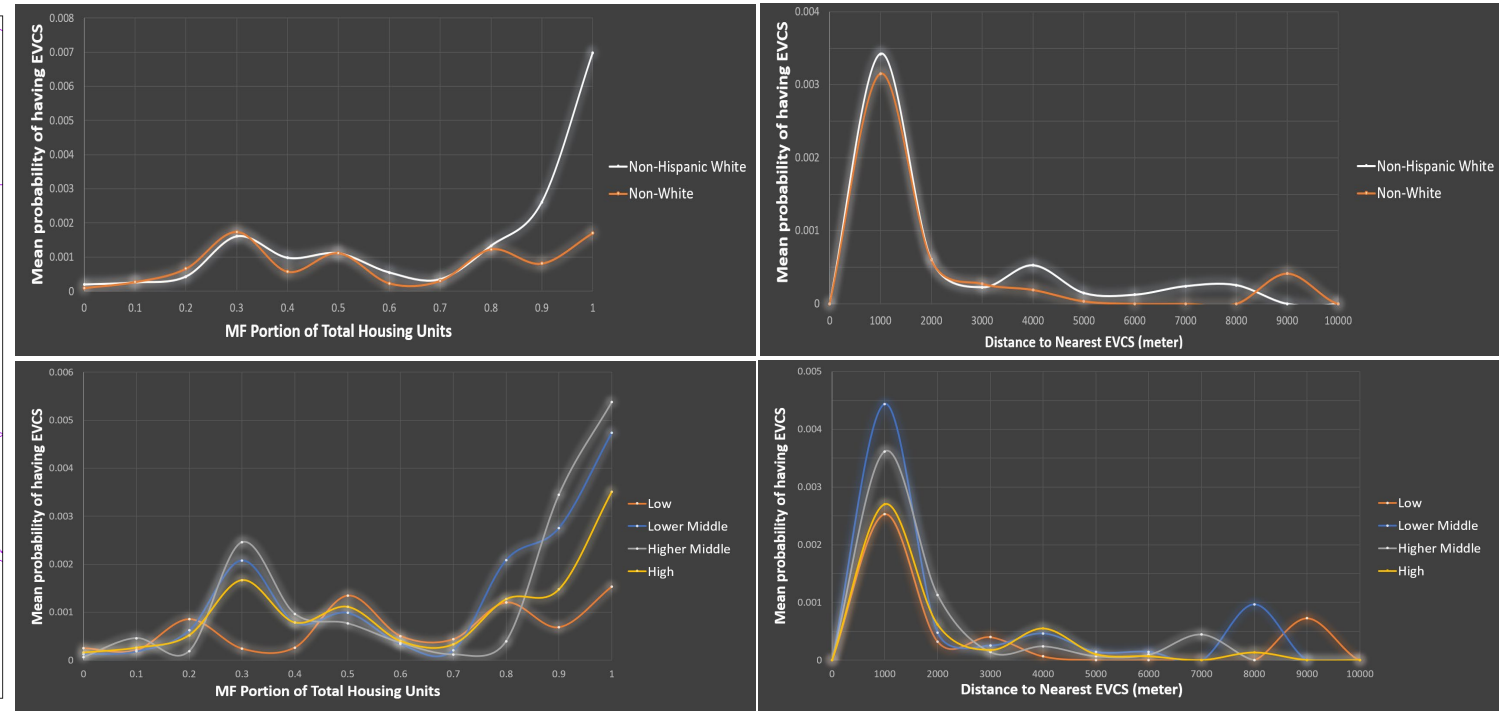
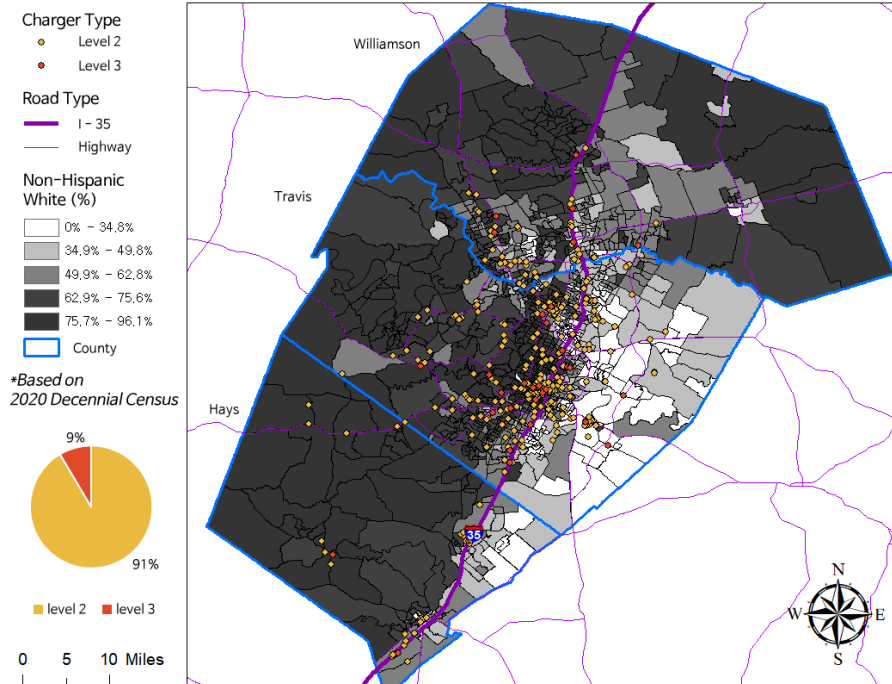


Toward Equitable Transportation Electrification in Austin, TX

PI: Junfeng Jiao; Presenter: Seung Jun Choi

Community and Regional Planning
School of Architecture

1. Measuring Public EVCS Access Disparities in Austin, TX



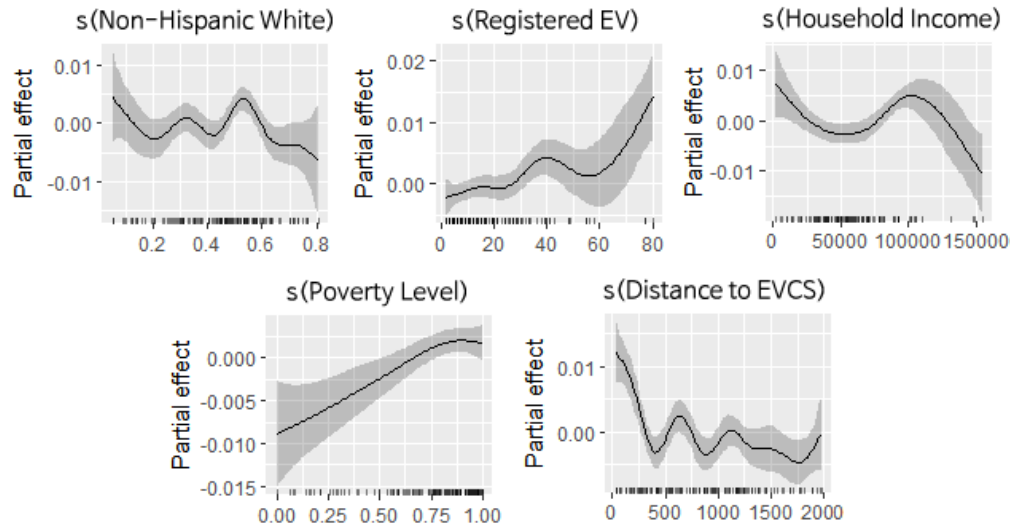
“Transportation Electrification should bring equity discourse.”

“The early stage of skewed public charger deployment issues exists in Austin.”

- The analysis results revealed that public charger access disparity exists in Austin, TX with **most chargers being installed in areas where the majority population is Non-Hispanic White.**
- There was a more equal distribution of public chargers across income quartiles when compared with race. **However, middle- and high-income groups had better access than lower-income communities** in terms of distance to nearest public chargers.

2. Measuring Public EVCS Access Disparities in Austin, TX

Estimated Smoothness of Statistically Significant Explanatory Variables

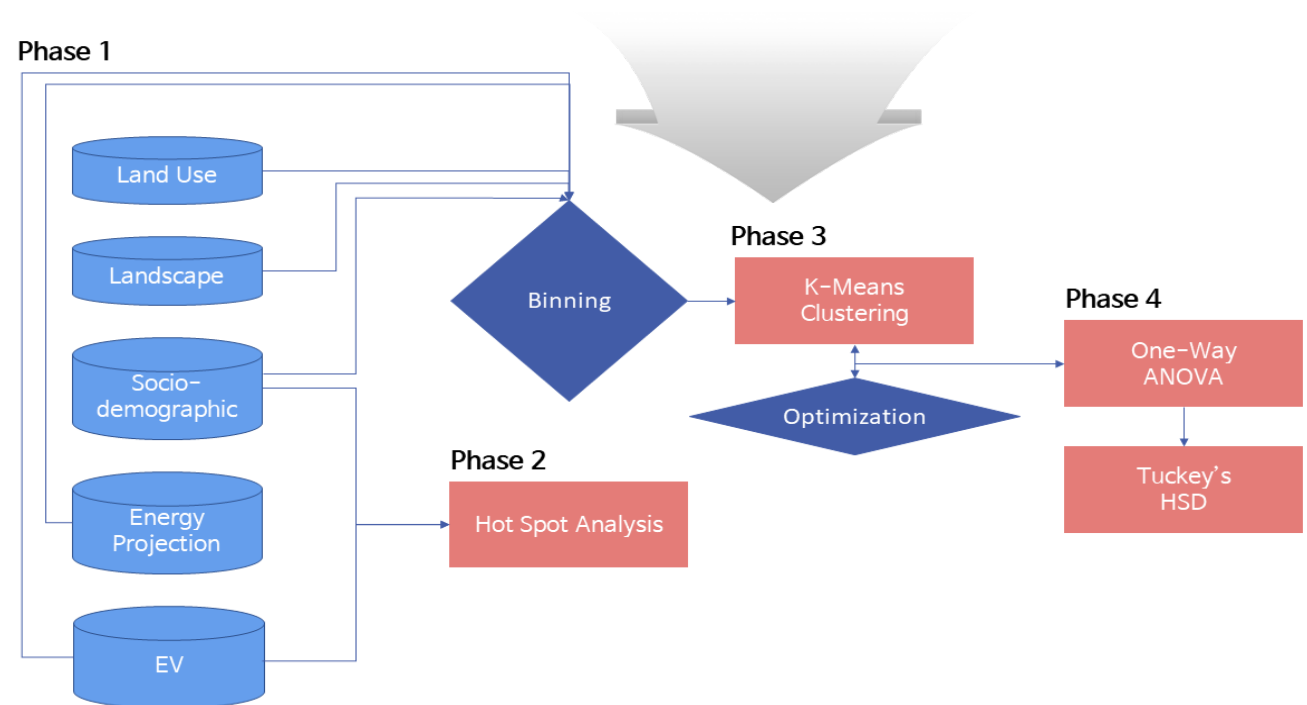


GAM Model								
Index	Estimate	Std. Error	t value	P-value	EDF	Ref.df	F-value	P-value
Constant	0.002	0.000	8.983	0.000***	--	--	--	--
Urban	0.002	0.000	8.983	0.000***	--	--	--	--
s(Non-Hispanic White)	--	--	--	--	7.922	8.656	2.922	0.004**
s(Registered EV)	--	--	--	--	5.294	6.247	3.701	0.002**
s(Median household income)	--	--	--	--	4.908	5.934	5.597	0.000***
s(Poverty level)	--	--	--	--	2.589	3.536	4.285	0.005**
s(Distance to nearest public EVCS)	--	--	--	--	8.705	8.959	6.195	0.000***
s(Distance to nearest highway)	--	--	--	--	2.138	2.472	2.305	0.075
s(MF)	--	--	--	--	1.000	1.000	3.691	0.058
s(Education)	--	--	--	--	4.460	5.476	1.580	0.166
s(Owner occupancy)	--	--	--	--	1.000	1.000	1.546	0.217
s(Vehicle occupancy)	--	--	--	--	1.000	1.000	1.844	0.178

*** p < 0.001; ** p < 0.01; * p < 0.05; s() indicates that the term is considered non-linear term; Chi-Squared test (simple OLS < GAM***).
 Dependent variable is a proportion of EVCS in a particular CBG relative to all the CBGs.

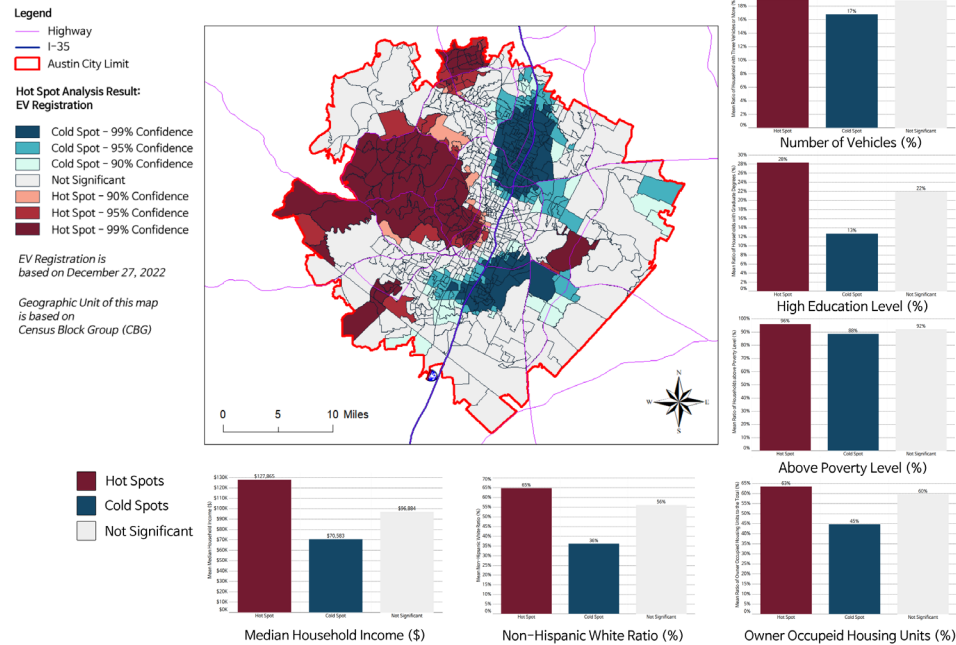
- Our GAM regression results found that communities with more registered EVs, lower poverty levels, closer proximity to chargers, and located in urban areas have better chance to access to public EVCSs.
- Comparing historically disadvantaged race and income groups such as lower-income and minority communities show a more pronounced disparity.

Methodological Flow Chart of Employing Unsupervised Machine Learning Technique

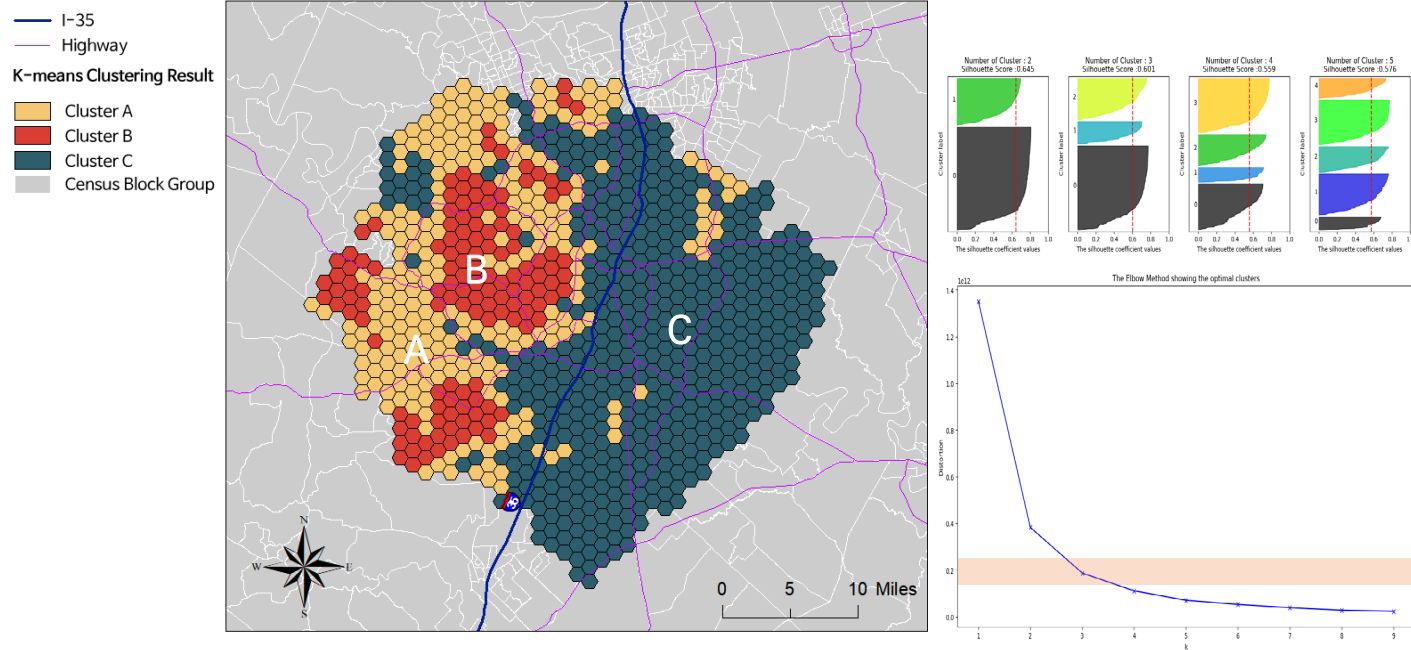


3. Measuring EV Ownership Disparities in Austin, TX

Hot Spot Analysis Result



K-Means Clustering Result & Optimization



- Hot spots have a 29 percentage point higher chance of having Non-Hispanic White population than cold spots, and the mean median household income in hot spots is 81% higher than in cold spots.
- The results of our study align with those of previous studies conducted in California and New York City (Guo et al., 2021; Hsu & Fingerma, 2021; Khan et al., 2022).

- The K-means clustering analysis revealed a hidden spatial disparity with three types of clusters. The disparity was evident between East and West Austin, and **there were also significant differences within West Austin.**
- In West Austin, there was a cluster with a high EV registration rate composed of a greater proportion of the White alone population, high income and education levels, and ownership of multiple vehicles. Notably, this cluster had more SF housing units and open space land use but was also projected to consume greater site energy.



Thank You



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