Seattle kids: changing demographics and the implications for public schools

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Background

Explosive population growth and expensive real estate

Urban Centers and Villages development plan

Debates over children and families in urban environments

Problem statement

What role does density play in the distribution of children in Seattle's Urban Centers and Villages?

What role do Urban Centers and Villages play in changing enrollments in Seattle Public Schools?

Can we model enrollment using current population data alone?

Data Collection

Census data aggregated by UCV and by region

Source: City of Seattle

Format: CSV files

Enrollment data by individual school

Source: Seattle Public Schools

Format: pdf reports

Geographical correspondence

Source: Created by comparing maps from city and schools

Format : Excel file

Data Dashboards

- Click me (I'm not sketchy at all!)

Exploratory Data Analysis: Key Findings

Centrally located UCVs are experiencing the steepest rise in child population

Very urban, essentially no single-family housing

Inconsistencies in UCV boundaries leads to interesting density trends

Uptown (Lower Queen Anne) is low density while Upper Queen Anne has 2nd highest density

UCVs split to balance school enrollments

Othello split between 6 elementary schools

Schools do not serve them as a whole

Modeling: predicting enrollment

Enrollment Data

By school, grade

Population Data

Local (UCV) and citywide

Time lags

Annual Timescale

Linear modeling

Challenges

01

Reworked school boundaries with UCVs split across schools

02

Different reporting frequencies

03

Aggregated by age:

Over/Under 18 only

Challenges

Feasible approach:
Model total enrollment using interpolated population data

01

Reworked school boundaries with UCVs split across schools

02

Different reporting frequencies

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Aggregated by age:

Over/Under 18 only

Forecast: can the population data help?

Simple Linear Regression

- Total and grade level enrollment
- Population data

Multiple Linear Regression

- Total and grade level enrollment
- Population data
- Time lagged population data

Null Model

- Enrollment average

Results: how much variation can our models explain?

Metric: R2 score

What fraction of variation is explained?

Best total enrollment model:

total enrollment

population and 5-year lag

Training: 99%

Testing: 91.3%

Best grade level model:

middle school enrollment

population and 10-year lag

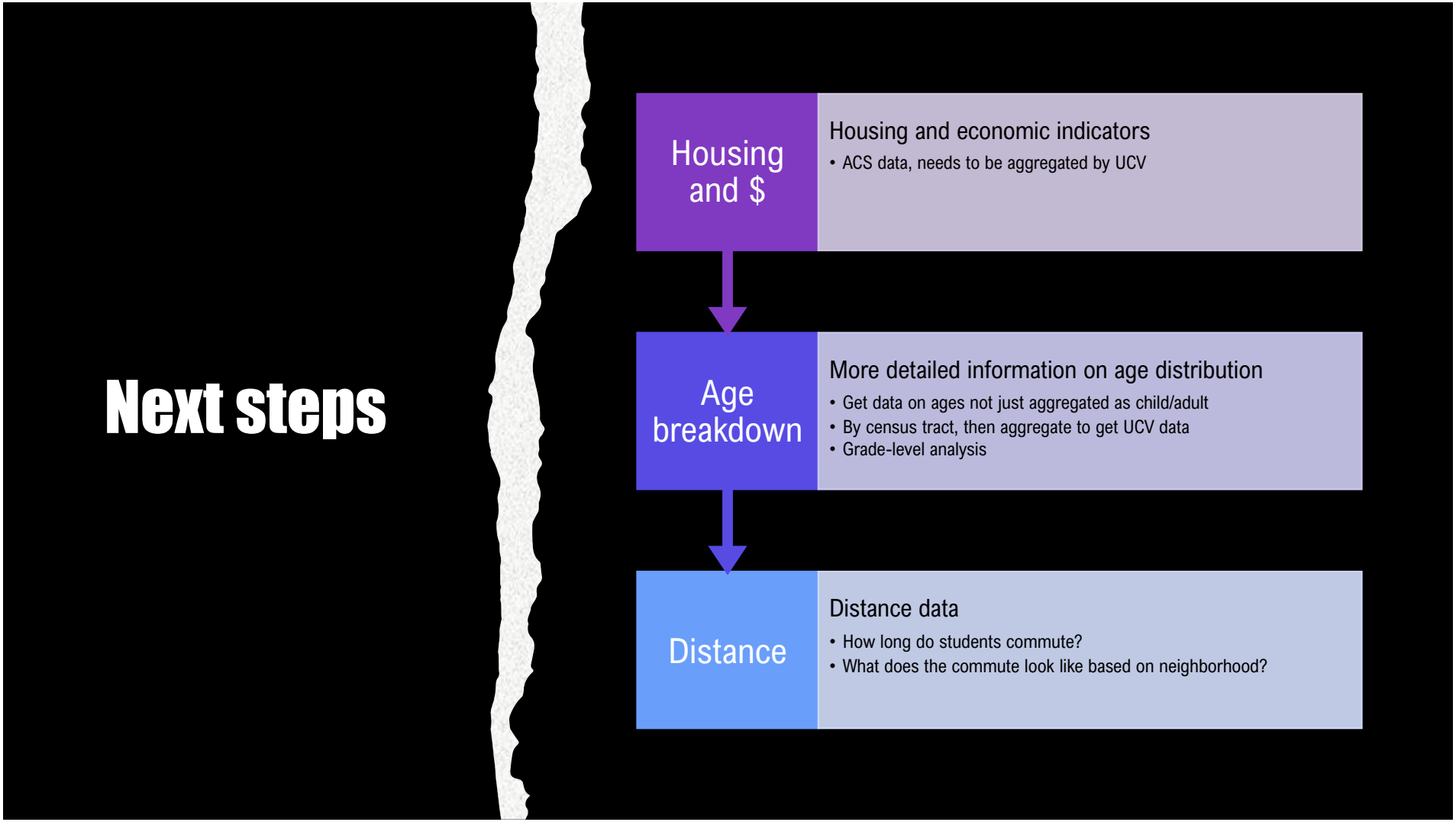
Training: 99%

Testing: 98.5%

Recommendations

- Re-examine how we define school assignments in relation to urban centers and villages, particularly Othello and Lake City
- Consider rising population of children in urban centers and villages when determining how to manage school assignments and plan for capital investments

Next steps


Housing and $
Housing and economic indicators
• ACS data, needs to be aggregated by UCV
Age breakdown
More detailed information on age distribution
• Get data on ages not just aggregated as child/adult
• By census tract, then aggregate to get UCV data
• Grade-level analysis
Distance
Distance data
• How long do students commute?
• What does the commute look like based on neighborhood?

Acknowledgments

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It has been a wild ride!

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