Interpreting Results & Discussion

Supervised Learning

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Contents of This Video

In this video, we will:

- Interpreting regression coefficients for real estate insights
- Determining which housing features have the strongest effects
- Using model performance to guide feature selection
- Using regression findings to inform property investment decisions
- Considering limitations and cautions in interpretation

Regression Coefficients Recap

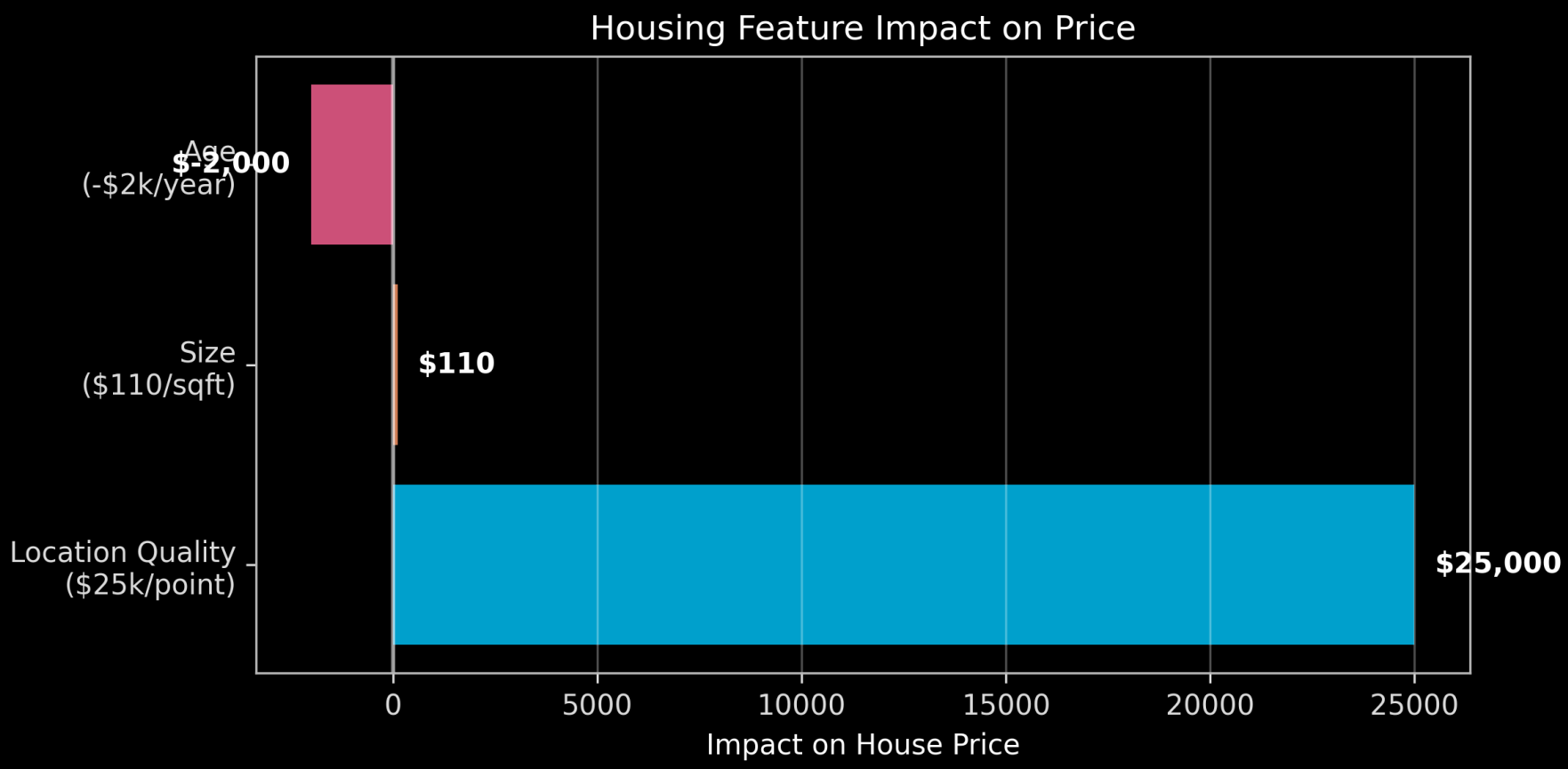
From our housing model:

- **Intercept (β_0)** ≈ $100,000 (baseline price for very small house)
- **Size (β_1)** ≈ $110 (additional price per square foot)
- **Location Quality (β_2)** ≈ $25,000 (price premium per quality point)
- **Age (β_3)** ≈ -$2,000 (price decrease per year of age)

What do these numbers mean for real estate decisions?

Coefficient Interpretation for Real Estate Strategy

What the coefficients tell us:



Key Insight: Per-unit vs. total impact can tell different stories!

Coefficient Magnitude and Model Performance

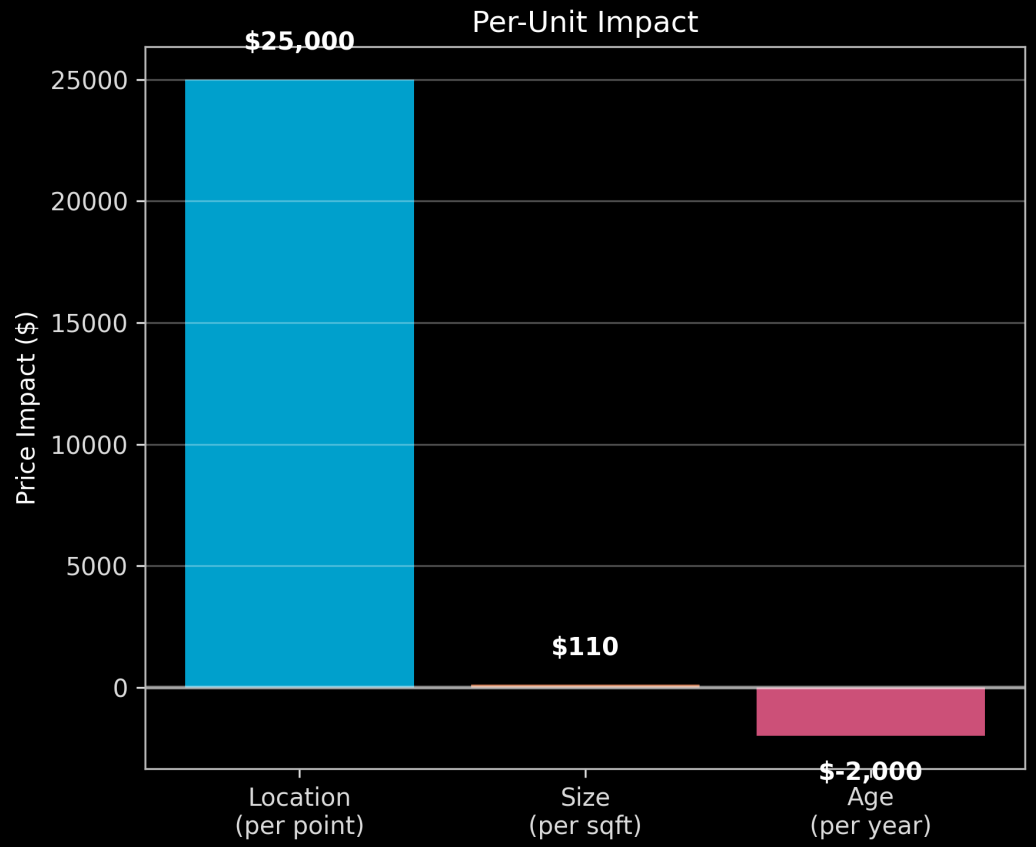
Comparing coefficient impact:

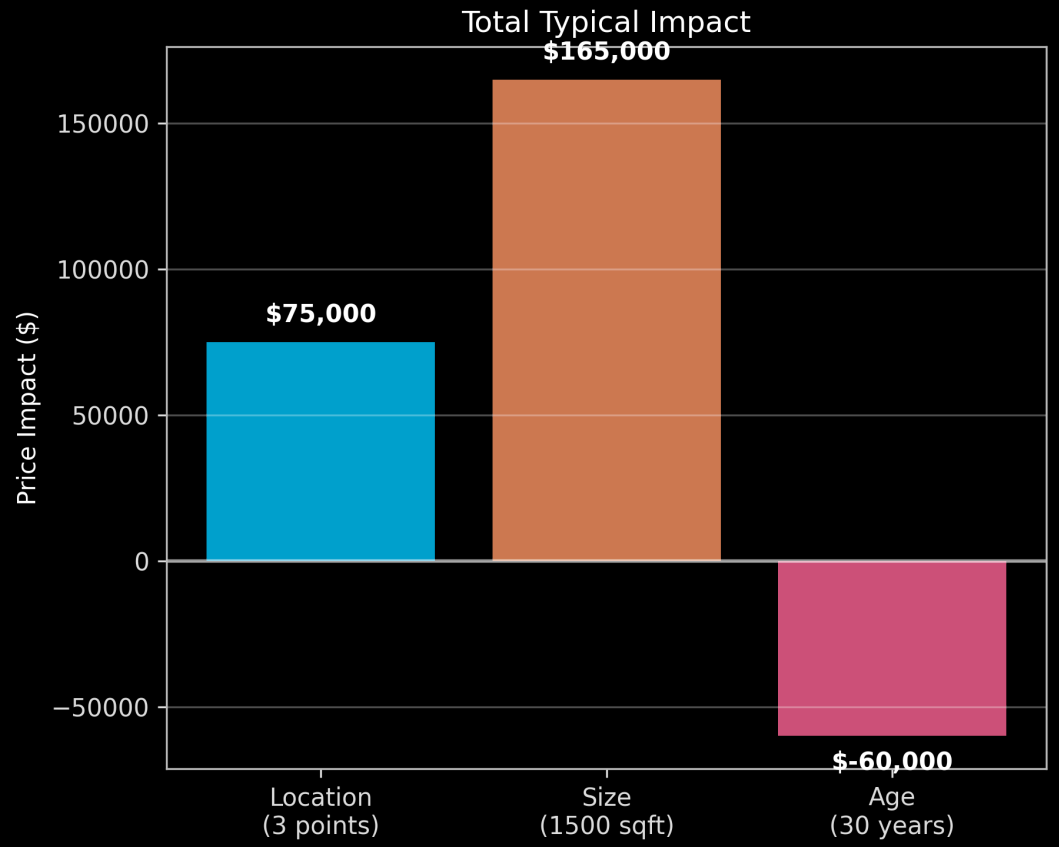
- **Location**: $25,000 per quality point (but quality typically ranges 1-5)
- **Size**: $110 per square foot (but houses vary by 500-2000 sqft)
- **Age**: -$2,000 per year (houses range from new to 50+ years old)

Total impact considering typical ranges:

- **Size**: 1500 sqft difference × $110 = **$165,000 impact**
- **Age**: 30 year difference × -$2,000 = **-$60,000 impact**
- **Location**: 3 point difference × $25,000 = **$75,000 impact**

Understanding Scale: Per-Unit vs. Total Impact





Key lesson: Always consider variable scale when interpreting coefficients!

Should We Keep All Features in the Model?

Considerations:

Arguments for keeping all:

- Each coefficient is substantial
- Together they explain ~90% of price variance
- Real estate pricing inherently multifactorial
- Each captures different aspect of value

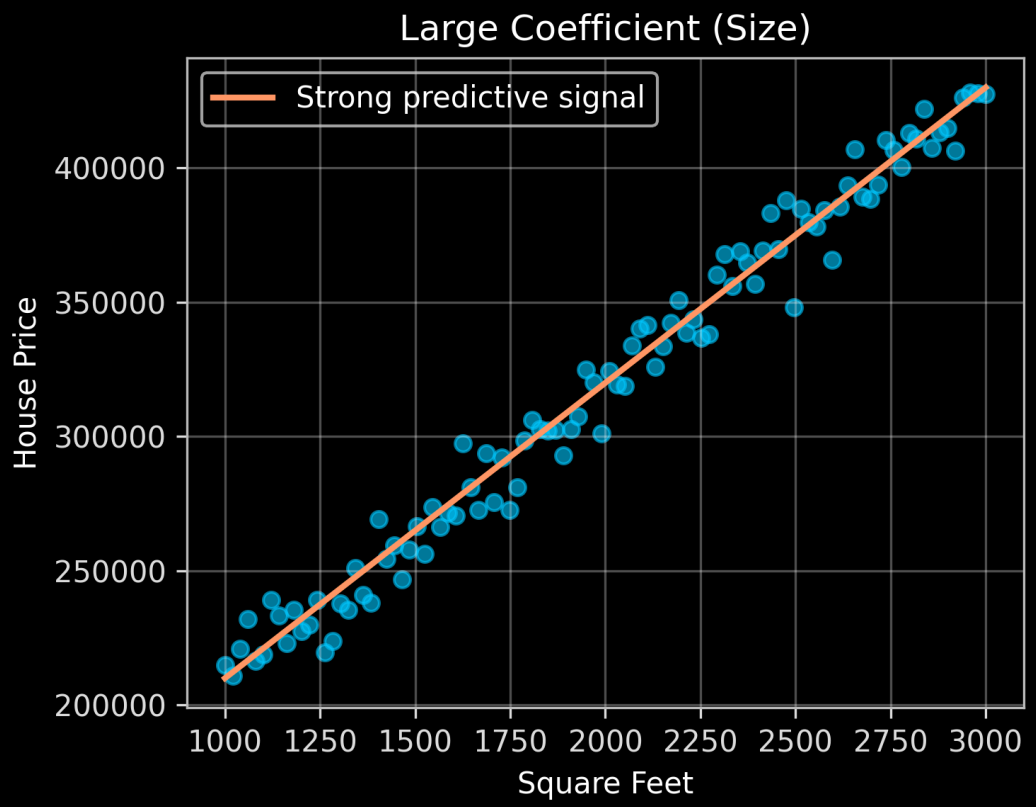
Real estate implication: Consider all factors when pricing or buying property

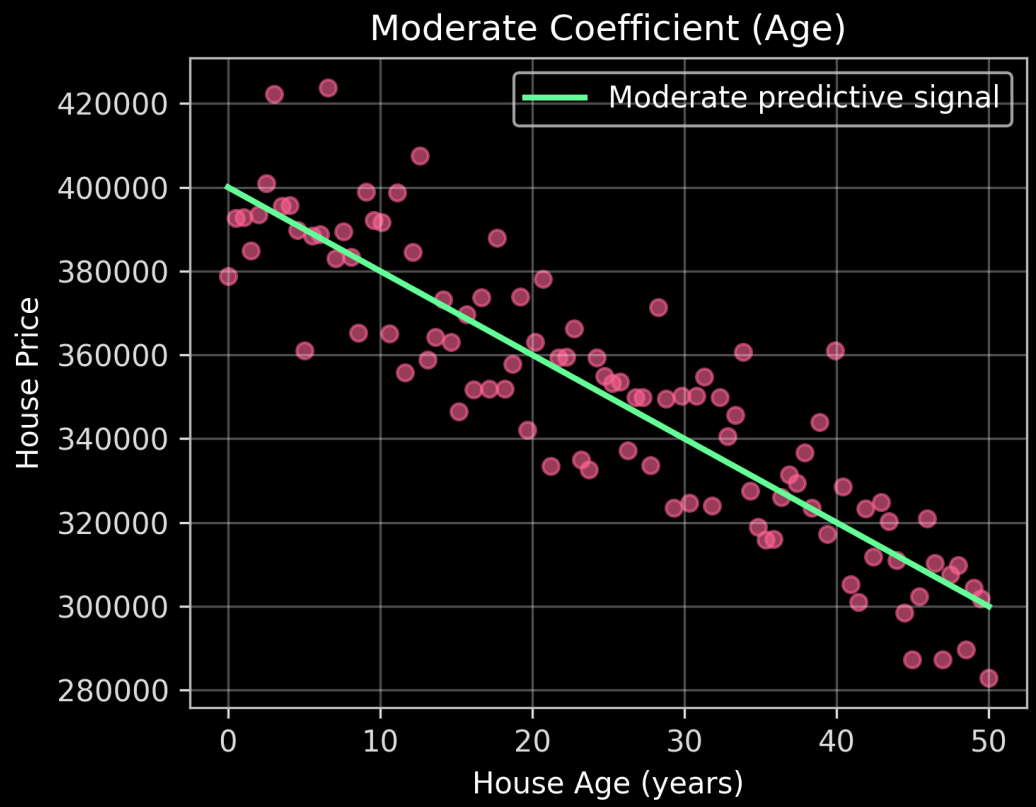
Feature importance ranking:

1. Location quality (highest per-unit impact)
2. Size (cumulative effect is large)
3. Age (captures depreciation)

Model performance: R^2 = 0.897 with all features

Why Coefficient Magnitude Guides Feature Selection





Strategic Real Estate Insights

Based on our analysis:

- **For buyers**: Prioritize location quality - it has the highest value impact
- **For sellers**: Highlight superior location features in marketing
- **For investors**: Newer homes in great locations offer best value retention

Understanding the coefficients:

- **Location**: $25k per quality point suggests investing in better neighborhoods
- **Size**: $110/sqft helps calculate renovation ROI
- **Age**: -$2k/year quantifies depreciation for financial planning

Cautions in Interpretation

Important considerations:

- **Correlation ≠ Causation**: Coefficients show associations, not necessarily causal effects
- **Range limitations**: Model based on houses within certain size/age ranges
- **Linear assumption**: Relationship might change for extreme values
- **Missing variables**: Other factors (bedrooms, bathrooms, garage) not captured

Best practice: Combine statistical analysis with local market knowledge

Summary: From Data to Insights

Key takeaways:

1. **Built** a multiple linear regression model for house prices
2. **Evaluated** its accuracy ($R^2 = 0.897$)
3. **Interpreted** coefficients for real estate meaning
4. **Identified** location as highest impact feature
5. **Made** data-driven recommendations for buyers and sellers

The power of regression: Not just prediction, but **understanding** what drives house prices

What We've Covered

In this video, we've learned:

- Interpret regression coefficients for real estate insights
- Compare the relative importance of different housing features
- Use coefficient magnitudes to guide feature selection
- Translate statistical findings into strategic recommendations
- Recognize limitations and cautions in interpretation
- Connect regression analysis to real-world decision making

You've mastered the complete regression workflow: build → evaluate → interpret → decide