



Orf 467 Fall 2014

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Analysis of Demand for and Management of NJ_aTaxi System

1. Starting assumptions:

- a. Everyone now has a clean ABC_OTrips.csv and ABC_DTrips.csv files for each of their county. Where ABC_OTrips.csv contains all of the trips that Originate in county ABC on a typical day that can potentially be served by the NJ_aTaxi System.
- b. Neither file contains any “intraPixel” trips or what we have defined as “walkTrips”.
- c. Each trip in each file has a legitimate pixelOrigination, pixelDestination, departureTime and arrivalTime (both in “wrapped” seconds form midnight).
- d. Originations from (and Destinations to) NYC and PHL have been translated to the NJT_RailStationPixel nearest the Destination (and Origination) of each of these trips.
 - i. Also... for trips destined to NYC/PHL, their arrival time at the nearest NJT_RailStationPixel will be corrected using the distance between OPixel and the NJT_RailStationPixel.
 - ii. For trips originating in NYC/PHL, their departure from the NJT_RailStationPixel nearest their destination will be **advanced** from that on the original data element in several ways:
 1. First to simulate train departure times from NYC/PHL (we’ll assume 15 minute service to Hudson and Bergen Counties, 30 minutes everywhere else.
 - a. to the next 15 minutes if destined to rail stations in Bergen or Hudson counties, or
 - b. to the next 15 minutes if destined
 2. Next by an amount of time required to travel the Pixel distance between NYC/PHL and NJT_RailStationPixel @ 30mph (This should give us a lot of trips arriving at the same time at each of the rail stations where we’ll find the largest propensity for ride sharing!, maybe?)
 3. The arrival time at the trip destination is then advanced from the new (rail station) departure time by the standard method.
- e. The file layout is as we’ve previously agreed:
 1. a pointer to the county of residence of the traveler
 2. a pointer to the traveler in the original county file
 3. trip origin data
 - a. O_Y_aTaxi
 - b. O_X_aTaxi”
 - c. O_Time
 4. trip destination data
 - a. D_Y_aTaxi
 - b. D_X_aTaxi”
 - c. D_Time (if this does not exist, then compute it by computing the distance between O&D, dividing by 30mph and adding to O_Time (get the units right!! Time is in hours from midnight modulated by length of day (trips

running into the next day are taken to be termination of the equivalent trip on the previous day).

2. Analysis of aTaxiStand Departure and Arrival Volumes

- a. Generate the distribution of Trip Originations and Destinations for each aTaxiStand (aka Pixel) in your county.
 - i. Produce a cumulative distribution of these volumes (one for O another for D) Both should have the same scale, a title and a legend and some grid lines.
 - ii. Produce a table of the 20 most active pixels with the following data elements: Pixel Name (give it a name that would make it recognizable by the locals), PixelLatCoords, PixelLonCoord, Ovol, DVol (use commas!)
 - iii. Produce a 3d OVol chart of these 20 labeling some if not all of the “skyscrapers”.
 - iv. Produce a 3d Ovol chart of all pixels having a value ≥ 100

3. Analysis of aTaxi RideShare Potential

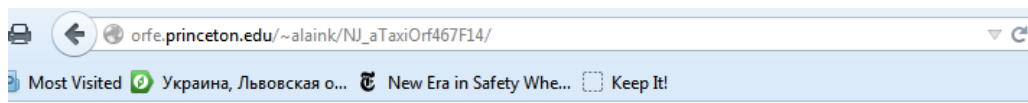
- a. Sort ABC_OTrips.csv by O_Y_aTaxi, O_X_aTaxi”, O_Time
- b. Create a DepartureQueueArray(i,j) :
 - i. Columns, j: 1: Destination_YPixel, 2: Destination_XPixel, 3: aTaxiDepartureTime, 4: aTaxiOccupancy, 5: Waiting_aTaxis (number of occupied aTaxis waiting to depart at time of departure), 6: ExpectedArrivalTime
 - ii. Rows, i: represent individual aTaxis waiting to depart; Allow for up to, say, 100 waiting-to-depart aTaxis
- c. Set DepartureQueueArray(i,j) = 0 for all i=1, 100; j=1,5
- d. Choose an aTaxiWaitTime, say 2 minutes (Do the analysis for 1, 2, 3, 4 and 5 minutes)
- e. Set aTaxisWaitingToDepart = 0
- f. For each unique pixel....
- g. Set k=1
- h. Read kth (next) ABC_OTrips.csv: ABC_OTrips(k,m)
 - i. If DepartureQueueArray(1,3) < ABC_OTrips(k,3) + aTaxiWaitTime
 1. Depart the 1st aTaxi
 - a. aTaxisWaitingToDepart = -
 - b. Append DepartureQueueArray(1,j) j=1,5 and ABC_OTrips(k,1) And ABC_OTrips(k,2) to **Departed aTaxis.csv** (Layout: Destination_YPixel, 2: Destination_XPixel, 3: aTaxiDepartureTime, 4: aTaxiOccupancy, 5: Waiting_aTaxis (number of occupied aTaxis waiting to depart at time of departure), 6: ExpectedArrivalTime, 7: O_YPixel, 8: O_XPixel)
 - c. “pop-up” all values of DepartureQueueArray(i,j)
 - d. Let p = aTaxisWaitingToDepart
 - e. DepartureQueueArray(i,5) = p for i=1,p
 2. Check i. until test fails
 - ii. For i= 1, aTaxisWaitingToDepart
 1. If ABC_OTrips(k,3) = DepartureQueueArray(i,1) and ABC_OTrips(k,4) = DepartureQueueArray(i,1)
 - a. DepartureQueueArray(i,4) =+
 - b. Go to g.
 - iii. Place trip in new aTaxi
 1. Let p= aTaxisWaitingToDepart + 1
 2. DepartureQueueArray(p,1) = ABC_OTrips(k,3)
 3. DepartureQueueArray(p,2) = ABC_OTrips(k,4)
 4. DepartureQueueArray(p,3) = ABC_OTrips(k,5) + aTaxiWaitTime
 5. DepartureQueueArray(p,4) = 1

6. $\text{DepartureQueueArray}(i,5) = p$ for $i=1,p$
 7. $\text{DepartureQueueArray}(i,6) = \text{ABC_OTrips}(k,8) + \text{aTaxiWaitTime}$
- iv. Go to g.
- v. When done summarize `Departed_aTaxis.csv` by counting the number of aTaxis that departed with 1, 2, 3, 4, 5 etc passengers. What was the average aTaxi occupancy?

4. Analysis of aTaxi flows in/out of aTaxiStands

- a. For each of the top 20 aTaxiStands in each county...
 - i. Create an aTaxi arrival stream for each pixel by combining all the `Departed_aTaxis.csv` from all counties and sorting by destination Pixel and expected arrival time
 - ii. For some large high volume stations play the cumulative aTaxiDispatchTimes and the aTaxiExpectedArrivalTimes on the same graph. Discuss imbalances throughout the day.

http://orfe.princeton.edu/~alaink/NJ_aTaxiOrf467F14/
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Index of /~alaink/NJ_aTaxiOrf467F14

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	AlainMrecreAnalysis/	28-Dec-2014 09:32	-	
	Brownell Kornhauser 2014TRB Paper FINAL.pdf	09-Oct-2014 14:28	813K	
	Disaggregated Pixel Statistics NJ.xlsx	10-Nov-2014 09:57	80M	
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	mer2 DD300CD3 wAVOConstraint.csv	20-Nov-2014 08:30	23M	
	oTrips ByCountyByMode/	04-Dec-2014 18:48	-	
	oTrips FileLayoutExample.pdf	10-Nov-2014 17:19	198K	
	oTrips FileLayoutExample.xlsx	10-Nov-2014 17:18	13K	
	trainTrips with more information/	04-Dec-2014 18:19	-	

