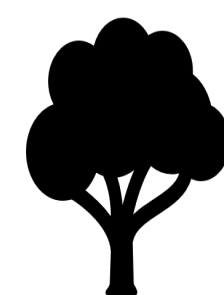




Optimal Placement of Speed Feedback Signs

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Motivation:



We set out to find an optimal placement of speed feedback signs in the City of Boston in order to reduce accidents related to speeding. We scored potential speed sign locations based on proximity to “triggers”, which we defined as schools, hospitals, parks, and accident hotspots. We hope to solve this problem by placing signs so that the average distance between each sign and its nearby triggers is minimized, in order to protect vulnerable areas.

Data Resources:



All of our data is from various open data portals provided by the City of Boston.

Methods:



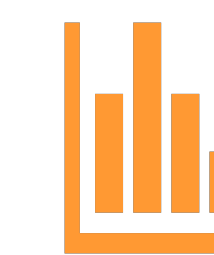
Part I: Placement of speed feedback signs

- Cluster accidents into accident hot spots via K-Means clustering
- Filter intersections by proximity to the accident clusters
- Run K-Means on equally weighted data points or ‘triggers’ (school, hospital, accident clusters locations, etc.)

Part II: Statistical Analysis

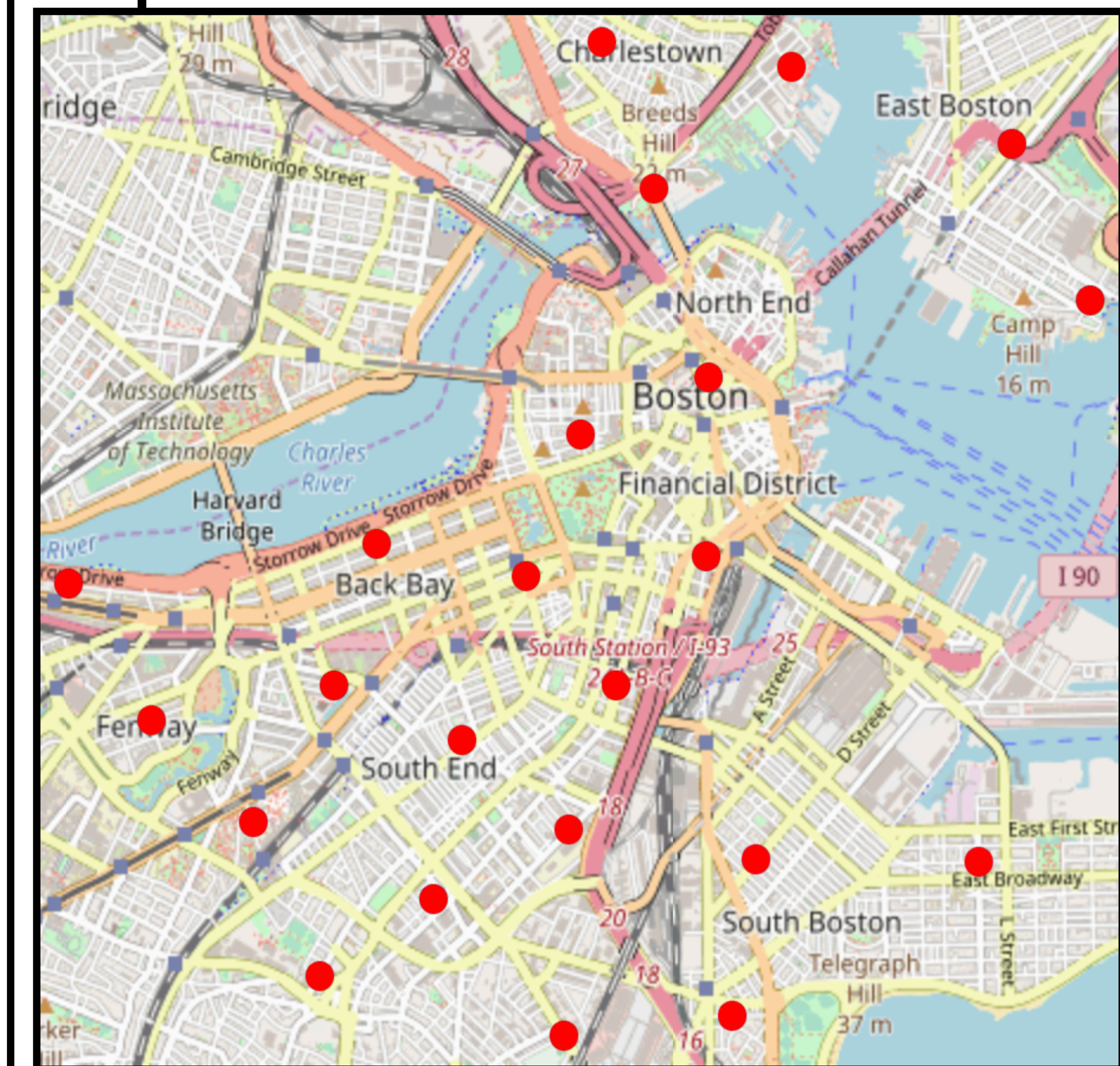
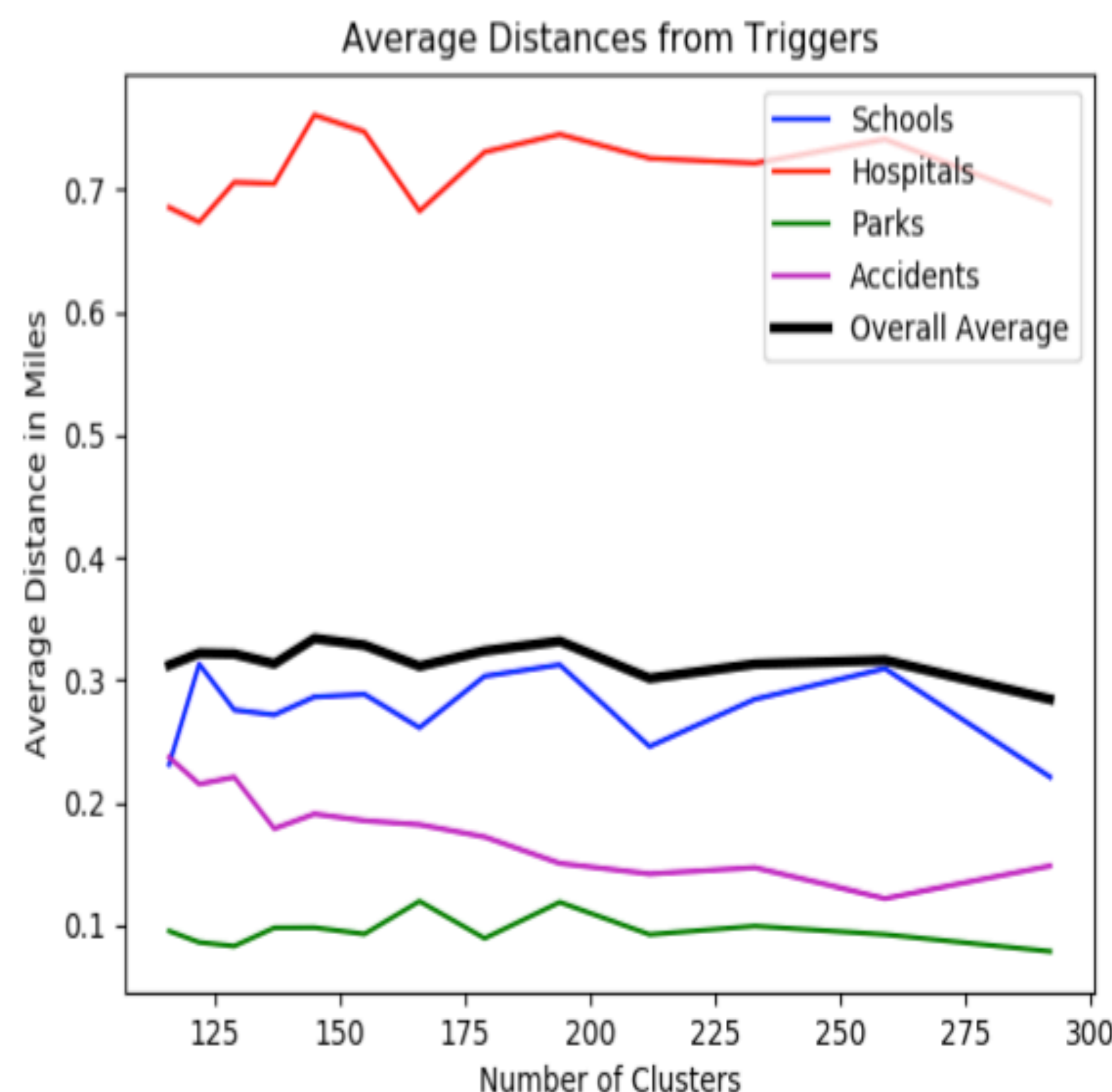
- # clusters = # accidents / cluster divisor c
- Run steps in Part I with c values in range(200, 190, ..., 80) and store avg distances of each sign to the triggers nearby
- For each value of c , find the averages of the averages of all the triggers
- Optimal number of clusters a minimizes distance of sign to other triggers (i.e. $a = \# \text{ of accidents} / c$)

Statistical Findings/Results:



Using the stated methods, we were able to map an optimal placement while also finding the amount of “accident hotspots” that would minimize a sign’s average distance from triggers.

- When finding the average distances from signs to each trigger (shown below), the overall distance was minimized when the number of clusters was 212 when placing 30 signs each at least 2 miles apart.
- Hospitals were the only complicating trigger, increasing the overall average (likely due to their scarcity and sparsity, thereby increasing the average).
- The placements for the signs for the visualization default averages is shown on the right, being evenly spread out among all parts of Boston



Future Works:



- Option to focus optimization of placements on sub-areas in Boston
- Narrow optimization area to places with high volumes of traffic to maximize zoning efficiency
- Use other critical areas, such as elderly homes, as additional parameters for determining placement