Residential Land Value in Multnomah County

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Background

- Initial idea
  - Predict how land values react to higher traffic volumes and subsequent changes in greenhouse gas emissions
  - Detailed data on emissions elusive
  - Data on study sites, particularly those outside Metro's jurisdiction, also elusive

Background

- Revised idea
  - What affects land value?
- Hedonic regression
  - Way to estimate demand, value
  - Breaks dependent variable down into component parts
  - Land value reflective of demand generated by nearby transportation, pollution, and other factors

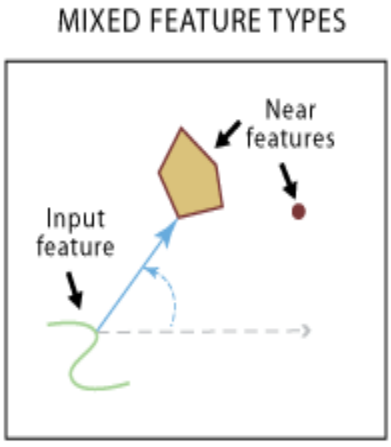
Model

- Basic Regression Model (univariate):
  - Y = mx + b
- Assumptions of linear regression
  - Y and X variable(s) have linear relationship
  - Each X has normal distribution of residual error
  - Homoscedastic
  - No autocorrelation

Method

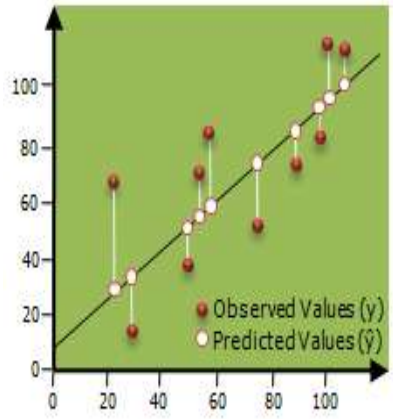
- Data from RLIS November 2005
- Determine variables of interest

Method (continued)

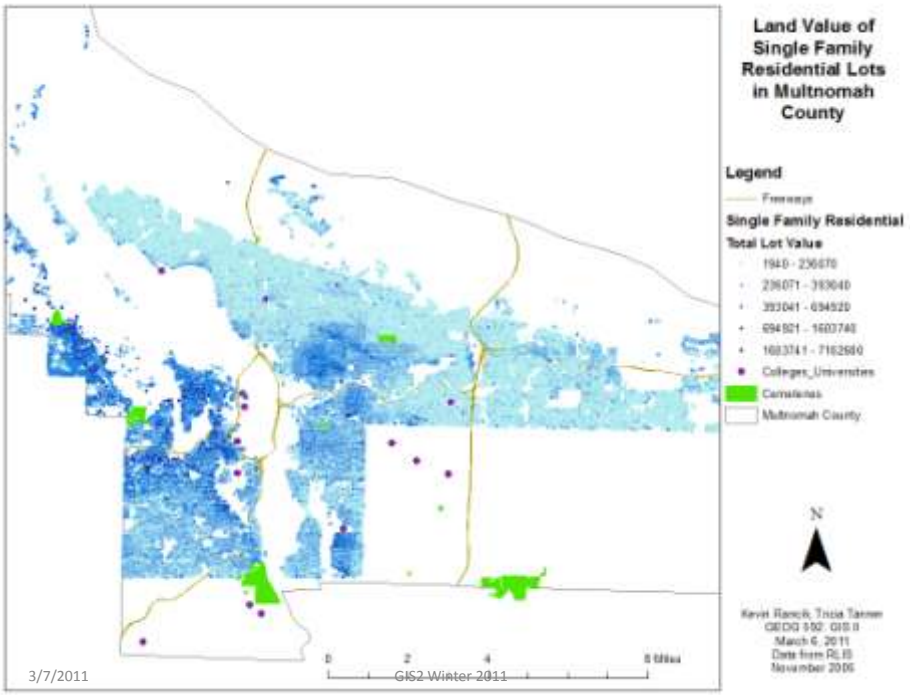


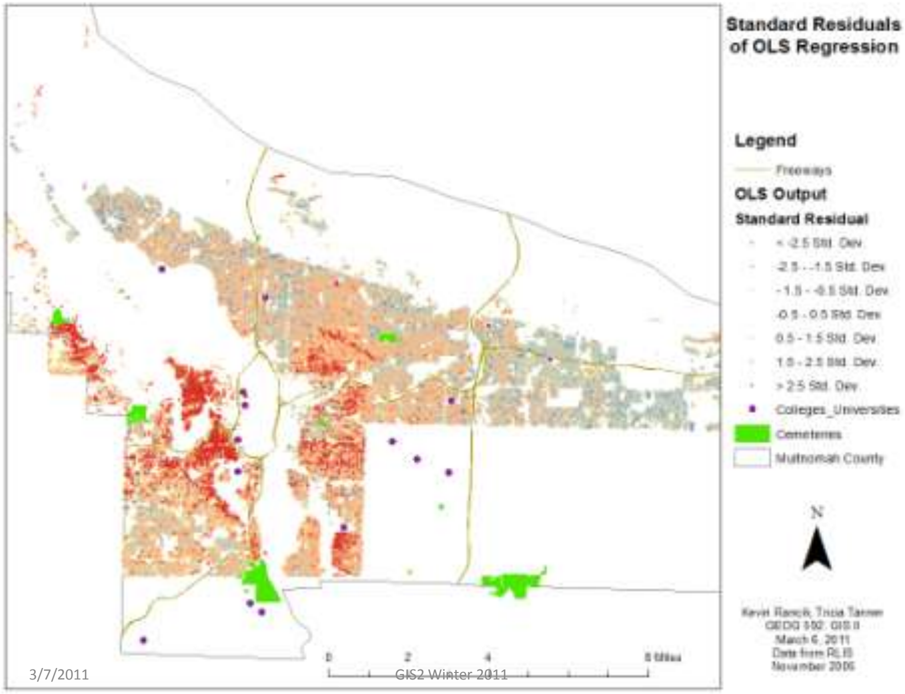
- Use *Near* function to determine distances to selected features

Method (continued)



- Normalize variable fields using log or square functions in the *Field Calculator*
- Run *Ordinary Least Squares* tool to determine fitness of model




Standard Residuals of OLS Regression
Legend
Freeways
OLS Output
Standard Residual
< -2.5 Std. Dev.
-2.5 - -1.5 Std. Dev.
-1.5 - -0.5 Std. Dev.
-0.5 - 0.5 Std. Dev.
0.5 - 1.5 Std. Dev.
1.5 - 2.5 Std. Dev.
> 2.5 Std. Dev.
Colleges_Universities
Cemeteries
Multnomah County
N
Kevin Rancik, Tricia Tanner
GEOG 592: GIS II
March 6, 2011
Data from RLIS
November 2006
0
2
4
8 Miles

Results


Summary of OLS Results
OLS Diagnostics
Input Features:
Dependent Variable:
TOTALVAL
Number of Observations:
Multiple R-Squared [2]:
Adjusted R-Squared [2]:
Notes on Interpretation

Results

- Our Model:
  - $Y = 1679x_1 - 6209x_2 + 19288x_3 + 262352x_4 + 4947x_5 - 1834712.4$
  - Y = Total Value
  - X_1 = Distance to Freeway
  - X_2 = Distance to Cemetery
  - X_3 = Distance to College or University
  - X_4 = Building Square Footage
  - X_5 = Building Age
  - # = Intercept

Conclusion

- We need a fast supercomputer
- Although roughly half of our dependent variable is “explained” by our model, other factors may make for better fits
- Our model does not fit assumptions of linear regression
- Random sampling would have been a better route for this analysis (100,000 samples)
- Would have been valuable to use univariate regression for each variable singularly to determine whether the variable was useful

Potential Future Analysis

- Use other independent variables such as
  - Distance to water bodies
  - Distance to city center
  - Incidents of violent crime
  - Weight schools based on test scores
  - Weight freeway based on traffic counts
- Include other locations such as neighboring counties
- Use different methods of regression and variable normalization

Questions

References

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- Kim, Kwang Sik et al, "Highway traffic noise effects on land price in an urban area", Science Direct, Transportation Research Part D 12 (2007), pp. 275 – 280
- Coulson, N. Edward et al, "A Hedonic Approach to Residential Succession", The Review of Economics and Statistics, Nov 1989, pp. 433 - 444