

GEOG 596A Proposal

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Public EV Charging Station Growth

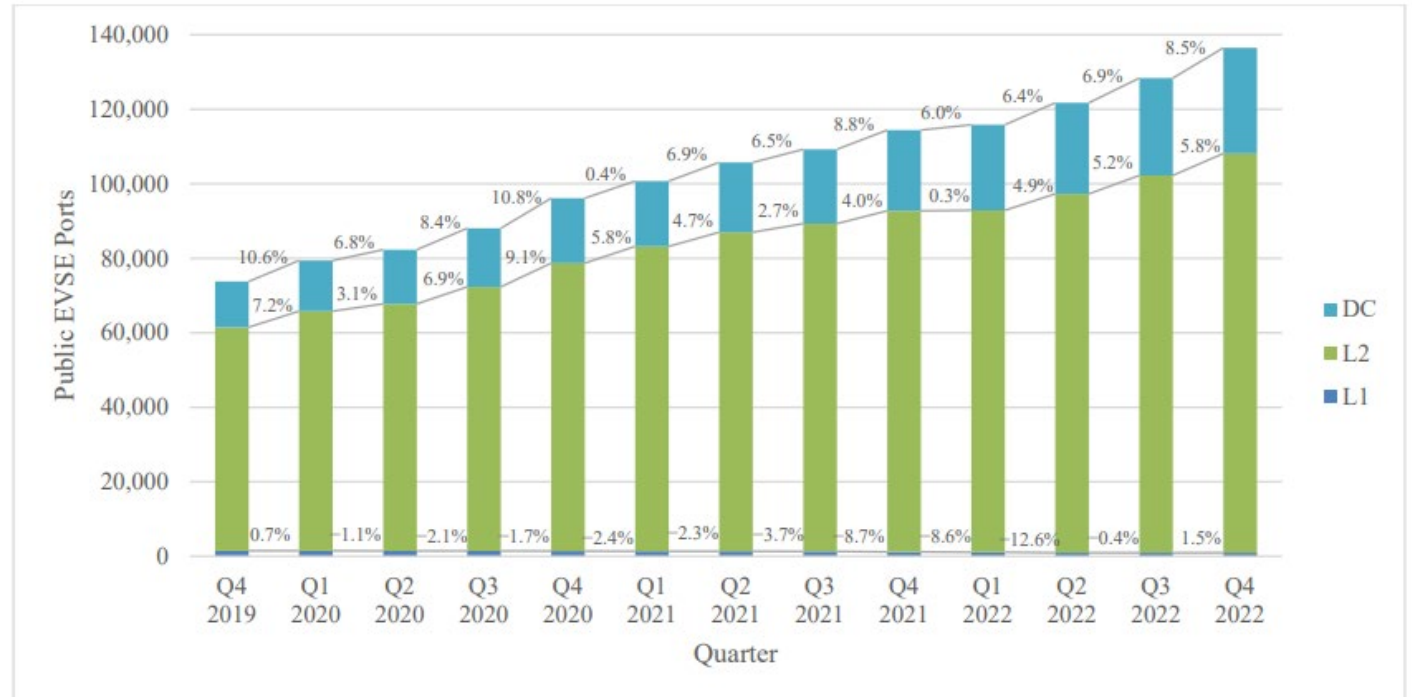


Figure 5. Quarterly growth of public EVSE ports by charging level.

- Growth of Public EV charging points
- It is important that the infrastructure is being used effectively

EV Charging Behavior in Ireland

- People prefer to charge at homes
- Peak EV demand is after home
- Public Charging was on average 3 hours
- Shortest duration of charge at Petrol(gas) stations

Group description	N	Mean	Std. dev.	Std. Error Mean	Min	Q1	Median	Q3	Max
<i>Charge consumption [kWh]</i>									
Multi-Modal	1042	6.89	5.42	0.17	0.01	2.02	5.58	10.97	27.47
Car Park	11,466	6.93	5.38	0.05	0.01	2.68	5.57	10.29	56.28
Household	2012	6.70	4.41	0.10	0.01	3.22	6.00	9.53	29.73
On-Street	6447	6.77	5.06	0.06	0.01	2.71	5.67	10.02	45.29
Petrol Station	573	5.14	5.33	0.22	0.01	1.11	2.69	7.83	24.30
<i>Charge duration [Minutes]</i>									
Multi-Modal	1042	125.64	121.90	3.78	5.02	30.05	83.83	190.13	580.93
Car Park	11,466	130.05	118.62	1.11	5.03	42.40	89.39	182.15	598.75
Household	2012	144.39	106.05	2.36	5.48	60.77	122.00	210.00	1275.00
On-Street	6447	132.59	116.17	1.45	5.03	45.95	95.90	187.00	598.60
Petrol Station	573	75.67	95.82	4.00	5.20	17.03	33.22	90.85	518.00

EV Charging Behavior in England

Table 4. Average EV recharging statistics for a six month trial period.

	Average number of recharging events				Average event duration (h)			
	Private	Org ind	Org pool	All users	Private	Org ind	Org pool	All users
Home	41.6	26.3	17.4	24.8	3.1	3.0	3.2	3.1
Work	36.9	51.3	54.9	50.4	3.6	3.6	2.4	2.9
Public	18.8	38.5	33.7	32.5	3.2	2.7	3.3	3.1
Other	12.4	8.7	11.7	10.9	3.7	3.6	3.7	3.7
Total	109.7	124.8	117.8	118.5	3.4	3.2	2.9	3.1

- Work was the most popular place to charge
- Charging took on average 3.1 hours in work and public ports

EV Behavior Analysis in Kansas City

- EV Charge Ports in Residential and Recreational land were used later at night
- 60% of EVs remained in the charging station while fully charged
- The rest left within one minute



Gaps in the Literature

- Focuses on charge events
- More room to explore spatial components

Goals & Objectives

- Spatial Analysis of EV Charging Ports where people stayed longer than needed
- Average length of time spent after charging



Data Origin

- Charger data was provided by Xianbiao Hu from his co authored paper
- Land use data and neighborhood boundaries comes from Kansas City Open Data



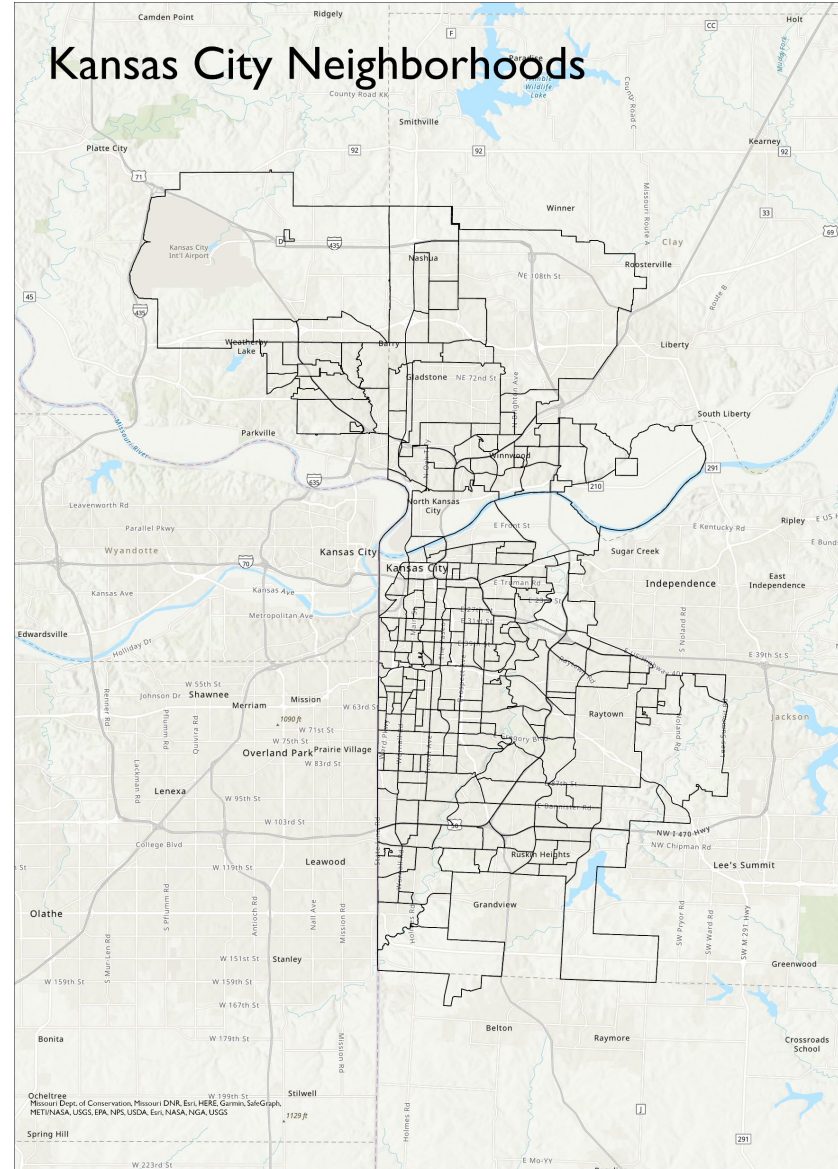
Looking at our Data

- 67 different land use categories
- 455 charge points throughout the city
- Charging Events from January 2014 until November 2019

Land Use Code	Land Use Description			
1111	Single Family (Non-Mobile Home Park)			
1112	Mobile Home Park			
1121	Townhouse			
1122	Duplex			
1123	Multifamily - 3 units			
1124	Multifamily - 4 units			
1125	Multifamily - 5 units or greater			
1126	Condominium			

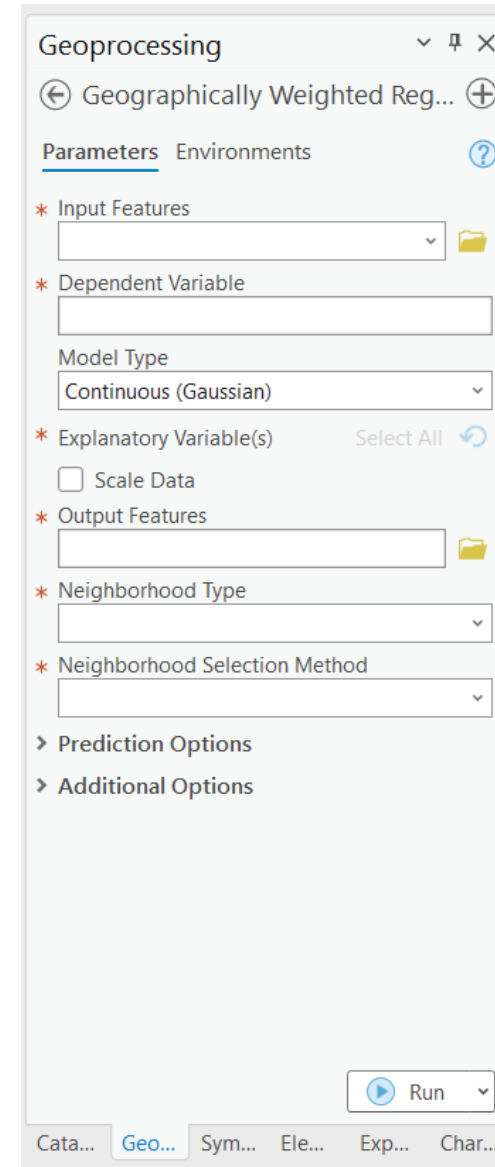
Descriptive Statistics

- Average time parked
- Time of day and week of overcharging
- Location of chargers



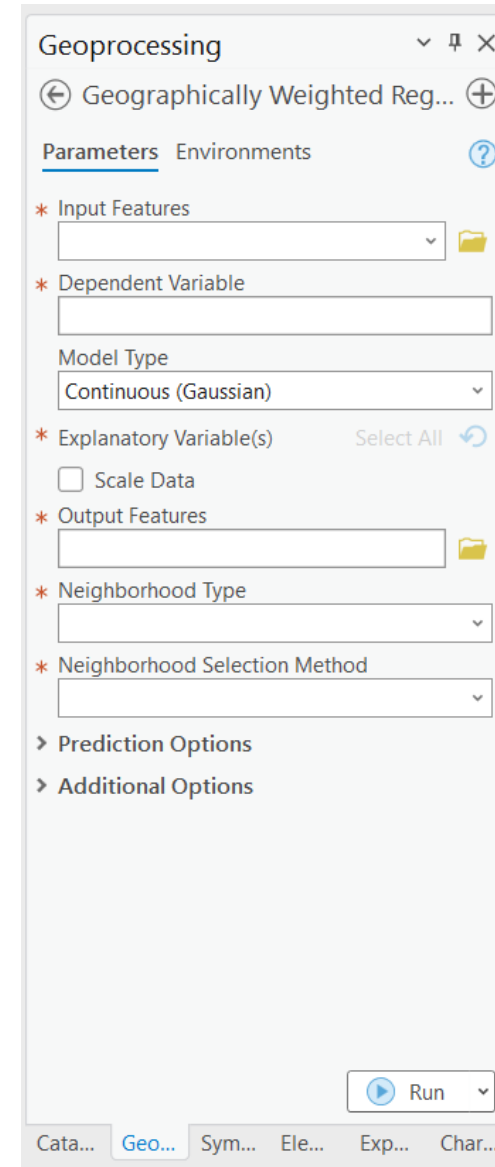
Methods of Analysis

- Cluster Analysis
- Determine geographic hotspots
- Geographic weighted regression
- Figure out associated land use types.

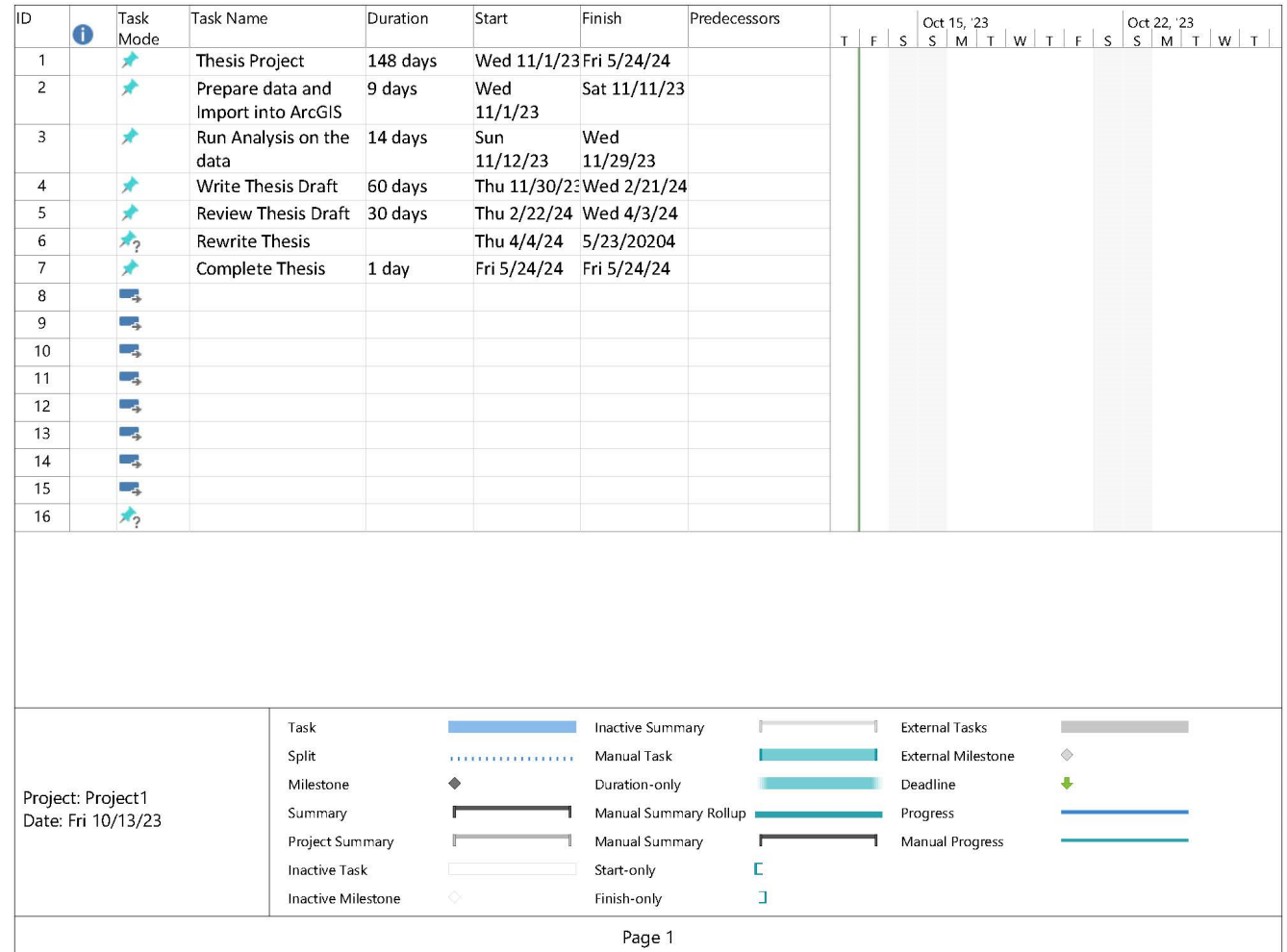


Geographically Weighted Regression

- Dependent Variable – Duration of vehicle stay
- Creation of raster layer
- Limited use for prediction



Project Timeline



Possible Presentation Venue

- IL GSA Association
- Multiple meeting during the year
- GIS Professionals across the state



Anticipated Results

- Longer time at EV charger associated with shopping land use
- Longer time at EV charger associated with weekends
- Longer time at EV charger associated with evenings on weekdays



Sources

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