Orf 467

Transportation Systems Analysis

Fall 2017/18

ORF467F17 FINAL PROJECT

Assessment of RideSharing, 'Last-Mile" and Optimal Empty Vehicle Management of Large Regional aTaxi Operation

Due:

Preliminary Presentations: Saturday, January 6, 2018

Formal Presentation: Saturday, January 13, 2018

Written Report: Dean's Date, Tuesday, January 16, 2018

Data resources and tool:

Orf467National_aTaxiPixelGrid NationWide Trip Data

Nationwide NN (Person) Files

Kyle Transit Node & Link Files (possibly 'flowable"); ALK Transit, Amtrak and Airport node files

ALK "Level 2" 'flowable' Highway network: Links; Nodes ; ReadMe

Browser interactive Display using Bokeh example: http://orf467.princeton.edu/KylePrelimIneractiveDisplayUSA.html

Earth Point: Excel To Kml – Display Excel Files in Google Earth

Regional aTaxi Companies:

Products:

Assessment of Population Served Based on analysis of the NN Files:

1. Population total (whole region) & Geographic Distribution of population (Circle Map of county population located at {Lat,Lon} of county seat. Plot of {X,Y, Count of rows of NN File for that county}
2. PersonTrips total (whole region) & Geographic Distribution of PersonTrips/county {X,Y, Count of PersonTrips in NN File for that county}
3. Average PersonTripLength (whole region) & Geographic Distribution of AveragePersonTrip Length {X, Y, Sum GCD for all trips in County NN File(s) / Sum PersonTrips in County NN File(s) }
4. Cumulative distributions of Trip Lengths for all trips made by Region's residents: (Y: % of all < X, range 0->100%; X: 0 -> 100 miles)
5. Cumulative distributions of Age or Region's residents: (Y: % of all < X, range 0->100%; X: 0 -> 85 year)

Assessment of Trips Originating in the Region based on the NationWide Trip Data

1. Region Totals, Total/Person and % of All for WalkTrips (GDC < 0.5 Miles); ShortTrips (0.5 ≤ GDC < 10), NormalTrips ShortTrips (0.10 ≤ GDC < 100), LongTrips (100 ≤ GDC<400), ReallyLongTrips ShortTrips (400 ≤ GDC)
2. Cumulative distributions of Trip Lengths for all trips made by Region's residents: (Y: % of all < X, range 0->100%; X: 0 -> 100 miles)
3. Assessment of RideSharing Potential: AVO Analysis for the region as well as each state and rank order the county AVOs focusing on the top 10 in each region. Analyze only non-walk trips. DD = 300,420, 600; 1200 ; CD = 2x2, 3x3, 5x5, 10x10 for GD: <2,<10, <100, all else. Assume 5 passenger aTaxis.
4. Create the aTaxi Trips files for the region: {oXpixel, oYpixel, aTaxiDepartureTime, dXpixel, dYpixel, aTaxiMadeEmptyTime, aTaxiDistance, aTaxiDepartureOccupancy, SumOccupantTripMiles}
5. Determine SoD Demand and EoD Supply for:

a. Each pixel in your Region
b. Each 5x5 SuperPixelixels in your Region
c. Each 10x10 SuperDuperPixel in your Region

6. Make a circle plot for each above where radius of circle Log (value), Demand in Red, Supply in Green (1 will show as zero which is OK/great)
7. Determine the (max) Fleet size implications of each above
8. Assess how important it is for you to cooperate with your neighboring region.
9. Determine how many of your 5 Passenger aTaxis which are serving your customers (trips originating in your region) in each minute of the day (Increment a {1440x1} vector for all the minutes between each aTaxi's DepartureTime and MadeEmptyTime (Be careful to deal with the wrapped trips properly). Plot the results for the region.
10. If you are really ambitious, Flow your personTrips and your aTaxi trips on the ALK level 1 network

Assess**ment of Business Case for your Regional aTaxi Mobility-for-All System**

1. Capitalization:
   a. You'll purchase a Fleet of $60k 5 passenger electric aTaxis that is 1.15 times your min estimated fleet size that have a 150k miles life. Do the capitalization and the CapCost/mile. Assume empty repositioning is 30% of loaded miles (Unless you've done a better analysis above).
   b. You'll need to lease land for your parking of aTaxis at major pixels and nearby storage, maintenance and charging facilities as well as solar power acquisition. Figure out the needs, costs and implications on operating costs.
2. Operating cost: Figure it out
3. Revenue: Create a win-win pricing model that is attractive to both you and your customers. Are there other sources of revenue?
4. Do a pro forma balance sheet for the business as a whole and possibly for each state.

Assessment of Last-Mile access to Transit, AMTRAK and Airports.

Using the Transit, Amtrak and Airline TripFiles in NationWide Trip Data

Determine:

1. The number of PersonTrips on each system and the Sum of Originations and Terminations at each station, airport.
2. Compare these values with published values for each system.
3. Plot the characteristics using Geographic circle charts {X, Y, Value}

Groupings:

1. NorthEast: ME,VT,NH, Mass, RI, CT, NY, NJ, DE, MD, PA, WV, DC, VA (14)
2. South: NC, SC, GA, FL, AL, MS,TN, AR, LA (9)
3. MidWest: OH, KY, IN, IL, MI, MO, IA, MN, WI (9)
4. Plains: ND, SD, NE, KS, OK, TX, NM, CO, WY, MT (10)
5. West: Idaho, Utah, AZ, NV, CA, OR, WA, AK, HI (10)
6. Transit, Amtrak, Airports

Group	Lead				
NorthEast	Magill	Plissner	Anderson	Agbim	
South	Ramchoreeter	Teng	Wang		
MidWest	Johnson	Kallfeiz	Bransford	Kelly	Argue
Plains	Yang	Fu	Yuan		
West	Cakmak	Erkalova	Wu	Wagner	
Transit/Amtrak/Airports	Joshi	Kabir	Weng		