IBM & Coursera Data Science Capstone Project

Battle of Neighborhoods
Exploring Islamabad

By
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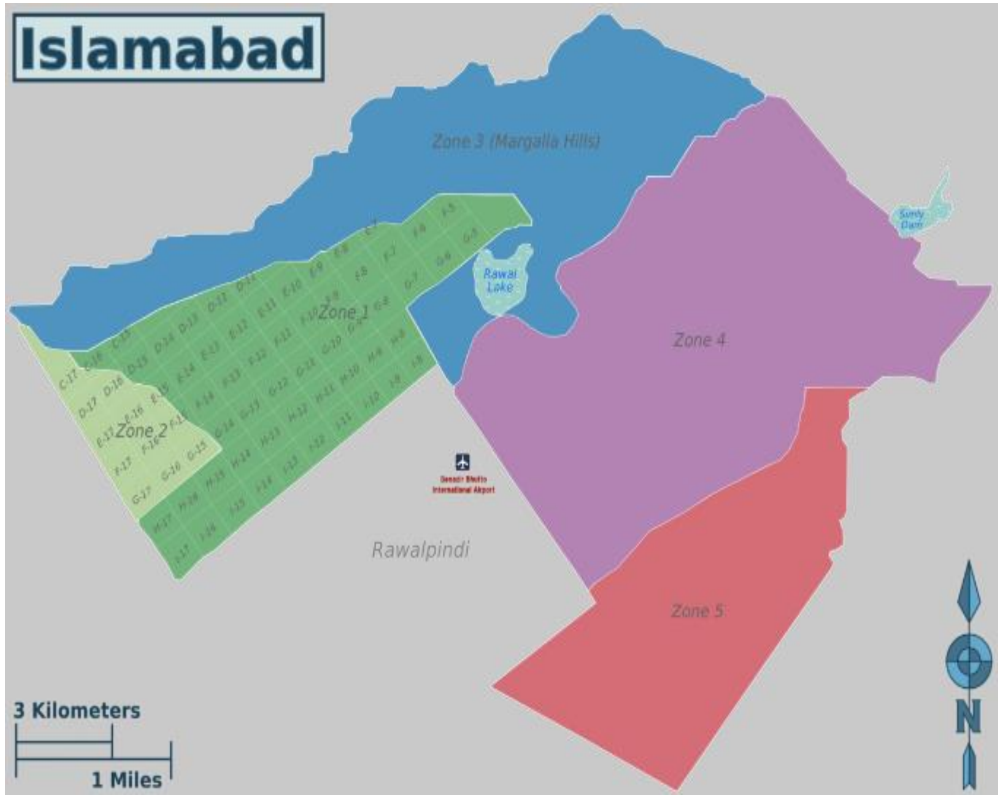
Introduction

Islamabad is the capital city of Pakistan. The city is divided into five major zones: Zone-I, Zone-II, Zone-III, Zone-IV, and Zone V. Out of these, Zone IV is the largest in area. Zone I consists mainly of all the developed residential sectors while Zone II consists of the under-developed residential sectors. Each residential sector is identified by a letter of the alphabet and a number, and covers an area of approximately 2 km × 2 km. The sectors are lettered from A to I, and each sector is divided into four numbered sub-sectors



Business Problem

In this project, we will explore, segment, and cluster the Zone-1 sectors in the city of Islamabad based on most common venue information. We will also try to answer following stakeholder questions so they can make investment decision:

1. What are the most common venues in Zone-I?
2. Which sectors in Zone-I have highest venues?
3. Which sectors in Zone-I are yet to be developed based on most common venues?

Data

Following data sources will be needed to extract/generate the required information:

- General information on Islamabad will be gained from Wikipedia
- Zones and sectors information will be gained from here
- Most common venues, their categories and location in every sector will be obtained using **Foursquare API**
- Coordinate of sectors will be obtained using **Geopy** library

Methodology

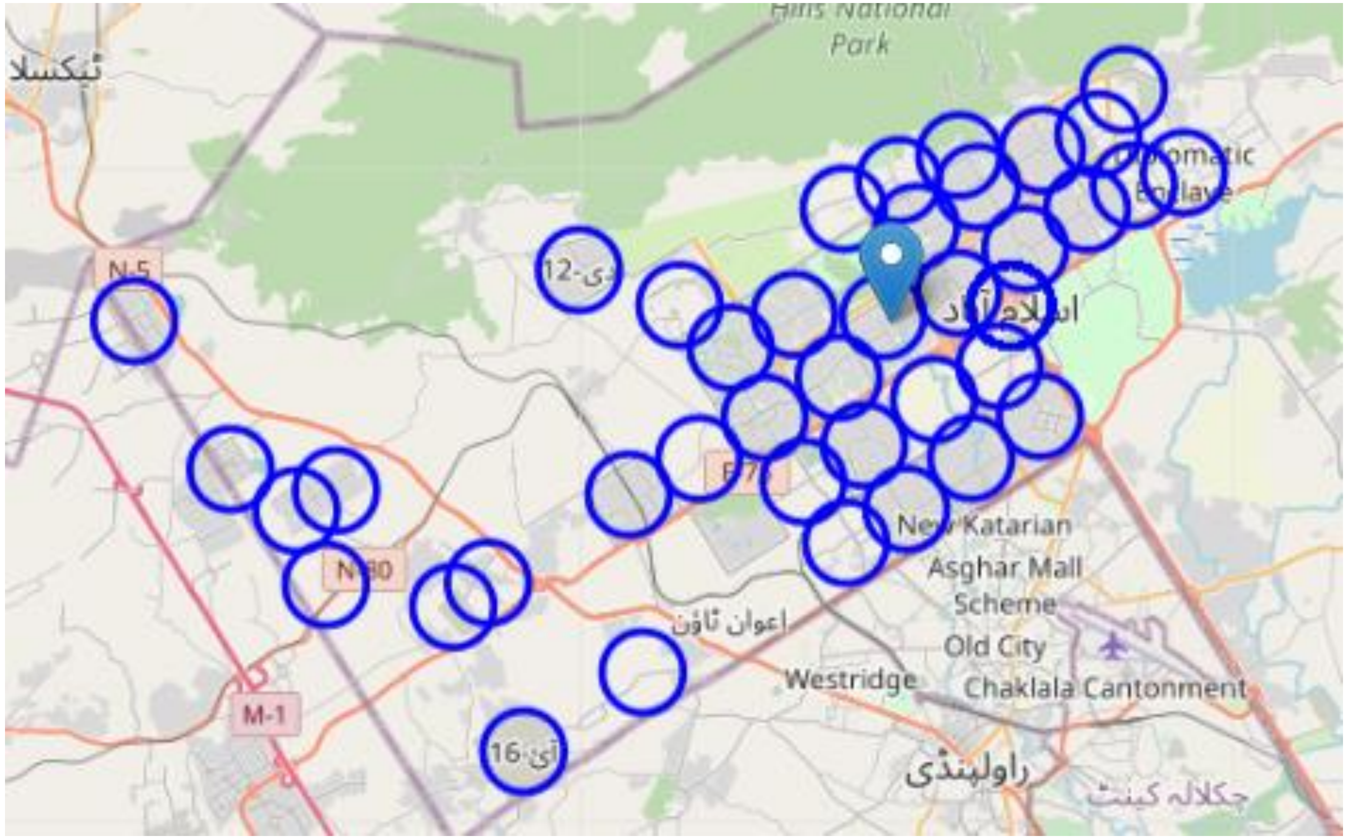
In first step, we have collected the required data: location and type (category) of most common venues within 2km from center of each sector

Second step in our analysis will be calculation and exploration of 'venue density' across different sectors of Islamabad - we will use bar charts to identify a few promising areas to answer questions.

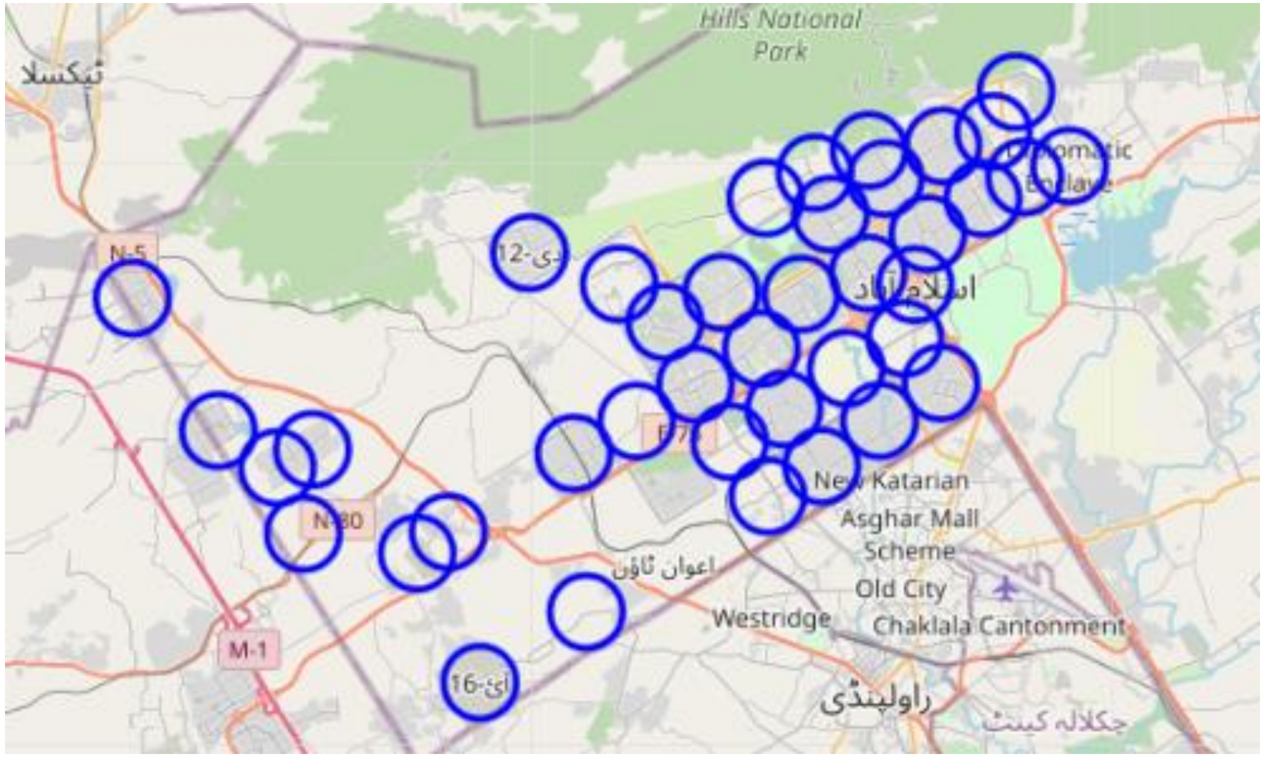
In third and final step we will focus on detecting outliers in Zone-I i.e. clusters of locations that meet some basic requirements established in discussion with stakeholders: we will take into consideration locations with least number of most common venues in Zone-I.

Exploratory Data Analysis

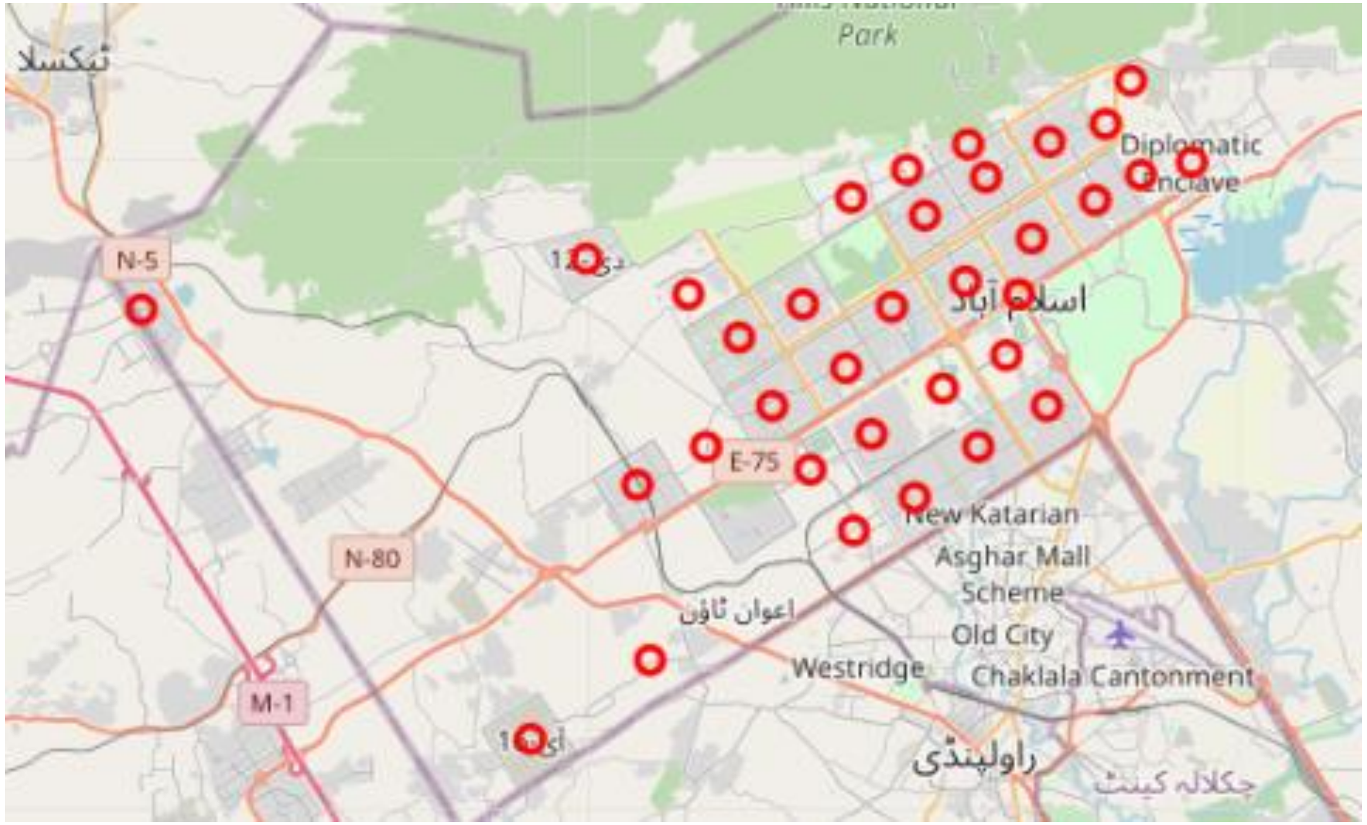
In first step, we used Wikipedia to identify the Zones & Sectors and then used Geopy API to get coordinates for these sectors



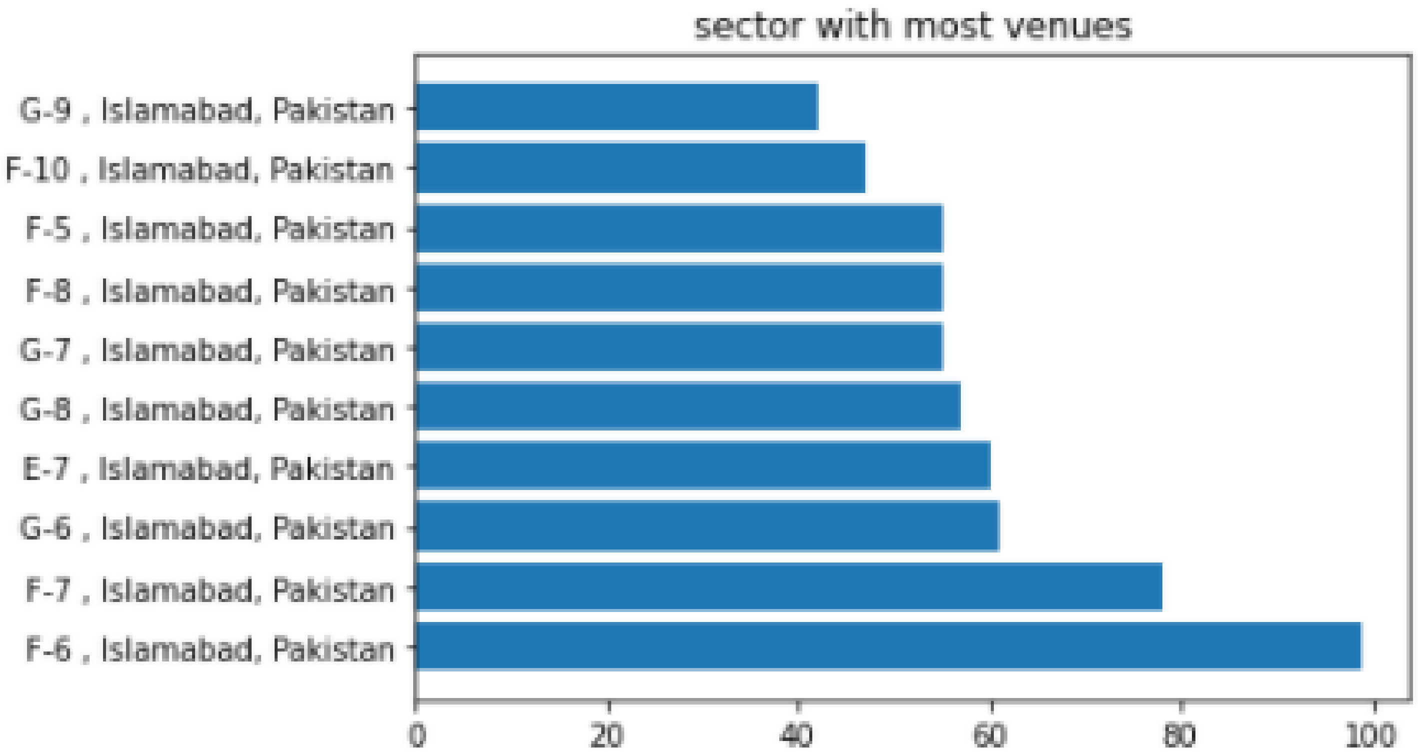
Then we removed duplicate coordinates and sectors



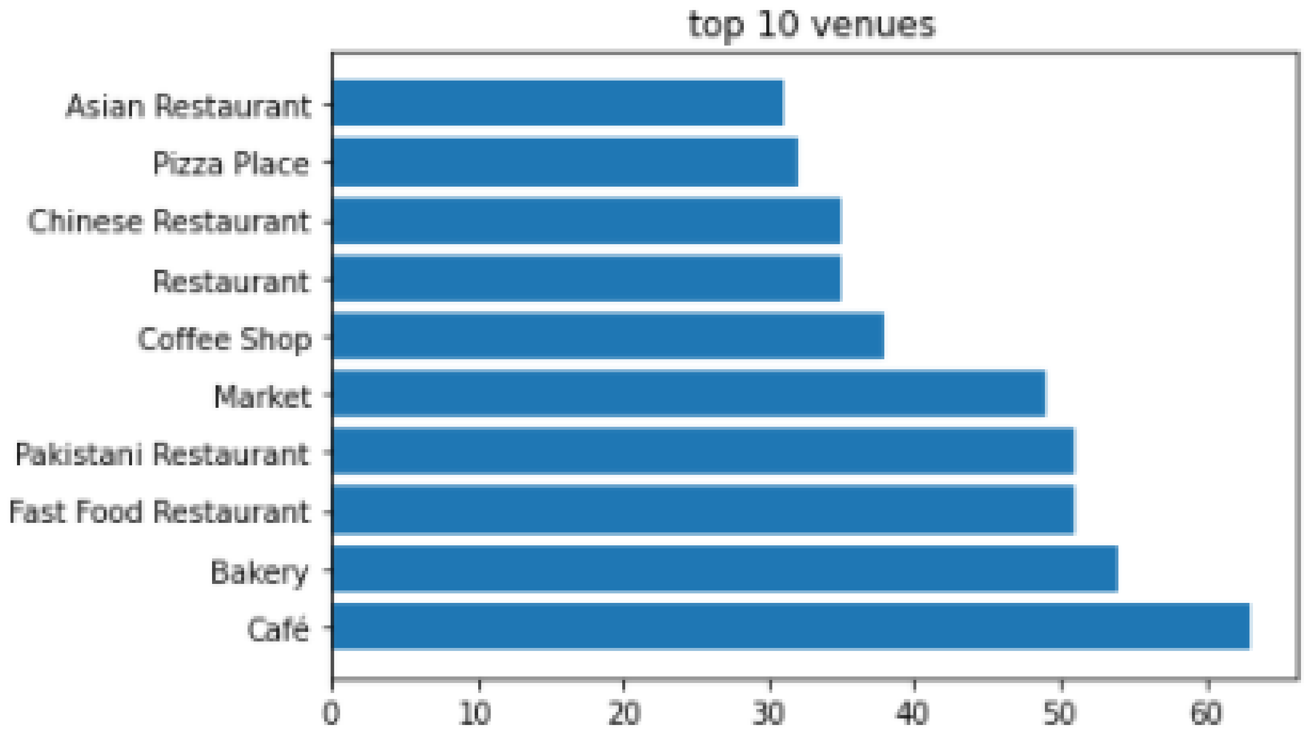
After that, we dropped sectors of Zone-II



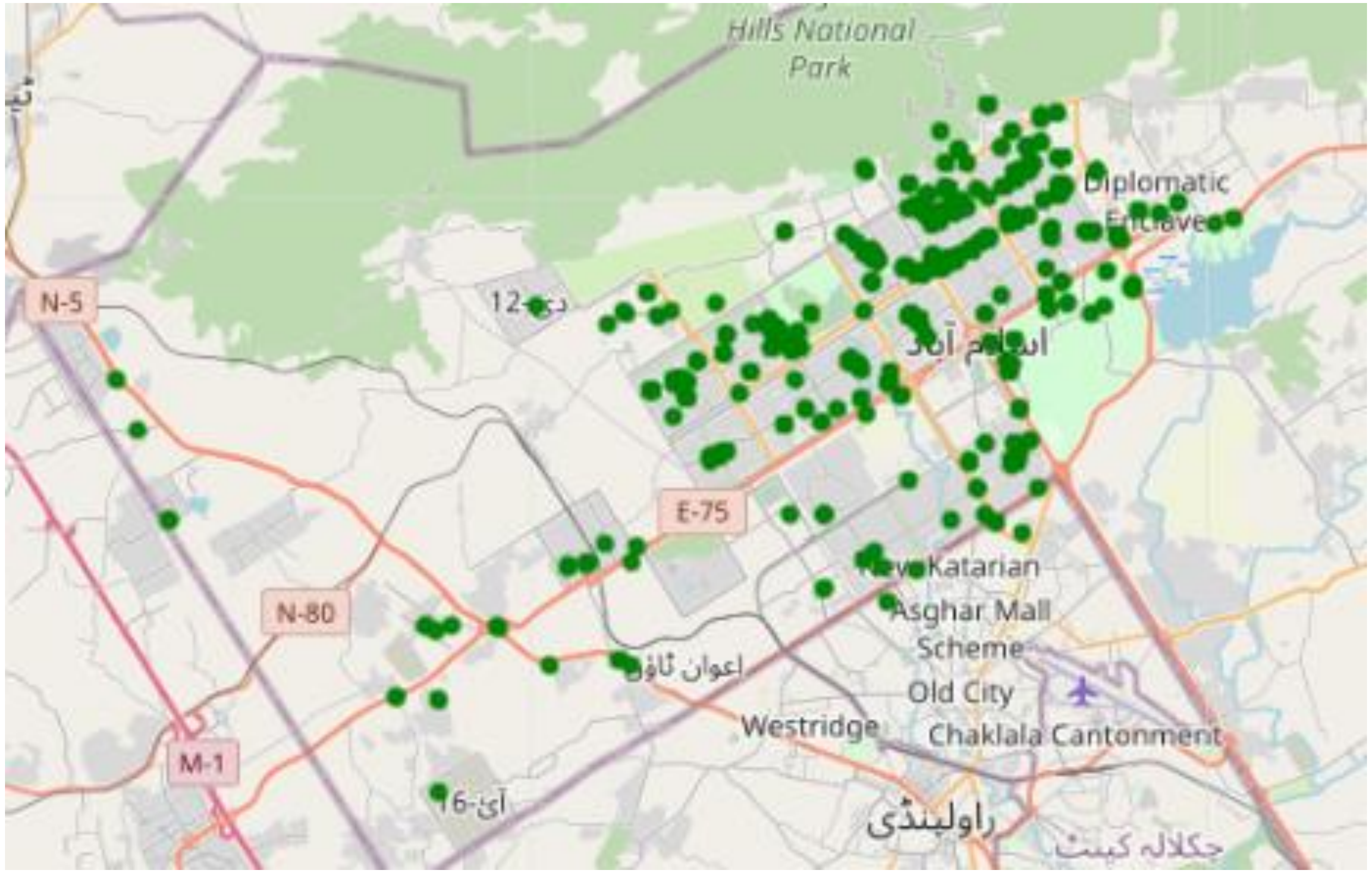
Following are top 10 sectors having most common venues in Zone-I



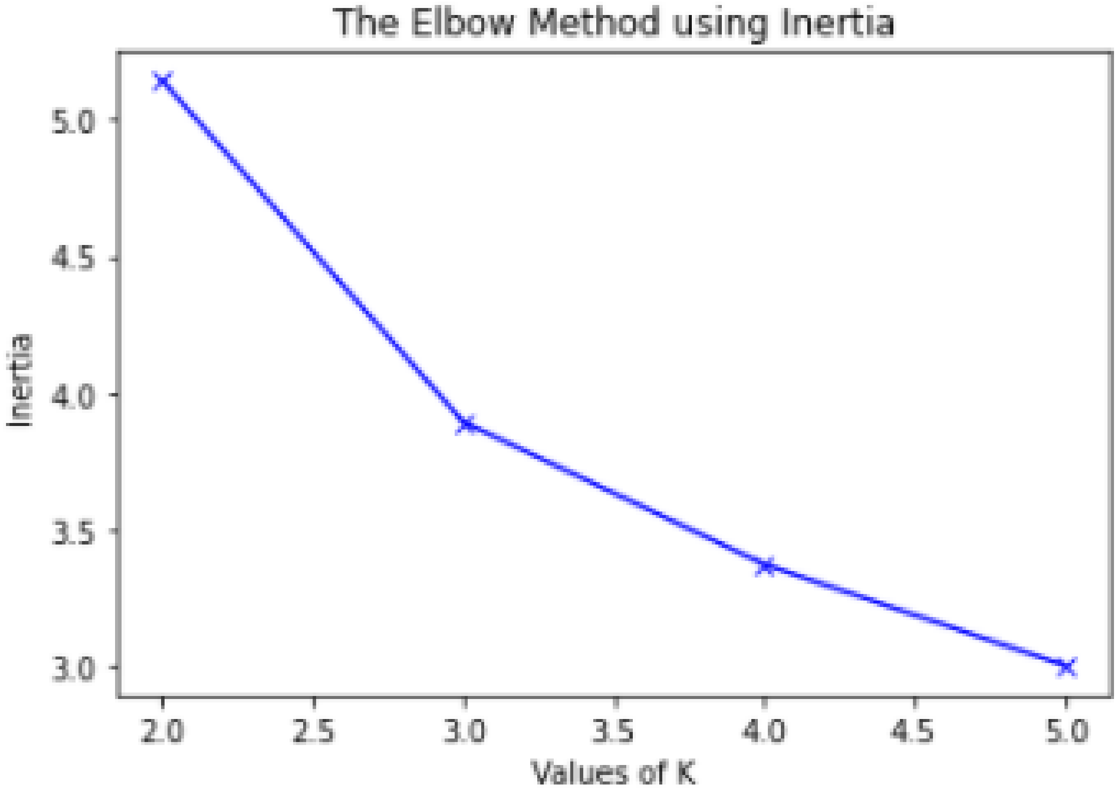
Following are top 10 most common venues in sectors of Zone-I



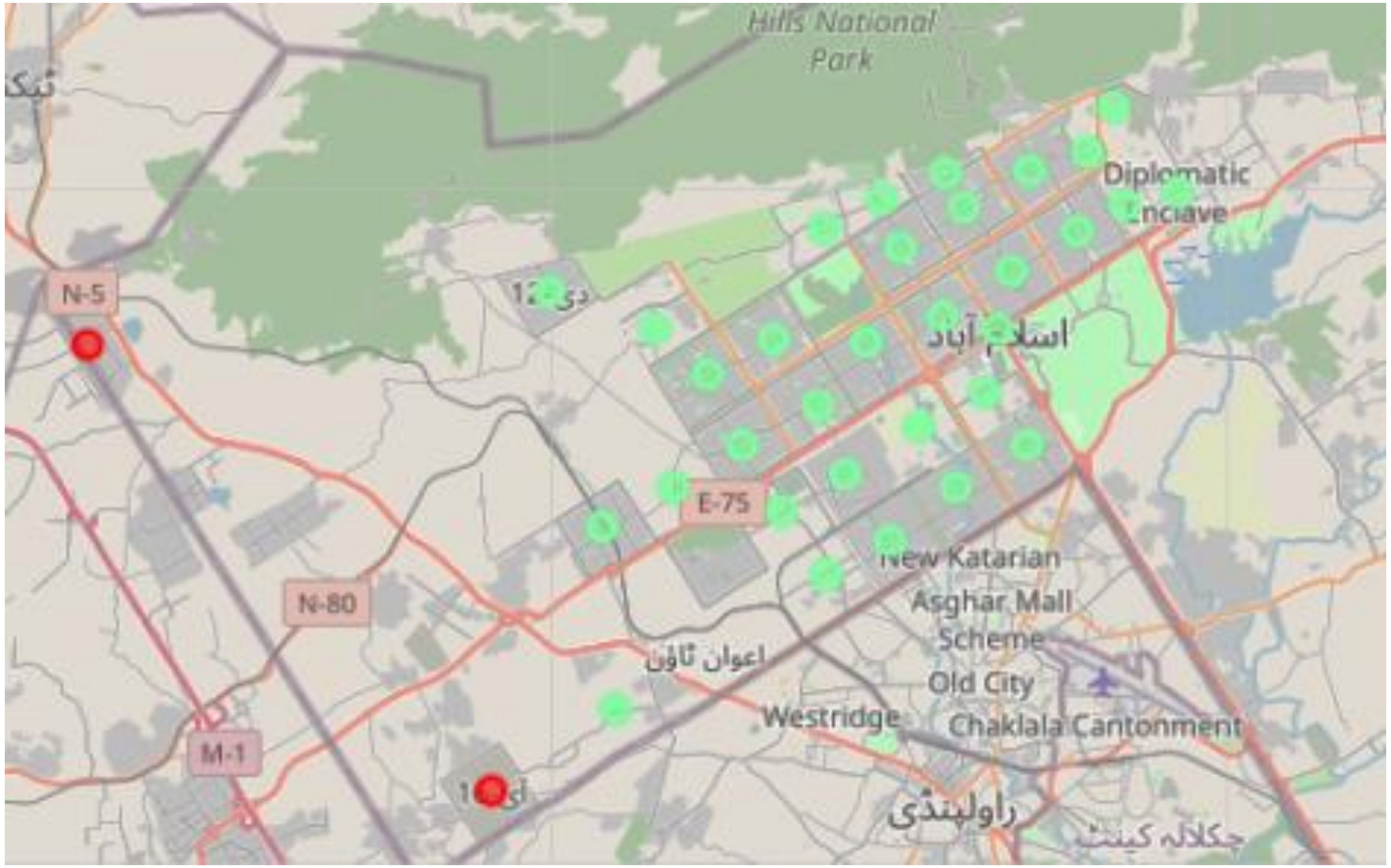
All common venues Zone-1



We used elbow method to find best value of k for K-means clustering



After clustering, we got two types of sectors in Zone-I w.r.t most common venues



Conclusion

Purpose of this project was to explore, segment, and cluster the Zone-1 sectors in the city of Islamabad based on most common venue information. We tried to answer following stakeholder questions so they can make investment decision:

1. What are the most common venues in Zone-I?
2. Which sectors in Zone-I have highest venues?
3. Which sectors in Zone-I are yet to be developed based on most common venues?

Location & venue data is collected using Geopy & Foursquare API respectively. Exploratory data analysis is performed to get answer of first and second question. Clustering of common venues was then performed in order to answer third question and create major zones of interest (containing least common venues).

Final decision on optimal business location will be made by stakeholders based on specific characteristics of locations in every recommended sector, taking into consideration additional factors like attractiveness of each location (proximity to park or water), levels of noise / proximity to major roads, real estate availability, prices, social and economic dynamics of every neighborhood etc.