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

Hong Yun Ting, Li ShuXian, Yang Xu

Introduction

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 released a tracking data of 2 weeks leading up to the disappearance as GAStech provides many of their employees with company cars for personal and professional use. GAStech also provided credit card transaction and Kronos-Kares 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.

Objectives

1. To reveal city location hot-spots based on the spending data and to detect spending anomaly.
2. To display movement patterns of one or more employees to discover abnormal behaviors and unofficial relationships.
3. To build a timeline analysis for the chaotic night on 23rd based on text analytics.

Exploratory Data Analysis

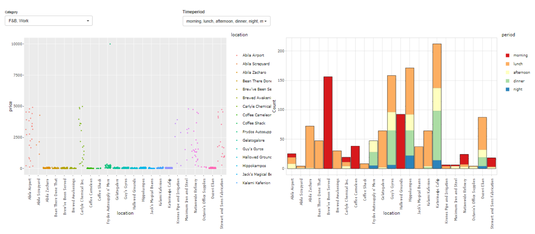

Fig 1. First Tab Layout

There are 3 kinds of locations based on its nature: F&B, Work and Lifestyle. Transactions are categorized into 5 types: Morning, Lunch, Afternoon, Dinner and Midnight. 'Lunch' and 'Dinner' periods are specially segregated as many F&B locations have high transactions during these two periods.

The jitter plot on the *left* side displays each transaction at each location.The jitter plot is useful in identifying the **anomaly** from the clustered expenditures. The histogram plot on the *right* side displays the distribution of the transactions at each location.The plot is able to show the hot spots during different time period and when they are popular.

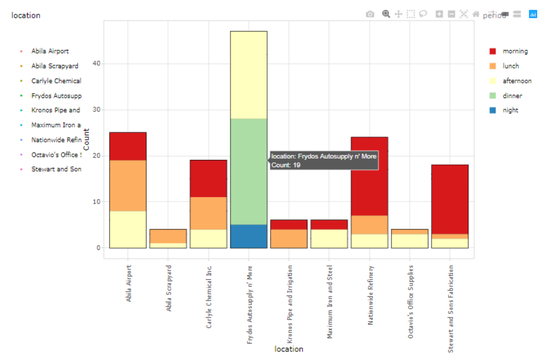

Fig 2. Number of transactions at each work-related location at different time

Two plots from the exploratory analsis tab work together to provide evidences on the suspicious activities. With a focused on work-related location histogram shown on Fig2,it is discovered that Frydos Autosupply n' More have transactions during the dinner and night hours whilst the rest of the work-related locations do not disply such patterns.With addition to the abnormal spending amount discovered from the jitter plot. Frydos Autosupply n' More could be circled as a location worthy more investigations.

Geo-visual Analysis

Geo-spatial approach is useful to track employees' movement patterns through space and time.The geo-visual analysis reveals official and unofficial relationships of the employees which are helpful evidences for investigations. For example, it is discovered that 3 Executives of GASTech ,Ingrid Barranco, Ada Campo-Corrente and Willem Vasco-Pais met at Desafio Golf Course on 12th, January.

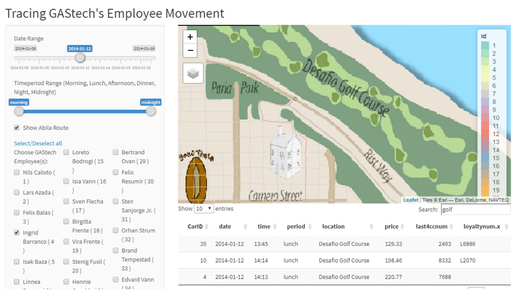

Fig 3. Executives Golf sessions on 12th Jan

Furthermore, there were several Chostus Hotel Meetups by Elsa Orilla and Brand Tempestad during midday lunch hours on 8th, 10th, 14th and 17th. Their homes seem located at the same building as well.

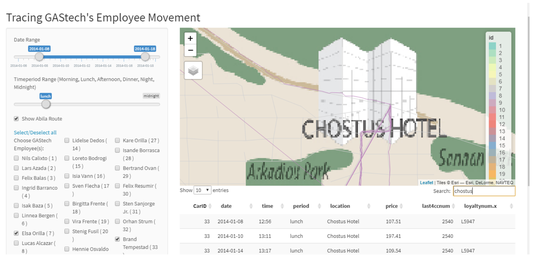

Fig 4. Traces of Elsa Orilla and Brand Tempestad on 10th Jan

However, based on the transaction details from below, they paid their bills separately.

CarID	date	time	period	location	price	last4ccnum	loyaltynum.x
33	2014-01-08	12:56	lunch	Chostus Hotel	107.51	2540	L5947
33	2014-01-10	13:11	lunch	Chostus Hotel	197.41	2540	
33	2014-01-14	13:17	lunch	Chostus Hotel	109.54	2540	L5947
33	2014-01-17	13:54	lunch	Chostus Hotel	159.62	2540	
7	2014-01-08	13:19	lunch	Chostus Hotel	111.89	9683	L7291
7	2014-01-10	13:08	lunch	Chostus Hotel	133.25	9683	
7	2014-01-14	13:21	lunch	Chostus Hotel	113.08	9683	L7291
7	2014-01-17	13:49	lunch	Chostus Hotel	114.22	9683	L7291

Showing 1 to 8 of 8 entries (filtered from 28 total entries) Previous 1 Next

Fig 5. transactionns of Elsa Orilla and Brand Tempestad on 10th Jan at Chostus Hotel

Text Analysis

Text analytics extracted frequent terms, word cloud and topic distribution from miniblogs and calls. The page is designed to show the readers how word clouds, term frequency and topic distribution change over time.

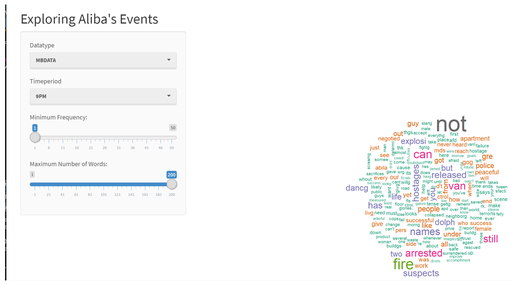

Fig 6. Wordcloud of the events

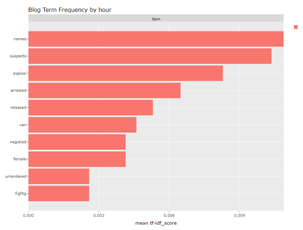

Fig 7. Blog term frequency by hours

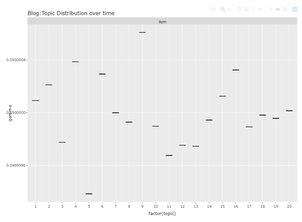

Fig 8. Topic Distribution by hours

There are 4 incidents we can conclude from the charts shown above. 1. At 6 pm, a fire started in the apartment dancing dolphin at 6 pm. The neighborhood evacuated themselves at 7 pm as the fire went stronger. People called fire station so firefighters came at 8 pm. The fire spreading is too fast to put out and injured the firefighters. Eventually, the fire caused explosion at 9 pm. Abila police arrested the suspects who started the fire. 2. At 7 pm, there was a shot fired by the officer. 3. At 7 pm, there was also a hit and run accident caused by a black van. 4. There was a gathering event for Pok rally in Abila Park. Kronosstar is one of the key member from the organization.

Conclusion

In this work we presented an integrated visual analytics dashboard for public and government analysis of tracking data, history of credit card, loyalty card and social media data. Multiple text mining, visualisation techniques were applied to further investigate things happened in Abila city in 2014. Abnormal behaviors were discovered.