AN EXPLORATORY ANALYSIS OF INTERCITY TRAVEL PATTERNS USING BACKEND DATA FROM A TRANSIT SMARTPHONE APPLICATION

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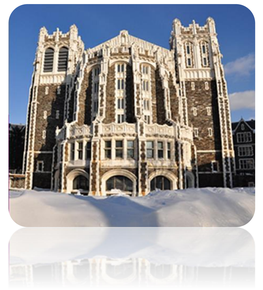


INTRODUCTION & RESEARCH QUESTION

Motivation

- Visitors are an important sources of transit demand especially in major metropolitan areas
- Lack of understanding intercity travel pattern by existing data sources

"Transit" Smartphone Application

- Free to download
- Android & iPhone
- Multi-city coverage
- 125+ cities
- 9 countries
- Real-time transit information based on user's location

https://transitapp.com/

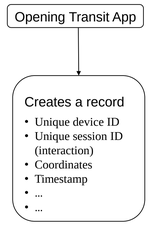
Research Question

- Can backend data from a multi-city transit information smartphone application be used to identify intercity travelers?

Data Description

Dataset

- Data files were obtained directly from Transit App developers
- Contains data for any user that opened Transit App at least once in one specific month of 2014 in the New York City region
- Data file in Comma separated value (CSV) format:
- Anytime a user opens the app
- Approximately 13+ million records by 170k+ devices
- User's privacy: all locations shifted by a random number



Methodology

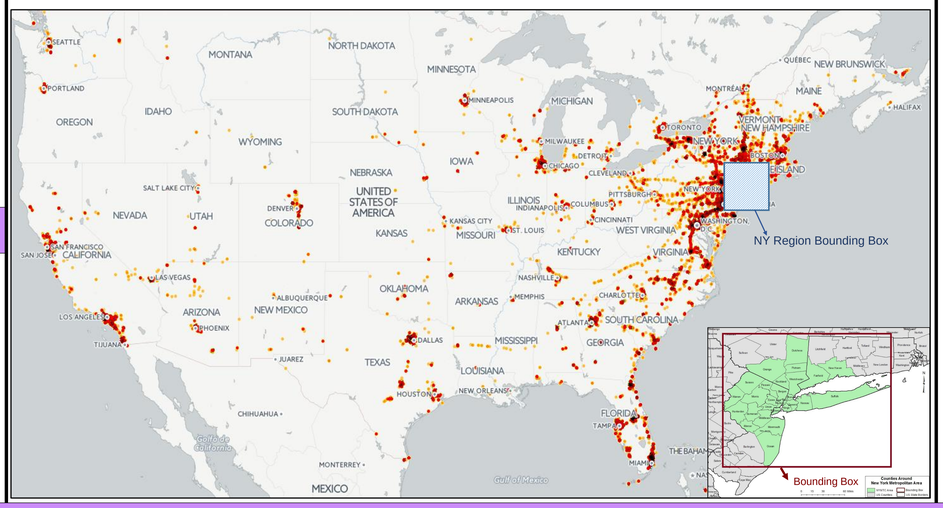
Step 1:

Identifying intercity travelers

- Dividing data file to inside & outside of the bounding box
- Identified 3,778 **intercity travelers**
- 552k+ records inside
- 64k+ records outside

Study Area

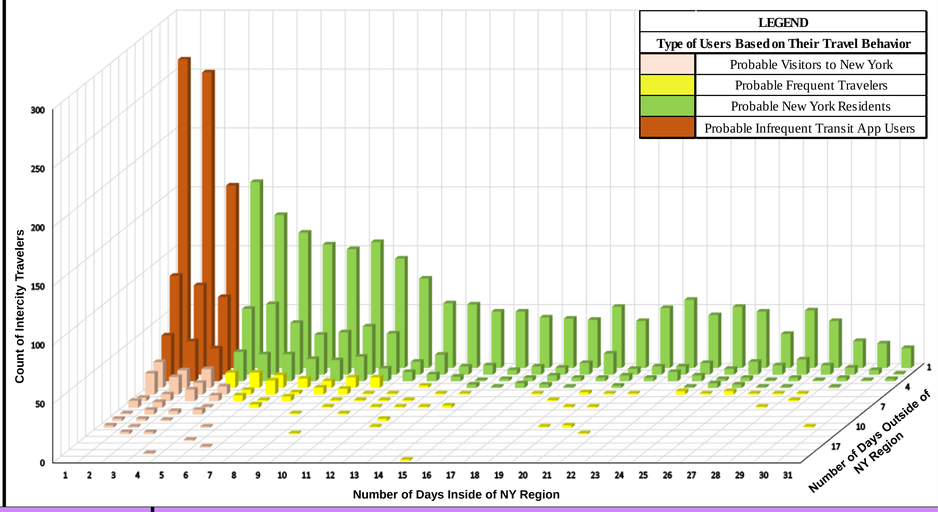
- New York metropolitan region
- High number of intercity travelers
- Highest concentration of transit trips
- A bounding box
- Geographic area defined by New York Metropolitan Transportation Council (NYMTC)



Step 2:

Classify intercity travelers

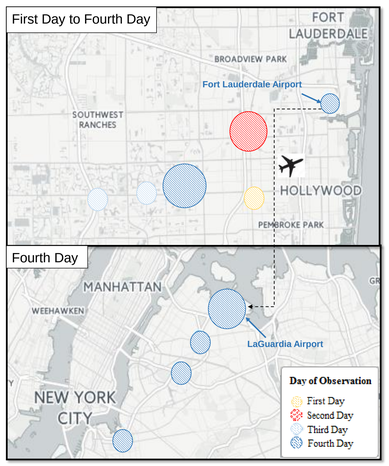
- Better understand their travel pattern
- For each intercity traveler: Count number of days using Transit App inside & outside of the bounding box
- 4 groups of intercity travelers



Visualizations of an Intercity Traveler Classified as Probable Visitor

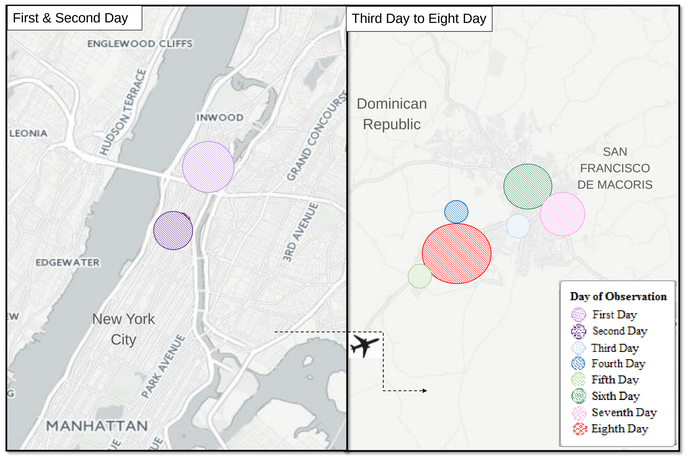
Example of a Probable Visitor; Inside United States

- 1 day in New York
- 4 days in Miami Florida
- Probably resident of Miami & visitor to NY
- However may be resident of NY & visitor to Miami and uses Transit app more in Miami because s/he is unfamiliarity with transit system there
- In airport locations both in Miami & NY



Example of a Probable Visitor; Outside United States

- 3 days in New York
- 6 days in Dominican Republic
- Probably resident of Dominican Republic & visitor to NY
- However may be resident of NY & visited Dominican Republic for 1 week and uses Transit app more in Dominican Republic because s/he is unfamiliarity with transit system there
- Dominican Republic is not among coverage areas of "Transit" app,
- User has opened the app and not exited the app properly, so the app keeps his/her information to the backend server.



Conclusions & Future Research & Limitations

Conclusions

- An exploratory method based on a new and rich data source
- 3,778 intercity travelers were identified
- 4 probable groups of intercity travelers were identified:
  - Visitors to New York/Visitors
  - Intercity travelers who frequently travel between cities
  - Residents of New York who infrequently leave the region
  - Infrequent Transit App/transit users who use Transit App
- An important first step toward identifying intercity travelers using backend data from a smartphone transit application

Future Research

- A longer timeframe (e.g., 1 year)
- Other factors for classifying intercity travelers:
- Consecutive number of days in a location, instead of the count of days inside & outside of a region.
- Patterns of using Transit App by days of the week
- Travel distance
- Additional data sources for validation:
- long distance travel survey
- designed survey of a sample of Transit App users
- Multi-regional nature of Transit App: expanded to other cities

Limitations

- Limited to travelers who are transit riders and get their needed transit information from the Transit app
- Good internet connection, turn on the data mode in the smartphone and use the Transit app

ACKNOWLEDGMENT

The authors acknowledge Transit App for sharing data for this research, and we are particularly grateful to Jake Sion. This research was supported in part by a 2015 City University of New York (CUNY) Collaborative Incentive Research Grant (CIRG) grant and a 2016 University Transportation Research Center (UTRC) faculty-initiated grant.

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