

Orf 467
Transportation Systems Analysis
Fall 2017/18



HW-7 Initial Investigation of Empty Vehicle Repositioning Needs for Shared aTaxis to serve your county's intra-county trips.

Due: Precept Monday, Dec 11, 2017

We have 5 things to accomplish in order to be able to begin to investigate how large the aTaxi fleet will need to be to provide mobility for various areas of the USA's aTaxi serving PersonTrips < 100 GCD Miles, assuming a DD={300, 420, 600} CD= SperPixel {1, 3, 5}.

We need:

1. The ride-sharing analysis for all pixels for a county (Trips that go outside the county are dropped out of the analysis (for now))
 - a. If the Trips destination pixel is not one of the origination pixels, then remove it from the analysis)
2. Create a file containing the departure time and occupancy of each aTaxi departing from each pixel and its final arrival pixel and arrival time throughout your county for a typical day. (Demand for aTaxis to load up with rider(s) by location (pixel) by ToD)
3. Assume aTaxis are infinitely large (can accommodate all traveling groups. This means that we simply buy a fleet of expandable aTaxis)
 - a. Determine the Initial Distribution of aTaxis that will be needed so that no repositioning needs to be done throughout the day, yet all trips will be served. What is that Fleet size?
 - b. Determine the number of aTaxis moving during any minute of the day. Plot that histogram. Find the largest value (That is the Minimum Fleet size). What is its value and at what time does this condition occur?
 - c. What is the extent (# aTaxis moved empty how far) Overnight Empty Vehicle Repositioning in order to get taxis from where they end up during the day to where they'll be needed (in order to not run out tomorrow, assuming tomorrow is the same as today. (a heroic assumption))
4. Assume that your atTaxis can accommodate at most only 4 passengers.
 - a. Redo the ride-share analysis and regenerate the aTaxis movements throughout the day. (redo step 2 above)
 - b. Redo 3a
 - c. Redo 3b
5. Suggest a "simple "back-of-the-envelope" empty vehicle management strategy to be used during the day that would allow the Fleetsize to be closer to the minimum Fleetsize.

Please refer to Shirley Zhu's Thesis ([Zhu'16MakingTransportationGreat_Thesis.pdf](#)) and [Interplay Between Fleet-size, LoS and EmptyRepositioning](#) S. Zhu & A. Kornhauser for background. As well as [Management of Empty aTaxis](#)