Predicting Permanent Housing for Homeless Families in the Puget Sound Region

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It all started in last summer's DSSG program

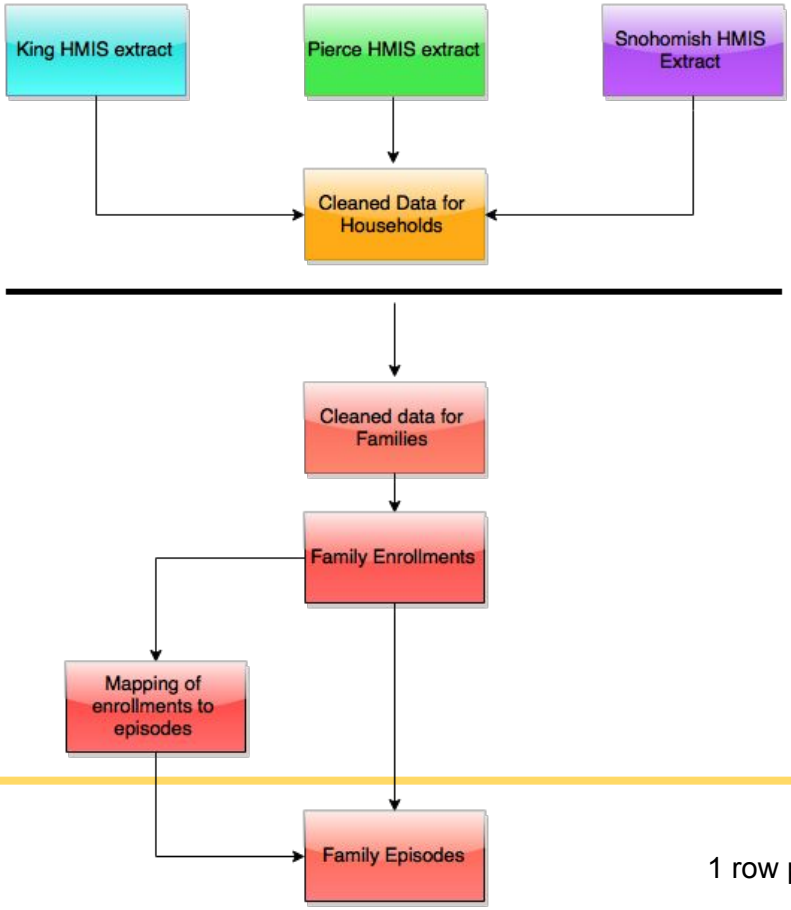
- DSSG (Data Scienc for Social Good): Student fellows work with project leads from non-profit, academic and/or government organizations
- Data-driven projects focused on urban data
- Second installment starts June 13th

Background

- Over **4,000** homeless families in the Tri-county (Snohomish, King, Pierce) area every year.
- BMGF and Building Changes: cut family homelessness **by half** by 2020.
- Make family homelessness **rare**, **brief**, and **one-time**.

http://www.watersupplyforum.org/home/resource/planning-area-map/

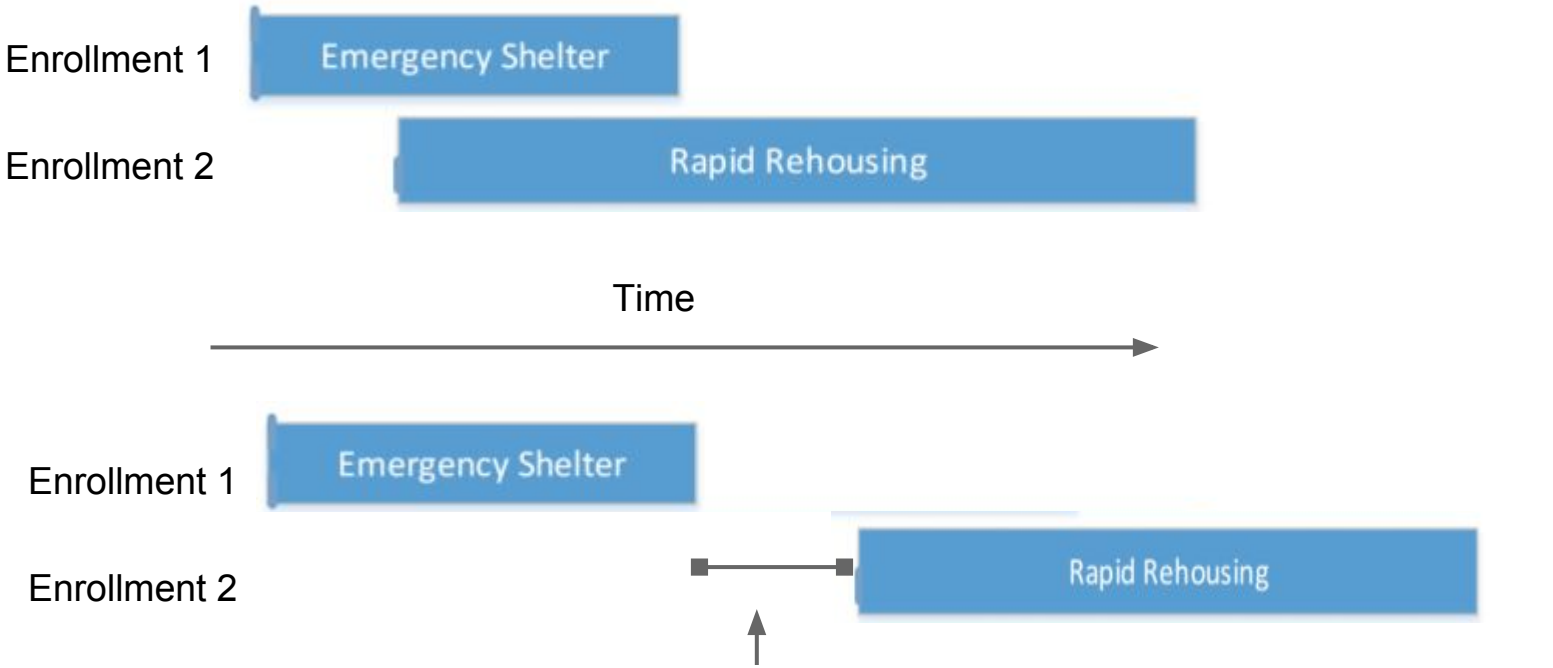
Data Processing Pipeline



Aggregating into episodes
Create family/episode aggregate variables

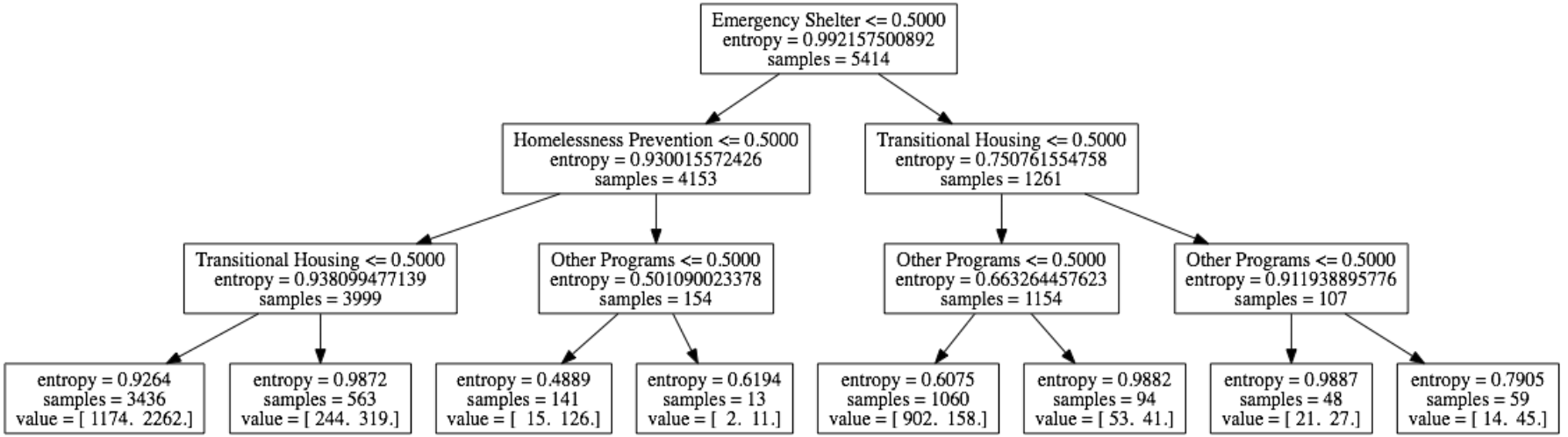
1 row per family per episode

Defining episodes



Decision Trees predict family outcomes

each ‘leaf’ represents a combination of programs:



This tree predicts exit status with approximately 70% accuracy ($p<0.05$)

How to communicate prediction error?

Error bars for the predictions of decision trees

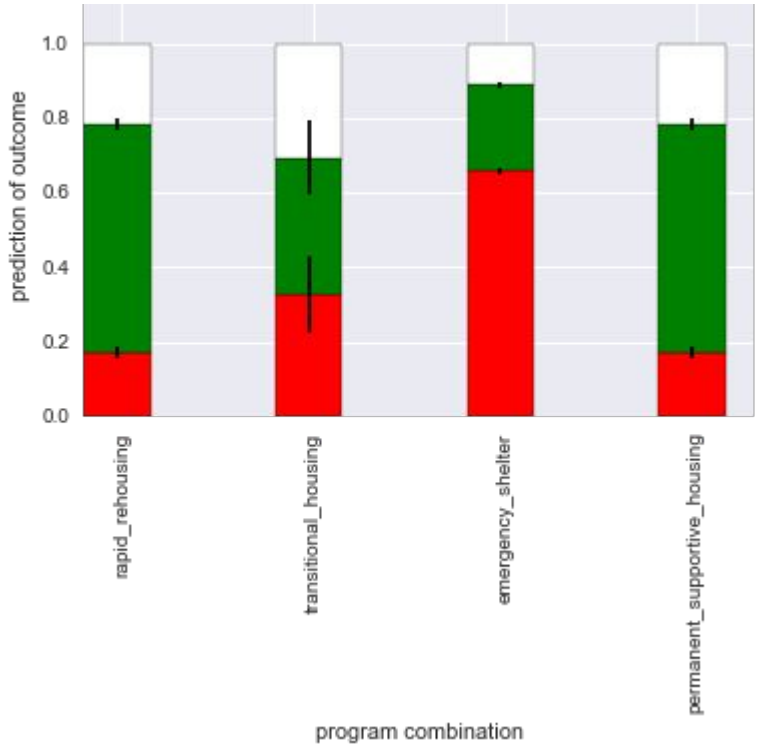
How to calculate error bars?

Error bars for decision tree algorithms:

- Use “random forests” of trees - a resampling strategy that makes the trees more robust…
- … and provides sub-samples for jack-knifing
- Correct for biases due to limited sampling

Wager et al. (2014)

Example


1.0
0.8
0.6
0.4
0.2
0.0
prediction of outcome
rapid_rehousing
transitional_housing
emergency_shelter
permanent_supportive_housing
program combination

Open source software

http://uwescience.github.io/sklearn-forest-ci/

- Integrates with scikit learn
- Supports both classification and regression
- Documentation includes usage examples:
- http://uwescience.github.io/sklearn-forest-ci/auto_examples/plot_mpg.html

Thanks!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