IBM Capstone Project

Optimal Location for EV Service in the Washington State

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Introduction

- The growing number of electric vehicles collaterally boosts the EV charging market, as more consumers decide to purchase electric cars as higher demand for charging stations.
- The EV requires maintenance and replacement services distinct from traditional gasoline vehicle, thus, a significant number of EV on the roads creates a market for EV service.
- To provide maintenance and replacement services for EV in Washington state, an optimal location has to be identified in order to maximize efficiency and profit.

Data

Following data required to perform the analysis:

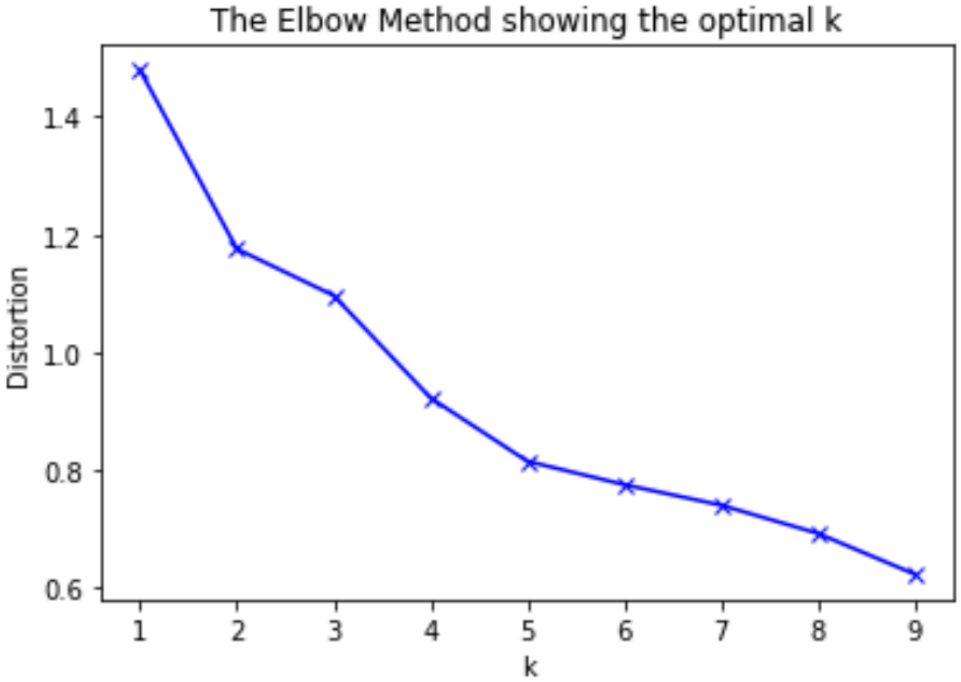
- List of zip codes that covers the state of Washington (WA) including geolocation and county.
- The geographical location of currently registered EV vehicles in WA will be obtained directly from (data.wa.gov), official state government site.
- The geographical location of EV charging stations in WA will be obtained from the National Renewable Energy Laboratory (NREL) through an API.

Modifyed dataset for K-clustering

- To identify groups (clusters) with similar parameters we applying the K-means clustering algorithm.
- To prepare data for clustering we replaced original parameters with a new parameter

	EV_count	Number of EV per 1000 people	Association between EVCS and Population Density	Number of EVCS per 100 EV
10759	1440	24.639814	3.782890	0.763889
7218	922	26.850719	2.435078	0.976139
244	851	30.451585	12.069885	5.640423
1481	832	22.879771	1.469771	0.600962
20226	820	17.746613	0.712425	0.609756

The Elbow Method



The graph shows that the optimal number of clusters is 4.

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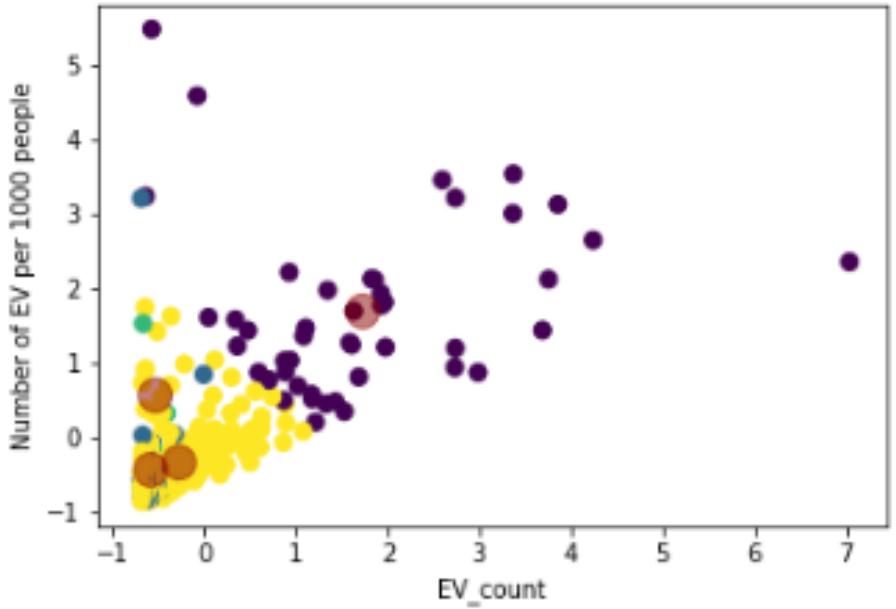
Clustering Analysis



Scatterplot shows the centroids of each cluster and concentration of zip codes based on:

- Number of EV per 1000 population.
- Association between EV charging stations and Population Density.
- Number of EV charging stations per 100 electric vehicles.

Results

- Cleaning and data preparation.
- Transformation of the EV data and merging with EV charging station data, population, and population density data.
- Cluster 1 defined as the most efficient option for EV service deployment.
- Cluster 1 among other three, has the highest density of EVs and population on the relatively small geographic area.

Discussion

Ware able to identify the estimate location within the largest cluster of electric vehicles in the Washington state where EV service deployment would be the most efficient.

However, an additional analysis of EV data relatively to all other type of vehicles registered in Washington state would help to predict the potential customer growth.

Modifying dataset

- The data analysis was performed to identify the most optimal location for electric vehicle service in the Washington state.
- During the analysis we explored and analyzed some important statistical figures of each zip code in Washington state where any electrical vehicle registered as of May 2020.
- Defined the most optimal cluster.