Perpetual - FUE, Distribution Point, and Collection Point Locating

Nonprofit Perpetual aims to reduce plastic waste resulting from single-use foodware by implementing city-wide systems of reusable foodware. These systems include three different locations: FUEs (foodware-using establishments), distribution points, and collection points. FUEs are businesses that serve customers in reusable containers provided by Perpetual, distribution points are locations central to multiple FUEs where Perpetual trucks deliver the reusable foodware, and collection points are places where customers can return dirty foodware to be picked up, washed, and re-distributed.

This past quarter, four undergraduate UChicago students helped Perpetual identify the locations of FUEs, distribution points, and collection points for Hilo, HI and Galveston, TX. First, they searched those cities for businesses that likely use disposable foodware, accessing Google Maps and Yelp data through public APIs. Having found a comprehensive list of FUEs for the two cities, the students moved onto searching for distribution points. To do this, they clustered the FUEs to find central locations, making it so all FUEs were near a distribution point and the distribution of reusable foodware would be convenient.

Next, the students searched for collection points. Using parcel data (information on each lot of land/building in each city), the students identified parcels where proximity to a collection point might be useful. To find collection points locations, they clustered these parcels to find central locations. However, the students realized these theorized points might be in infeasible locations, like someone's backyard. To address this issues, they found the business closest to each proposed location, figuring businesses would be suitable places for collection points.

Last, the students looked for optimal routes to pick up and drop off the reusable foodware. They used Google OR Tools to determine the distances between each collection and distribution point and to obtain optimal routes that minimized the distance between stops.

