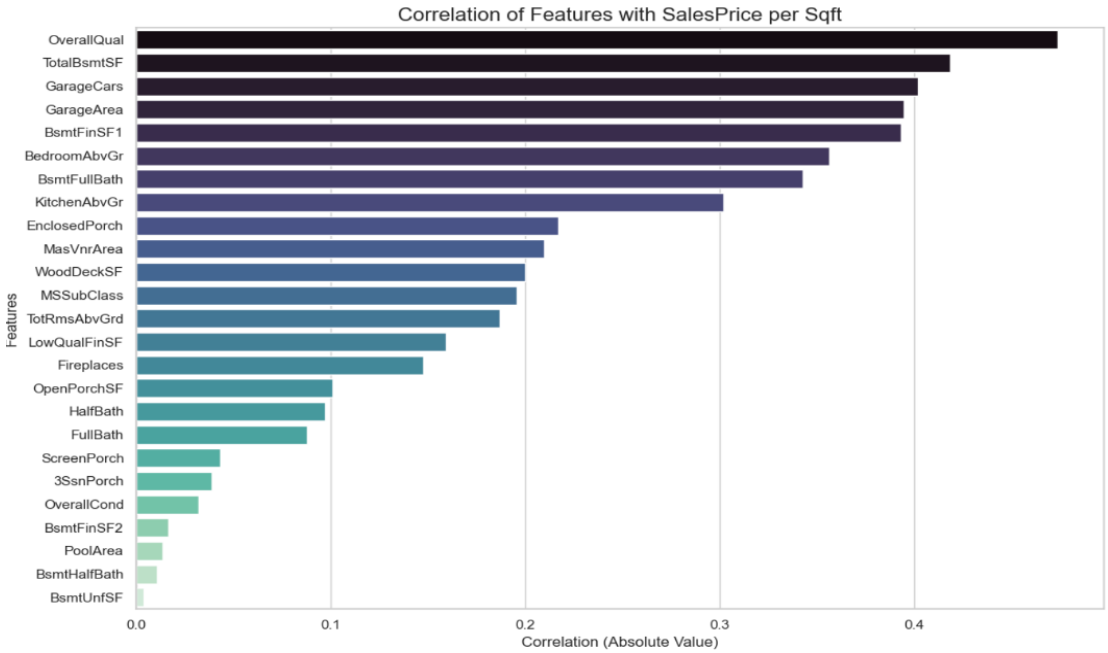
Quantitative Attributes

Correlation with price/sqft

- Overall Quality leads with highest correlation

Removal of Collinear and Irrelevant Data



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ML Models

- Used to verify our findings of quantitative data
- Four Models: Linear Regression, Random Forest, XGBoost, Gradient Descent
- Results: Overall Quality, Overall Condition, Garage Car Space were biggest factors

UNCOVERING PATTERNS

Deep-dive into the relationship with sale price per sqft

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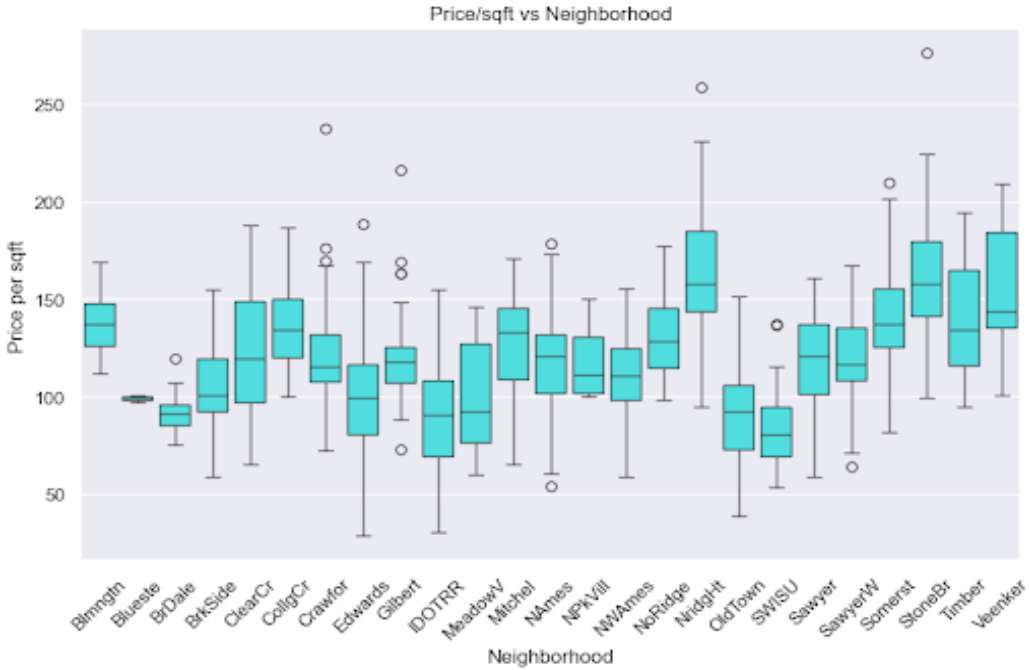
Qualitative – Neighborhoods

- Location greatly influences property value
- Takeaways:
  - Research Neighborhoods
  - Higher price/sqft – Luxury Amenities
  - Lower price/sqft – Cost effective design



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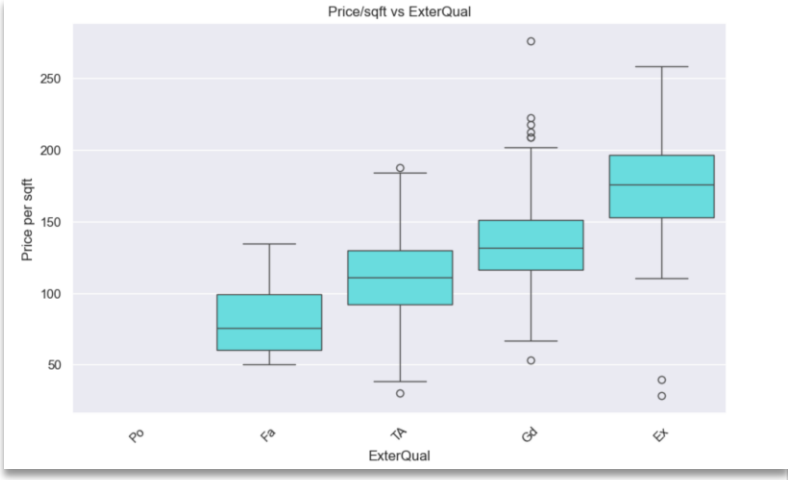
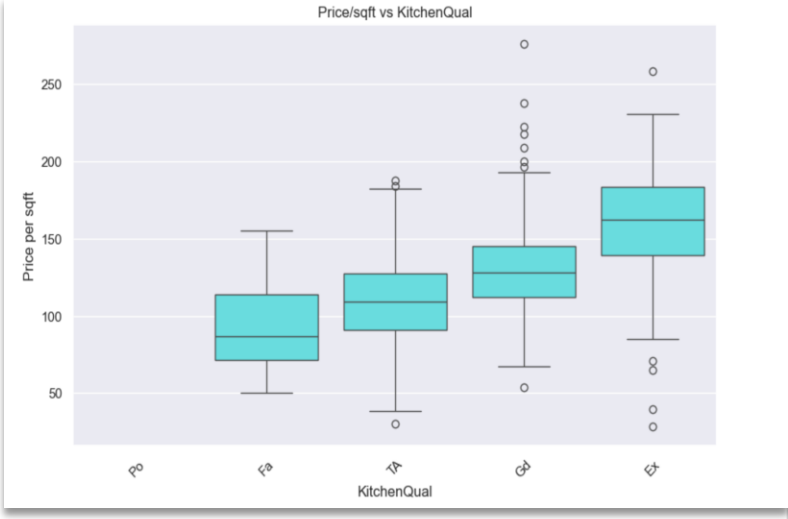
Qualitative – Kitchen & Exterior

- Excellent(Ex), Good(Go), Typical(TA), Fair(Fa), Poor(Po)
- Higher qualities exterior and kitchen = higher price/sqft
- Takeaways:
  - Improving exterior and kitchen quality is cost effective strategy to improve home value





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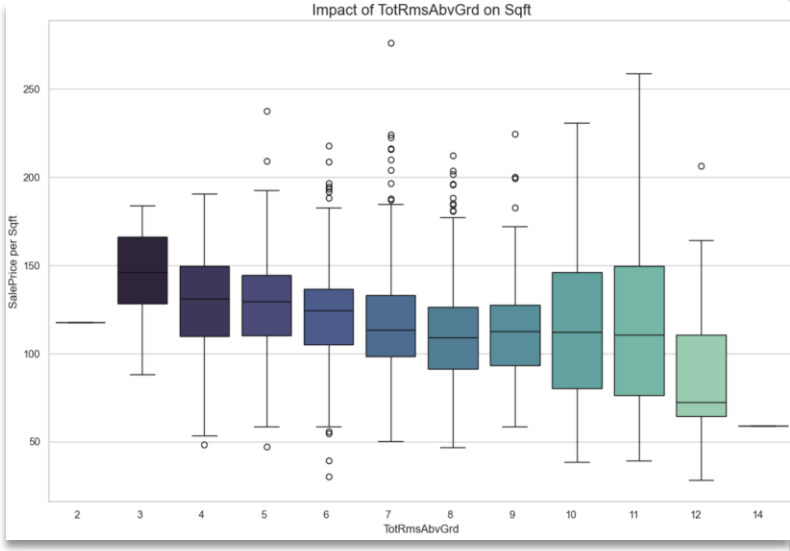
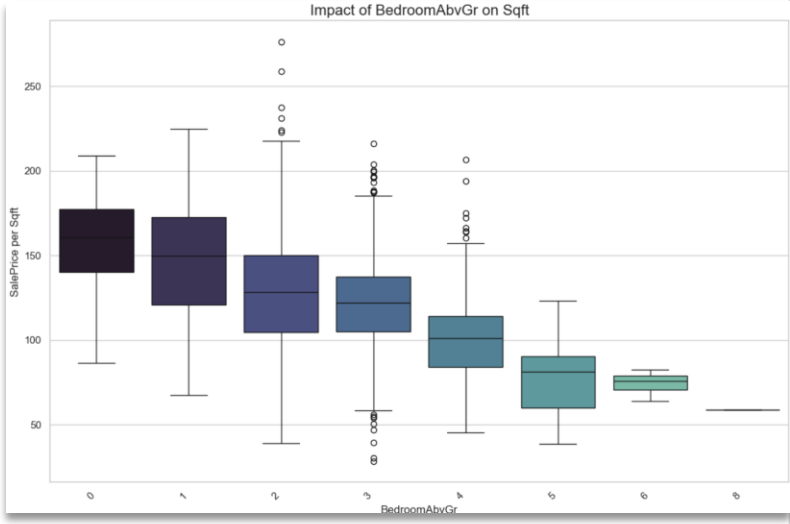
Quantitative – Rooms

- No clear trend in adding more above ground rooms
- Adding more bedrooms decreases price/sqft
- Takeaways:
  - Buyers prioritize comfort and functionality over house stats
  - Buyers prefer thoughtful designs





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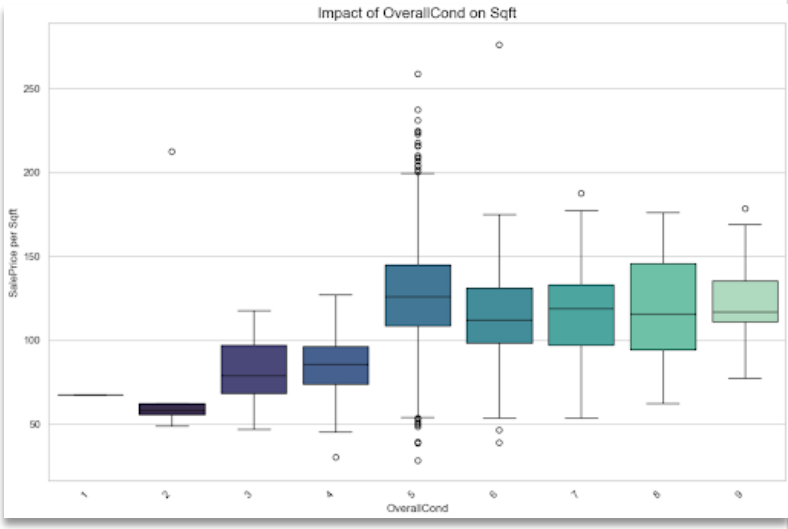
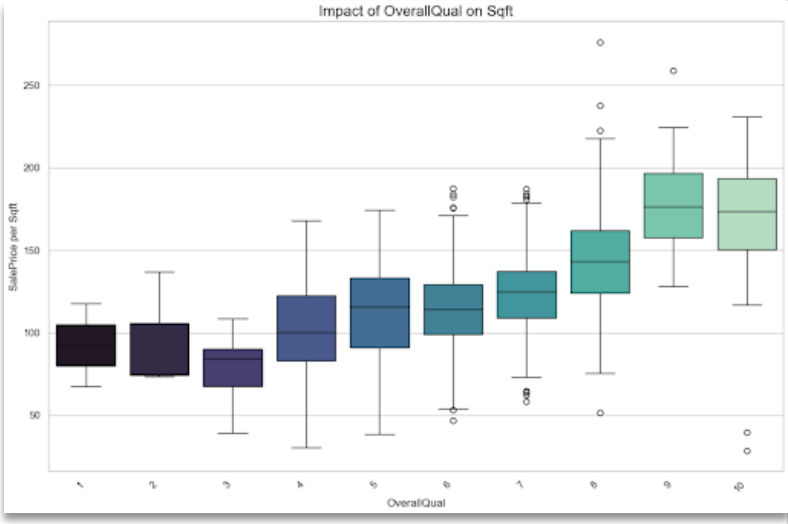
Quantitative – Condition and Quality

- Overall Quality and Condition of the House Greatly Increase price/sqft (Condition has diminishing returns after average rating)
- Takeaways:
  - Make house condition decent then focus on quality





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Final Takeaways

- Prioritize Neighborhood Research
  - Developers should align their designs with neighborhood trends to maximize profitability
- Optimize Room and Bedroom Design
  - Developers need to focus on functionality and comfort of spaces rather than padding statistics
- Balance Condition and Quality Improvements
  - Improve house condition until reaching diminishing returns, then prioritize quality finishings to maximize profits.

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