

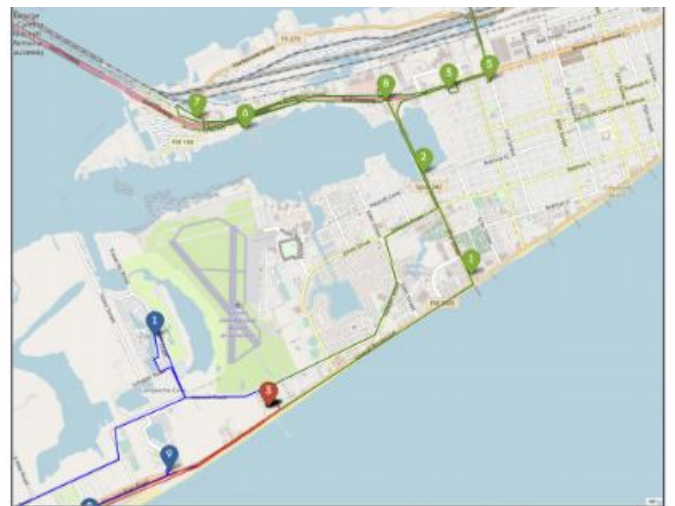


Perpetual is a nonprofit organization aiming to reduce plastic waste by creating city-wide reusable foodware systems. An example flow of a reusable cup is as follows: a coffee shop will serve a customer in a reusable cup, the customer will leave and enjoy their coffee, when they visit the local grocery store later in the afternoon they will dispose of their reusable cup into a collection bin, the next morning the used foodware will be taken to a washing center, the cup will be washed and then distributed back to a business that will use it.



In order to create a city-wide reusable foodware system, we needed to identify potential participating businesses, locate places where trucks can stop to distribute clean foodware to these businesses, locate convenient places for users to dispose of their used foodware, and calculate the best routes for vehicles to take for distributing and collecting foodware. Since perpetual is working in 4 cities, the goal was to create reusable scripts that can be used for each city.

Our team handed over a git repository and series of datasets that accomplished the goals of Perpetual. Business data was collected from google and yelp APIs. Residential data was gathered from city GIS websites. With these datasets, the team handed over scripts that perform spatial clustering to identify the best locations for trucks to stop and distribute clean foodware and identify the best locations for customers to return used foodware. After these stops were identified, there is a script that calculates the optimal truck routes between these locations and corresponding visuals to show stakeholders. This entire process was thoroughly documented and could continue to be used in new cities as Perpetual expands.



Example visual of 3 truck routes (indicated by color) with the order of stops that they each make