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UNIVERSITY OF MICHIGAN

Predicting Household Characteristics Using Street View Images

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Outline

- Motivation
- Research question
- Methods
- Potential problems/limitations
- SRO Mapping Application



Motivation

- Screening households to identify eligible sample elements
 - Time consuming
 - Cost intensive
- Increase screening efficiency by oversampling cases likely to be eligible to the study
- Use frame, commercial and paradata variables to create models to predict eligibility
 - National Survey of Family Growth: 15-49 years old
 - Health and Retirement Study: 50+ years old



Research question

- Can we improve the predictive power of our models by including street view image data?



Methods (1)

- Supervised machine learning algorithm (deep learning) to predict household characteristics (eligibility criteria)
 - Usual frame, commercial and paradata variables
 - Street view images
- Training dataset:
 - Previous national survey conducted by SRO
 - $n = 46,797$ labeled addresses
 - Addresses geocoded by sample vendor (Marketing Systems Group) using linear interpolation



Methods (2)

- Street View Images:
 - Download static street view images using Google Maps Street View Image API
 - R package: `googleway` (`google_streetview` function)
- Obtain eligibility probability from machine learning algorithm and compare gains/losses of predictive power with current models in validation dataset





Potential problems/Limitations

- Geocoding
- Position of the street view image:
 - Compass heading of the camera
 - Horizontal field of view (zoom)
 - (up or down) Angle of the camera relative to Street View vehicle
- Time of street view image
- Apartment buildings/complexes
- Gated communities

















SRO Mapping Application

- SRO needed a mapping tool to assist in assigning/transferring sample cases to interviewers in the field based on their location
- R Shiny application
- <https://kambanane.shinyapps.io/SROMappingTool/>



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Thank you!

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SRO Mapping Tool

Pin function off?

Pin radius (miles):

Interviewer area settings
Adjust the maximum radius of the IWER area here.

Max radius:

Generate a report of your query.

Report title

Report author

Requests/Bugs: [Click Here](#)

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Map Query tab Sample Lines IWER List

Locations of sample lines and IWERS

Click on sample lines to show names and name of nearest IWER.

Sample lines within the pin drop

Leaflet | © OpenStreetMap contributors, CC-BY-SA



Browser address bar: <https://kambanane.shinyapps.io/SROMappingTool/>

SRO Mapping Tool

Map | Query tab | Sample Lines | IWER List

Create your query below

Interviewers

Select interviewers

Adam Scott, Amanda Martinez, Amy Richards, Andrea Smith, Ashley Figueroa, Brenda Escobar, Charles Koch, Cheyenne Thomps

Select state

AK, AL, CA, CO, CT, DC, DE, FL, GA, HI, IA, IL, IN, LA, MD, ME, MI, MN, NC, NH, NJ, NM, NY, OK, RI, SD, TN, TX, UT, VA, VT, WA, WI, WV

Select language

EN, SP

Select experience

NewHire, ProjExp, SROExp

Select TL

Bryan, Fitzpatrick, Gonzalez, Holloway, Jones, Lyons, Michael, Perry, Rose, Smith, Stewart, Taylor, Thompson, Wilson, Zamora

Sample lines

Assigned IWER

Adam Scott, Amanda Martinez, Amy Richards, Andrea Smith, Ashley Figueroa, Brenda Escobar, Charles Koch, Cheyenne Thomj

TL for assigned IWER

Bryan, Fitzpatrick, Gonzalez, Holloway, Jones, Lyons, Michael, Perry, Rose, Smith, Stewart, Taylor, Thompson, Wilson, Zamora

Distance to assigned IWER (Enter range)

0 2625

Nearest IWER

Adam, Scott, Amanda, Martinez, Amy, Richards, Andrea, Smith, Ashley, Figueroa, Brenda, Escobar, Charles, Koch, Cheyenne, TI

Submit query

Pin function off?

Pin radius (miles):

50

Clear Pin

Interviewer area settings

Adjust the maximum radius of the IWER area here.

Max radius:

50

Generate a report of your query.

Report title

Enter title

Report author

Enter author name

Generate report

Requests/Bugs: [Click Here](#)

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SRO Mapping Tool

Map Query tab Sample Lines IWER List

Locations of sample lines and IWERS

Click on sample lines to show names and name of nearest IWER.

Legend (Language)

- English
- Spanish
- No Data

IWER area (in miles)

- 13.25
- 25.5
- 37.75
- 50

Sample lines within the pin drop

Download pin data

Generate report

Requests/Bugs: Click Here

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