Internship Project

ATM Cash Status displayed using Heatmap

CONTENTS

1. GENERAL INFORMATION

1.1 DOCUMENT PURPOSE

This document provides a detailed description of the project "ATM Cash Status displayed using Heatmap"

1.2 PROJECT OVERVIEW

The program is written in Python, and the Folium Library [2] has been used to generate the heatmap. There are two kinds of heatmap generated:

1. Static heatmap: In this heatmap, the cash status of ATMs at any given moment is displayed using data from an excel sheet.
2. Heatmap with time: In this heatmap, how the cash status changes over time is displayed. The map is animated.

Gradient: The gradient for the heatmap has to be defined in the map data structure of python. In the map, each value, between 0 and 1, is mapped to a certain colour. These values represent the data that has to be displayed on the map. The gradient is then passed as a parameter into the function that will plot the map.

Gradient adjustment: The values that have to be mapped to a certain colour may not always be between 0 and 1. For example, the amount present in the ATMs will be far greater than 1. In this case, the amount needs to be adjusted to a value between 0 and 1, which is done using a formula.

2. HOW IT WORKS

2.1 Static Heatmap

An excel sheet contains data of the ATMs (branch location in latitude and longitude, branch name, cash amount present). This data is used to plot points on the map. The lower the amount, the more the colour gradient moves towards red. Fig 1 shows a static heatmap:

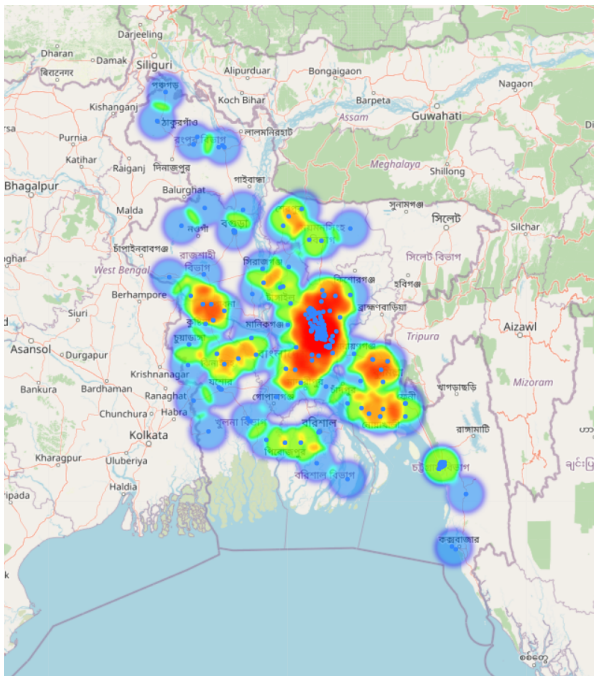

Fig 1: A static Heatmap showing the cash status of all BRAC Bank Branches across Bangladesh

2.2 Heatmap with Time

An excel sheet contains data of the ATMs (branch location in latitude and longitude, branch name, time, cash amount present at respective time). This data is used to plot points on the map. A time index is also shown. As the time increases, the gradient of the map also changes with the amount. Fig 2 and Fig 3 shows how gradient changes over time with time index=11 and time index=51

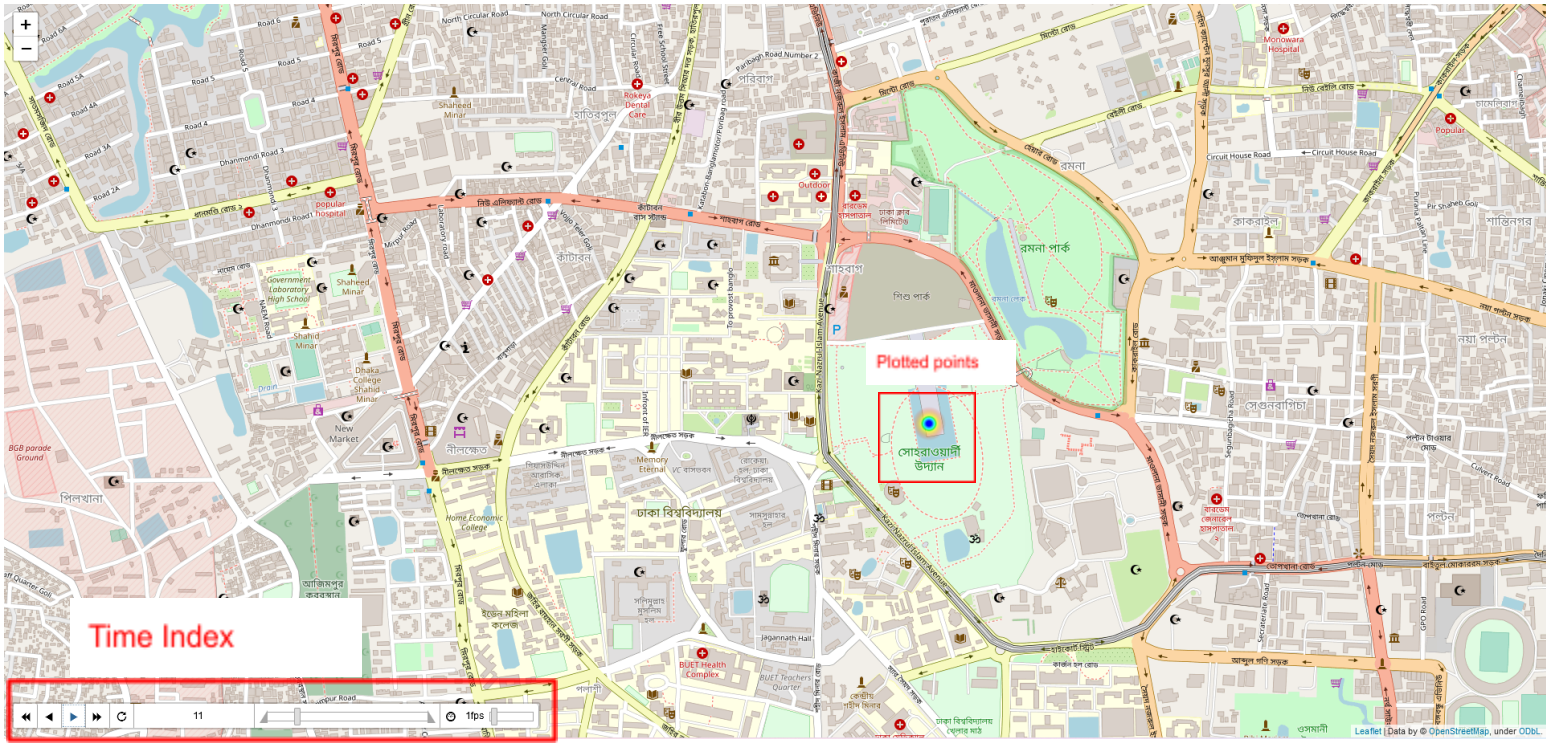

Fig 2: Gradient change with amount over time (Time Index=11)

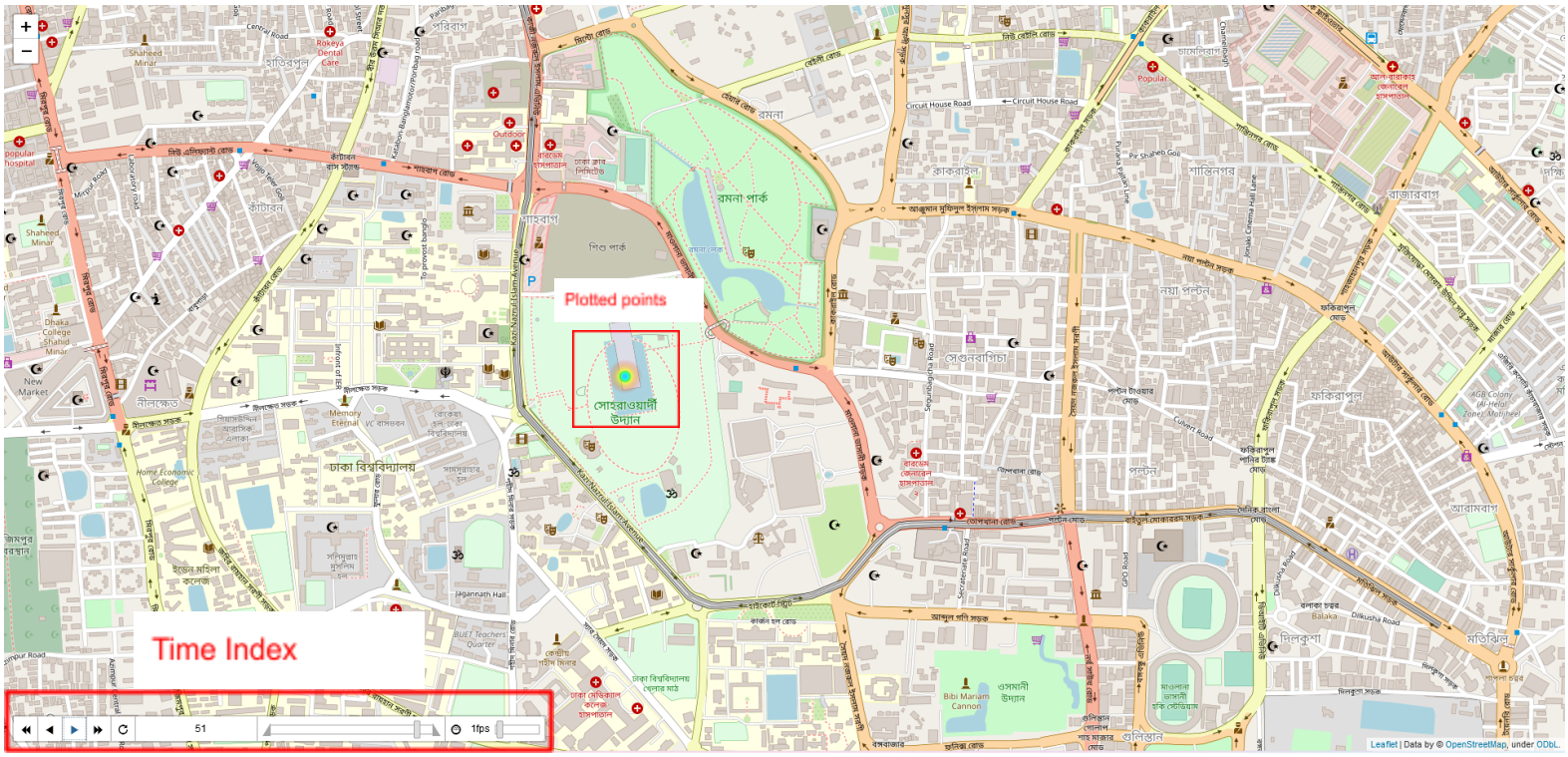

Fig 3: Gradient change with amount over time (Time Index=51)

References:

1. Skill - Draw heatmap on a python folium map. (2021). [Blog]. Retrieved from https://nagasudhir.blogspot.com/2021/08/draw-heatmap-on-python-folium-map.html

2. plugins — Folium 0.12.1 documentation. (2022). Retrieved 17 May 2022, from https://python-visualization.github.io/folium/plugins.html