Identifying Pharmacy Deserts on Residential Distribution

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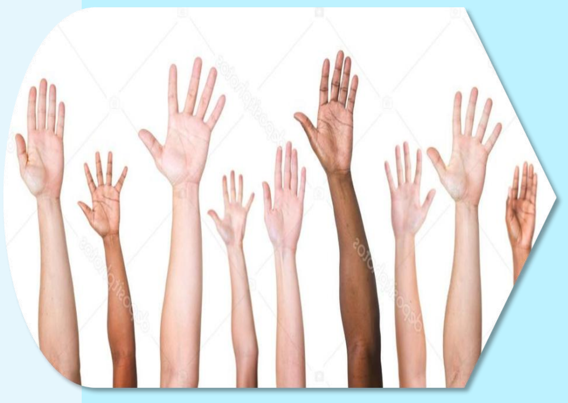
1 INTRODUCTION

Pharmacy Deserts (PDs)

Geographic areas with limited access to nearby pharmacies.



The impact of analytical methods in identifying PDs by demographic and socioeconomic factors is challenging.

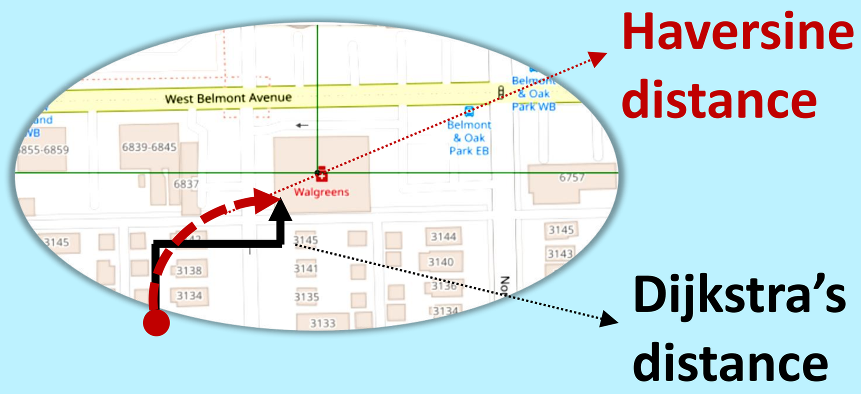
Using diverse models e.g., centroid and tracts, along with metrics like traveling distance led to variations in the mapping of PDs which impacts decision-making.

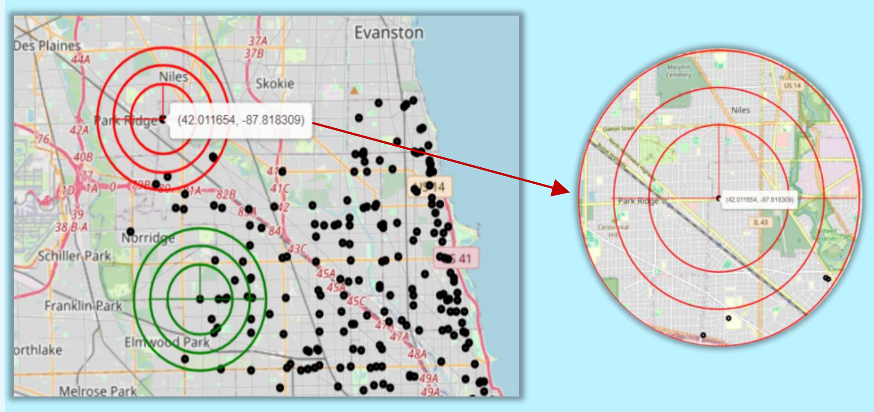
Goals

- To identify PDs according to the nearest distance between pharmacies and households by using Haversine & Dijkstra's methods in various distance thresholds.
- To display findings in a user-friendly interface.

2 METHODOLOGY

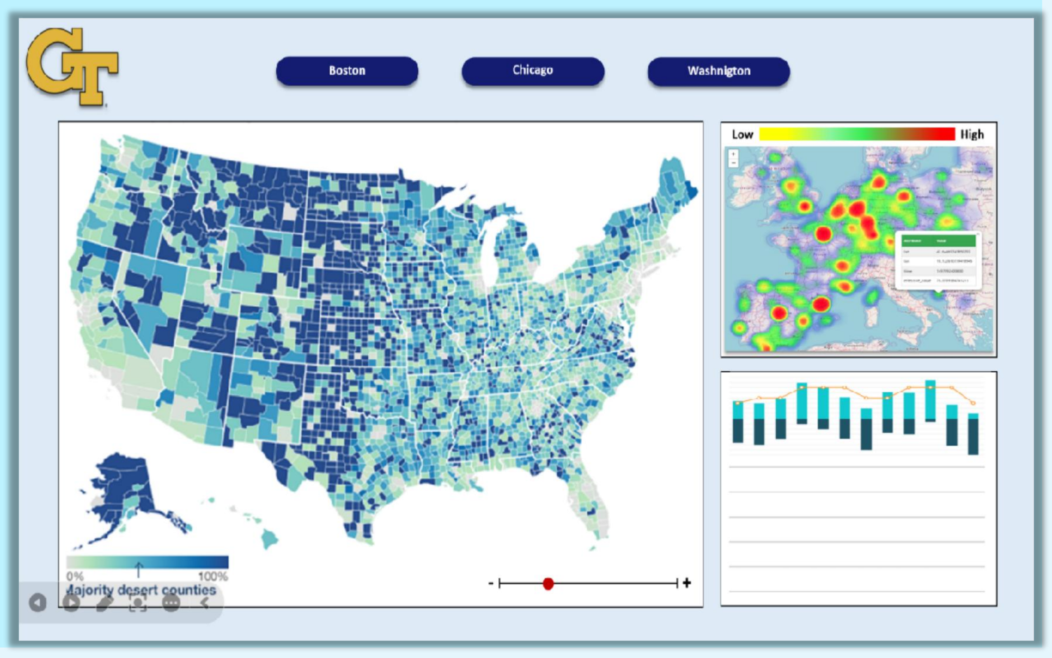
1. Computing the nearest distance between pharmacies and households.

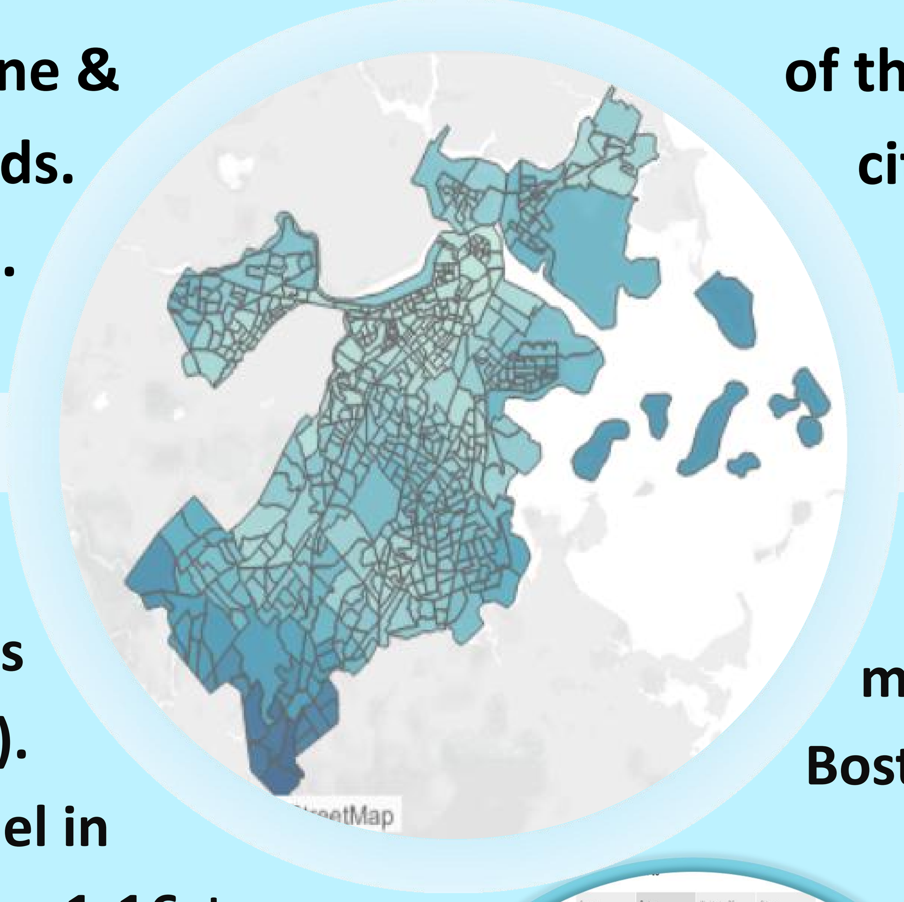




2. Identification PDs for both methods under 1.0, 1.5, and 2.0 miles distance thresholds.

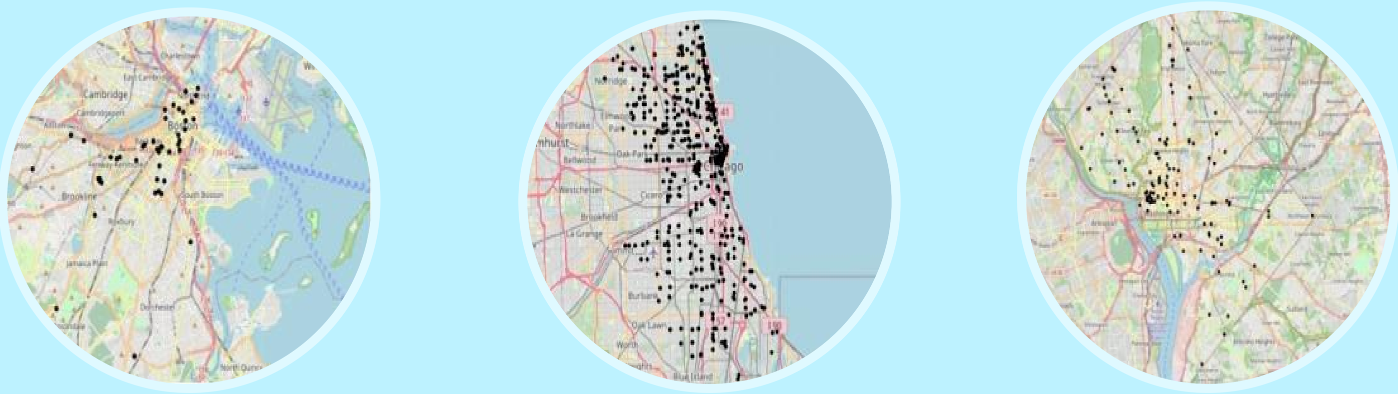
3. Developing a UI for visualization of PDs distributions by tracts, demographics, and socio-economics features on map of the three cities.



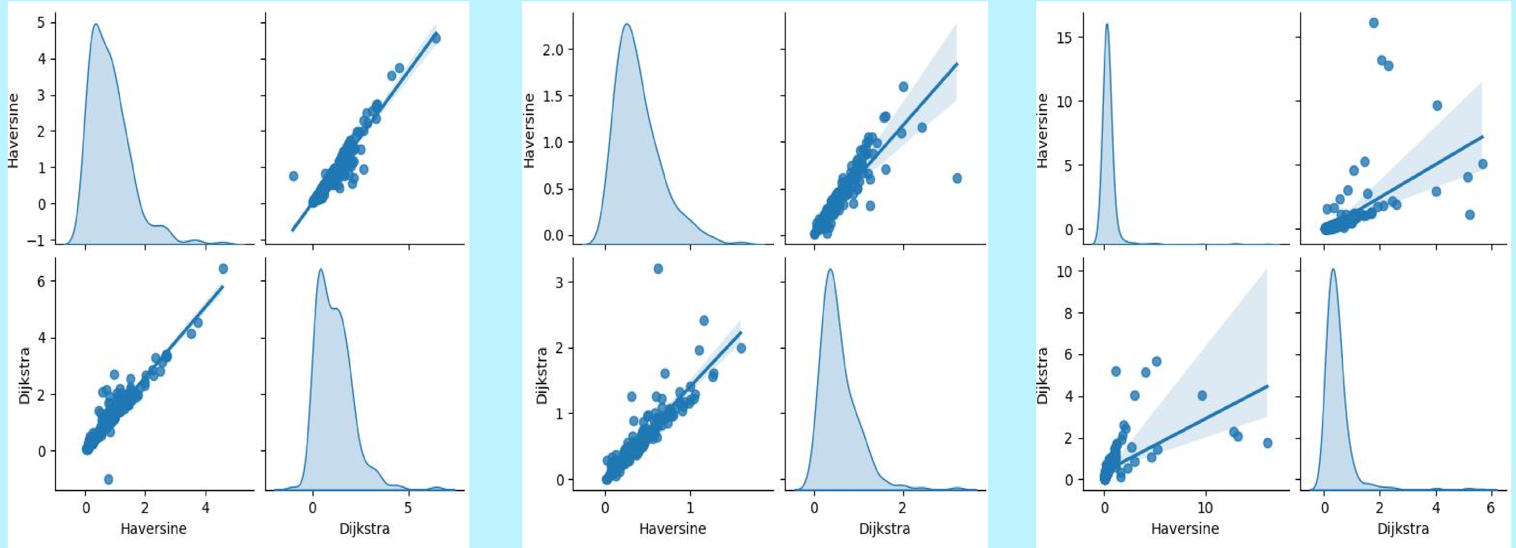


3 RESULTS

The performance difference between both models was minimal in Chicago (0.5 ± 1.34 vs. 0.49 ± 0.59). Haversine distance was lower than Dijkstra's model in Boston and Washingtonaverage (0.84 ± 0.72 vs. 1.16 ± 0.95 and 0.4 ± 0.27 vs. 0.57 ± 0.43, respectively).

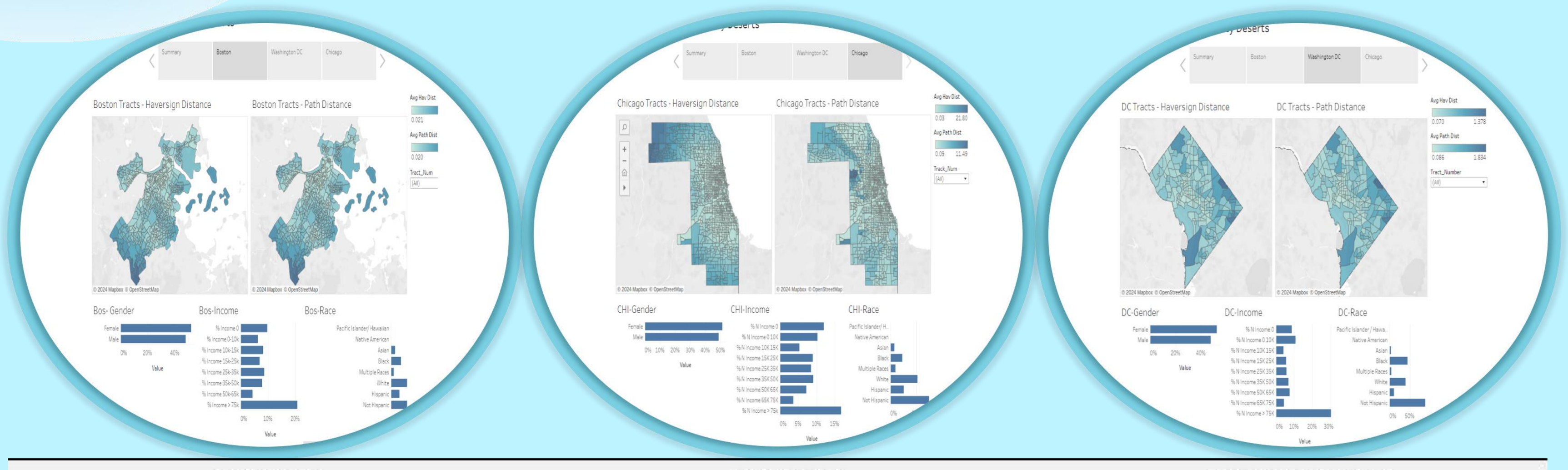


Boston | Chicago | Washington

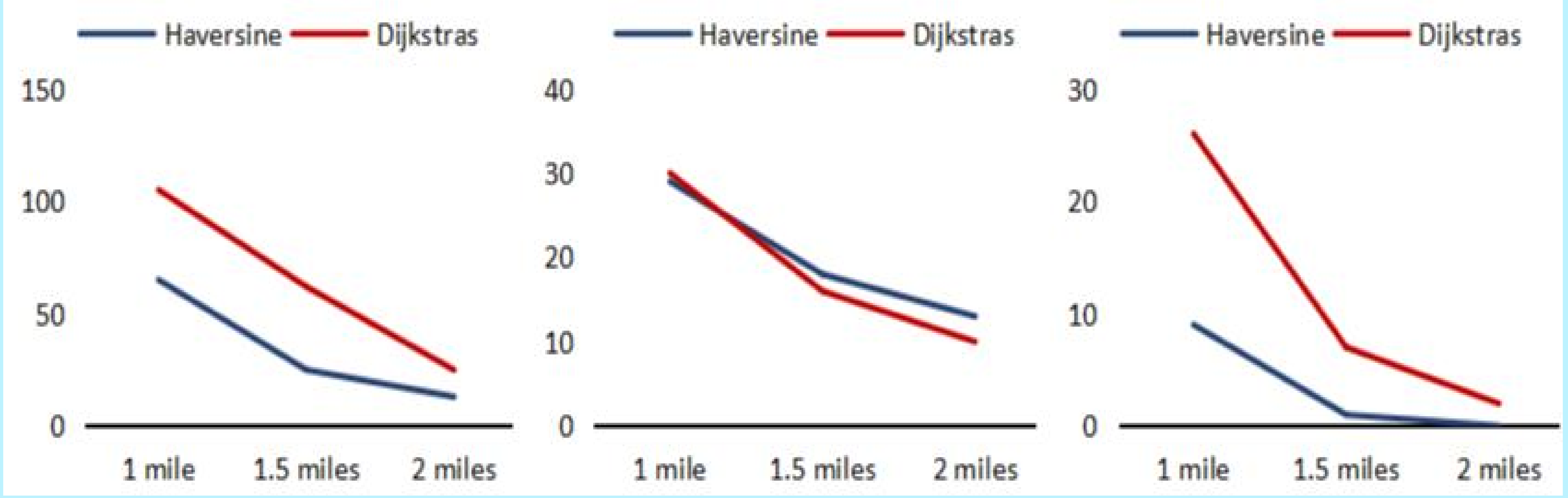


The Haversine distance was strongly correlated with Dijkstra's distance in Chicago, Boston, and Washington (p-value: 2.07e-39 vs 4.81e-104 and 3.14e-63, respectively).

Dijkstra's algorithm outperformed Haversine model in identifying PDs across all thresholds in Boston, Chicago, and Washington.



Boston				Chicago				Washington			
Threshold	Model	PDs(%)	Accuracy	Threshold	Model	PDs(%)	Accuracy	Threshold	Model	PDs(%)	Accuracy
1.0	H	65 (31)	80.7	1.0	H	29 (7)	80.7	1.0	H	9(4)	80.7
	D	L05 (51)			D	30 (7)			D	26 (13)	
1.5	H	25 (12)	82.1	1.5	H	18 (4)	82.1	1.5	H	1 (0)	82.1
	D	62 (30)			D	16 (4)			D	7 (3)	
2.0	H	13 (6)	94.2	2.0	H	13 (3)	94.2	2.0	H	0 (0)	94.2
	D	25 (12)			D	10 (2)			D	2 (1)	



4 CONCLUSION

Analysis of nearest distances via two models in a composite of centroid and household models under various distance thresholds identified PDs by demographic and socio-economic features showed the superiority of Dijkstra's over the Haversine distance, particularly at lower thresholds. Increase of threshold reduces the distinction between the two models.