Saptiotemporal Analysis of Gastech Employees' Movement Data

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ABSTRACT

The research paper should include an abstract of not more than 300 words. The actual research paper itself should not more than 6 pages excluding figures, tables, formula and references. The practice research paper must be edited by using R Markdown and the ACM: Association for Computing Machinery template of rticles should be used.

1. INTRODUCTION

The VAST 2021 Mini Challenge 2 outlines a hypothetical scenario in which several GAStech employees have gone missing and the organisation, Protectors of Kronos (POK), is suspected of being involved. The dataset includes two weeks of GPS tracking data for company cars assigned to employees, credit and loyalty card transactions of employees before the disappearance. ESRI shapefiles for the city of Abila & country Kronos are also provided. The challenge requires identification of suspicious activities hidden in data and determine any dubious people and locations that should be reported to the law enforcement.

The dataset was wrangled to develop a Shiny app that aims to provide users actionable insights based on the following analyses:

- Exploratory Data Analysis (EDA) of GPS tracking data and credit and loyalty card transaction patterns
- Visualisation of employee movements over time and associated purchase transactions
- Network analysis of employees based on their visited locations

This paper details our efforts to design, create and implement a web-based analytics tool to assist users from the law enforcement to derive insights and accelerate the investigation process of the disappearance of GAStech employees. The paper consists of six sections. Section 1 presents a general introduction of the paper. Section 2 provides an overview of the motivation and objectives of our project. Section 3 provides a review of techniques used in Vast Challenge 2014 and similar spatiotemporal visualisations. This is followed by a detailed description of the design principles used and data visualisation elements built, and a demonstration of the user interface in section 4 and 5. Insights and uses of the system are documented in section 5. Finally, the paper finishes by highlighting how the system can be extended or refined in the future.

2. MOTIVATION AND OBJECTIVES

3. REVIEW AND CRITIC OF PAST WORKS

4. DESIGN FRAMEWORK

A detail description of the design principles used and data visualisation elements built (Refer to Section IV: Interface of this paper.

5. DEMONSTRATION

6. DISCUSSION

What has the audience learned from your work? What new insights or practices has your system enabled? A full blown user study is not expected, but informal observations of use that help evaluate your system are encouraged.

7. FUTURE WORK

A description of how your system could be extended or refined.

References

[1] Fenner, M. 2012. One-click science marketing. Nature Materials. 11, 4 (Mar. 2012), 261–263.

[2] Meier, R. 2012. Professinal Android 4 Application Development. John Wiley & Sons, Inc.