An Interactive Visual Application for Exploring GAStech Employees Movement Data and Aliba, Kronos Events

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ABSTRACT
Building interactive web application using Shiny for R programming language.

It consists of two paragraphs.

1. INTRODUCTION
Abila city was in unrest in the first month of 2014. The local company GAStech reported missing employees while multiple major outbreaks struck the city on the night of 23rd.

To investigate the incidents, multiple sources of evidences have been collated:

1. GAStech provides many of their employees with company cars for personal and professional use, but unbeknownst to the employees, the cars are equipped with GPS tracking devices. Beside that, to promote local business, GAStech also provides Kronos-Kares loyalty card in exchange for collecting information about their employee's credit card transactions and preferences recorded on loyalty cards. With the disappearance of GAStech employees in January 2014, GAStech released a tracking data of 2 weeks leading up to the disappearance, as well as the credit card transaction and loyalty card usage data.
2. Relevant microblog records that have been identified by automated filters and text transcripts of emergency dispatches by the Abila, Kronos local police and fire departments.

Leveraging on the available information, different visual analysis have been used to support the investigations of these incidents and potentially contribute to local law enforcement to identify anomalies or suspicious pattern of behaviors.

2. MOTIVATION
Appropriate visual approaches could largely reduce tediousness to scan through numbers and text data and improve investigation efficiency. Further empowered by the UI interactivity, trends and patterns of behaviors can be easily revealed with the ease of selections and filtering.

However, real-life data comes in with different formats and users often need to spend much efforts to perform analysis separately and draw meaningful insights. With the general lack of effective and easy to use web-enabled interactive and integrated applications for investigation, this project aims to build and publish an interactive RShiny web applications prototype to integrate different visual analysis together. The project attempts to enable the following analysis:

1. To reveal city location hot-spots based on the spending data and detect spending anomaly. The location data and the time of spending were split into different categories to sharpen the analysis. Investigators are able to scale down the scope of analysis with more focus on specific segments with the use of selections.
2. To create an interactive map visualization framework that supports selection of time frame as well as employees. movement patterns of one or more employees are displayed to discover abnormal behaviours and unofficial relationships.
3. To build a timeline analysis for the chaotic night on 23rd based on text analytics. Leveraging on topic modelling techniques, meaningful themes are extracted from the massive amount of text data to help investigators form better understanding on the occurrence of events.

3. REVIEW AND CRITICS
There has been work done on the map visualisations from the previous VAST Challenge submissions. Many teams have adopted the geo-visual approaches by adding the background map to reveal daily patterns of each individual and the potential relationships among the employees.

(Central South University, VAST 2014 MC2 Submission). Through the combination of geospatial data as well as georeferenced map, the team was able to visualize the movement patterns and visited spots are clearly identified.

4. DESIGN FRAMEWORK

The applications has 3 major components: -Displaying city hot-spots and GASTech employees' spending patterns -geo-spatial approach to track employee movement pattern through space and time and are likely to contain patterns which provides useful information about the characteristics of the employee daily journey. -Text analytics

5. USE CASES

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6. DISCUSSION

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7. FUTURE WORK

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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.