**Your Name: Purnabhishek Sripathi**

**Grading Policy: In order to get credit for each screenshot,** you **MUST** have the repository named as ***BAN540\_YourLastName*** with ***TraderJoes\_YourLastName*** and ***BAN540\_Lab9\_YourLastName*** in it. The repository and data files **MUST** be clearly shown in your screenshot as my examples below. you will get ZERO for that particular screenshot which doesn’t show them clearly.’

**Screenshot #1 (3 points)**

A screenshot of a computer

Description automatically generated

**Screenshot #2 (3 points)**

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**Screenshot #3 (3 points)**

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**Screenshot #4 (3 points)**

**A screenshot of a map

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**Screenshot #5 (3 points)**

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**Screenshot #6 (3 points)**

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**Discussion Questions:**

1. If Trader Joe’s establishes eight distribution centers (i.e., k=8 in k-means clustering), how many retail stores does the k-means approach suggest assigning to each distribution center? What are the ideal locations of those distribution centers? To answer this question, please replace all “?”s in the following table **(6 points)**.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Longitude** | **Latitude** | **Number of retail stores** |
| Distribution Center 1 (The centroid of cluster\_0) | -74.616 | 40.638 | 63 |
| Distribution Center 2 (The centroid of cluster\_1) | -121.920 | 46.245 | 26 |
| Distribution Center 3 (The centroid of cluster\_2) | -98.399 | 33.594 | 28 |
| Distribution Center 4 (The centroid of cluster\_3) | -71.550 | -32.930 | 1 |
| Distribution Center 5 (The centroid of cluster\_4) | -87.324 | 41.671 | 44 |
| Distribution Center 6 (The centroid of cluster\_5) | 50.120 | 26.460 | 1 |
| Distribution Center 7 (The centroid of cluster\_6) | -82.118 | 29.885 | 26 |
| Distribution Center 8 (The centroid of cluster\_7) | -118.584 | 35.158 | 145 |

1. Should Trader Joe’s use the **exact** longitude and latitude (e.g., Longitude=-74.616 and Latitude=40.638 for Distribution Center 1) as suggested by the k-means clustering method to set up its distribution centers? If not, what are the other factors (*hint: how about* geographic characteristics?) that Trader Joe’s should consider to make the final decision of the locations of those distribution centers? Please elaborate your answer **(3 points)**.

**Answer:**

Beyond the coordinates recommended by the k-means clustering approach, Trader Joe's should take other considerations into account when choosing the locations of its distribution branches. The location of the centers in relation to major transportation routes, demographics, and market demand, zoning laws and regulations, labor costs, real estate prices, and the competitive landscape are all important factors to consider. Other factors include the potential impact of geographic features on accessibility and logistics, the ease of distribution, and the centers' advantageous positioning. In addition to being ideal in theory, these elements guarantee that the locations are realistic, practical, and financially feasible.

1. Besides the issue discussed in question 2, do you see **another** problem by directly applying the solution as suggested by the k-means clustering method to assign retail stores to distribution centers **(3 points)**? (*Hint: Please examine the number of retail stores assigned to each distribution center.*)

**Answer:**

Apart from the concerns mentioned in question 2, there is also a possibility of an imbalance in the number of stores allotted to each distribution center when using the k-means clustering approach directly for assigning retail stores to centers. Geographic proximity is the primary focus of K-means clustering, which may lead to certain distribution locations having an excessive number of retailers while others have notably fewer. Inadequate distribution logistics, overworked centers, and inconsistent service standards among areas can all result from this mismatch. When allocating retail outlets, it is crucial to consider the workload and capacity of each distribution center.

**Now you are done with Lab Assignment 9, please make sure to fill in your name on the first page of this document, and rename this document to reflect your own last name before submitting it to Canvas.**