Who is suspicious?

Joanna Lian[1], Ng Yen Ngee[1]

[1] Singapore Management University

Introduction

In January 2014, the leaders of GAStech are celebrating their new-found fortune as a result of the initial public offering of their very successful company. In the midst of this celebration, several employees of GAStech go missing. An organization known as the Protectors of Kronos (POK) is suspected in the disappearance, but things may not be what they seem. It appears that certain employees of GAStech may be involved in the disappearance.

Motivation

This project is motivated by findings that there were suspicious activities within GAStech itself which were worth investigating. This project aims to create a data analytics application to visualize these suspicious activities and relationships for users to judge, who exactly are the ssuspicious individuals.

Approach

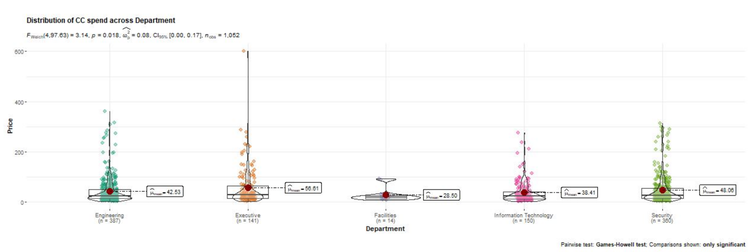
- Conduct data preparation using dplyr and other R packages.
- Analyse VAST 21 data set with background research using:
  - Exploratory Data Analysis (EDA) methods in R.
  - Inferential Analysis methods in R
  - Network Analysis in R.
- Creating a R shiny dashboard showing our findings/insights

Results

We identify four GAStech employees who have familial relationships with members of POK and hence are the most suspicious people in GAStech: Hennie Osvaldo, Isia Vann, Edvard Vann and Loreto Bodrogi. From here we can observe that these four people have many similarities. They are all males in their twenties and all from the security department, probably with a lot of drive and impulse to possibly plot an internal kidnapping. In our subsequent analysis, we will scrutinize closely the data with these characteristics.

Credit Card Expenditure

We see from the unfiltered credit card data that there are outliers and statistical analysis confirms these are worth investigating.

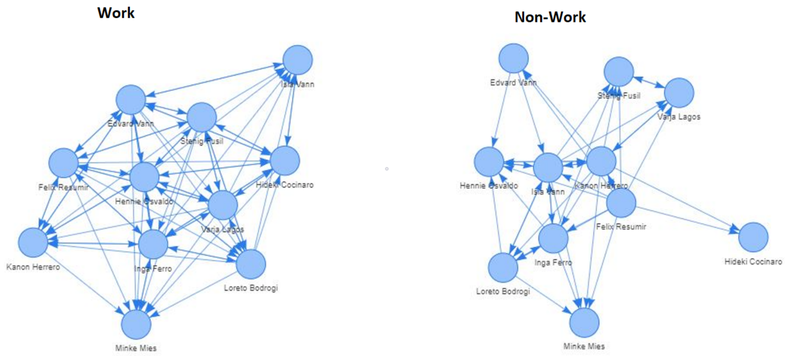


The following are just some suspicious oberservations that we make:

- Nils Calixto made a purchase of $10,000 at Frydos Autosupply n' More just two days before the kidnapping. Compare to the other purchases within the same cateogory, most transactions fall below $500.
- Axel Calzas made a purchase of $1239.41 at Albert's Fine Clothing just 3 days before the kidnapping. Most purchases made are around $300.
- Sten Sanjorge Jr made a purchase of $600 at the Chostus Hotel just 3 nights before the kidnapping incident.

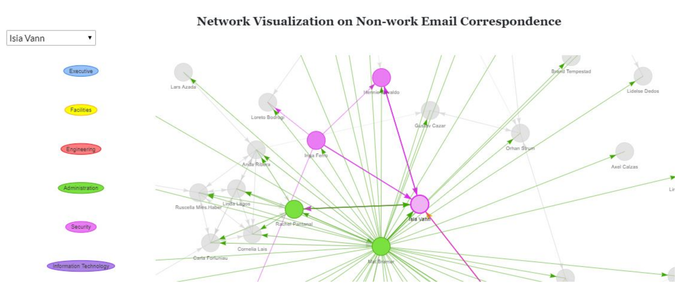
Email Correspondence

We focused straight into the correspondence within the security team and compare the differences between the network visualization of Work and Non Work correspondences.



If we observe the network of Work Correspondence, we observe that the emails sent are sent rather consistently throughout the team, however if we look at the other visualization we can see quite obviously the imbalance. Isia Vann and Hennie Osvaldo seems to be in the center of all these correspondence.

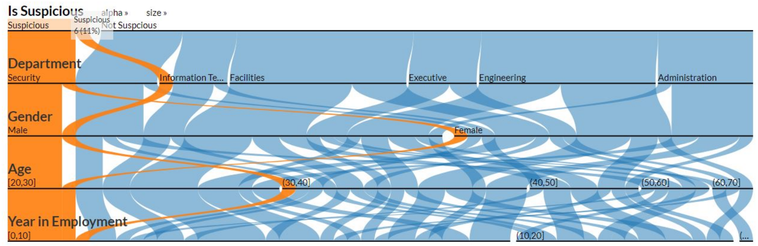
Let us scrutinize the non work email correspondence of Isia Vann with the rest of the organization:



We find another member closely related to our current suspicious candidates - Inga Ferro who is in correspondance with at least 3 of the original suspicious candidates.As for Axel Calzas, we eliminate him as a suspicious person as he does not have non-work correspondence, and any work related emails are department of company based.

Suspicious Members Profile

Finally, based on the suspicious employees that we have identified, here is the profile observed from the parallel set plot.



Future Work

- Additional user interaction features within and between each tab in the app to speed up the detection of suspicious individuals. E.g. users could be given the option to highlight certain transactions in the violin plot and that simultaneously triggers the network visualisation tab to showcase any connections between the individual who made that transaction.
- The GPS dataset can be utilised further. An additional tab exploring the daily commutes of the employees could be used to further illustrate the daily routiness and the relationships between the employees.

Try out the App yourself!

You can access the app here.

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