OPTIMIZING A HEALTHCARE NETWORK FOR IMPROVED SERVICE DELIVERY

1. Introduction

Shortage of staff has been a major concern among Healthcare Facilities to meet the needs of people. To obtain different health services people are travelling to their nearest area facility resulting in time consumption and travel costs. Appointing additional staff to the facilities will overcome the challenge. However, this process will incur additional costs to the Health Ministry. Distribution of excess staff across the facilities may lead the people to utilize these services within their area facility without any addition burden to the health ministry and the people.

Problem Statement:

How many staff members should be shifted between facilities by maintaining minimum staff to population ratio, so that the population living in Area can utilize facility in their area without travelling to nearby area facility.

2. Assumption

As people from an area travel to nearby area facility by keeping overall trip time in mind we will assume the nearest facility is the least time it takes people to make the trip neglecting distance travelled.

We will also shift the staff between nearest facilities to make the process easy for the health ministry.

3. Data gathering, handling, cleaning, processing

Data Gathering

The facility data which we have is not enough to perform modeling. However, we can obtain more data using them. We need nearest area and the population in these areas to get started. All the additional data is obtained from public data sources using zip code as a reference.

To collect the distance and travel time by different modes of transport we are using

Google Maps API and to collect population census data we are using American fact finder website.

Data Handling

We will identify the nearest facility by observing the travel times obtained and plotting them on the graph.

Data Cleaning

We will standardize and scrub/replace empty or duplicate data wherever necessary

Data Processing

After identifying the fastest mode of transport, we will discard data of other modes of transport as they become irrelevant at this point.

4. Proposed Solution

We will be using simple regression model to predict the least no of staff members required in a facility and then we will shift the staff across.

5. References

Google Distance Matrix API - https://developers.google.com/maps/documentation/distancematrix/start
American Fact Finder - https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml

6. Source Code

https://github.com/AmmarKhawer/Optimizing-a-Healthcare-Network-for-Improved-Service-Delivery/blob/master/Optimizing%20a%20Healthcare%20Network%20for%20Improved%20Service%20Delivery.ipynb