Universidade Federal do Pará

Instituto de Ciências Exatas e Naturais

Faculdade de Computação

Introduction to Information Visualization

Activity 03 — VAST 2021 (Mini-challenge 03)

Degree: Computer Science — Baccalaureate

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Question 1. Using visual analytics, characterize the different types of content in the dataset. What distinguishes meaningful event reports from typical chatter from junk or spam?

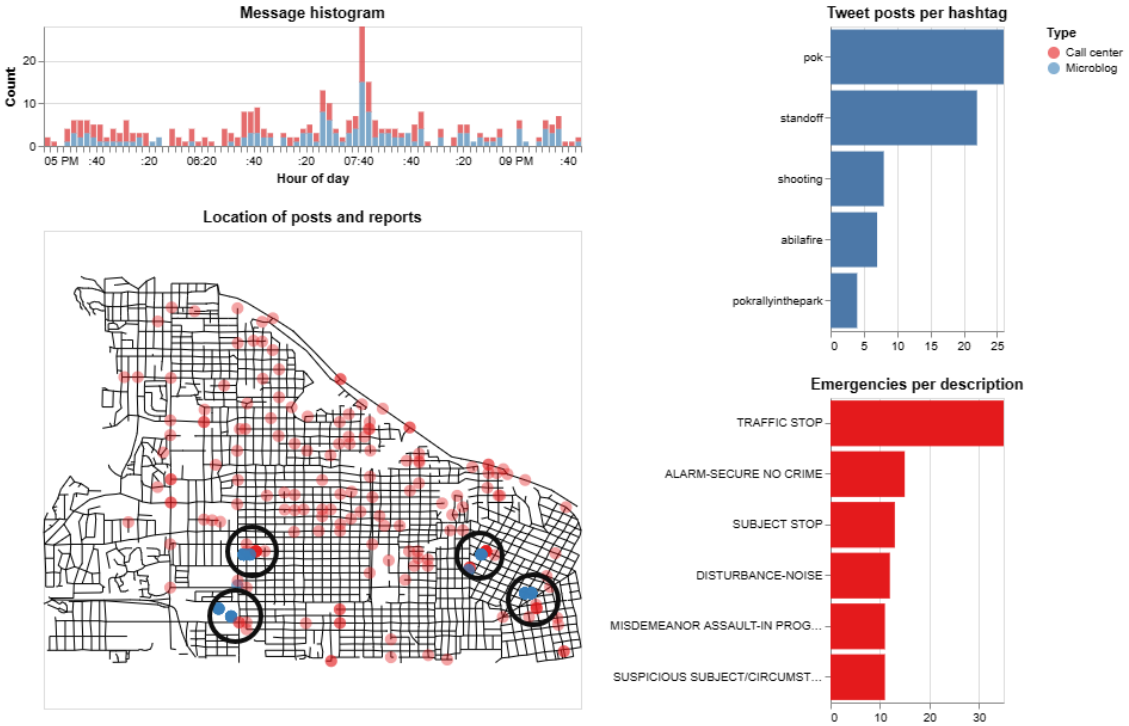

Figure 1 – Default view of the first group of visualizations. Source: the authors.

Upon exploring this data set, it was learned that the messages with coordinates or locations attached to it, albeit scarce, could be helpful to look for message clusters. These clusters, which can be seen in Figure 1 as more opaque points than the others, aided our search for meaningful events by distinguishing them from the customary city chatter. The adjacent bar plots also help discern meaningful events from peaceful events

and other frivolities: hashtags such as “#standoff”, “#shooting” and “#abilapark” are distinct from “#pok” and “#pokrallyinthepark”, and represent different types of events. Lastly, the reports also show distinct differences between typical events (e.g., “TRAFFIC STOP”) and atypical ones (e.g., “SUSPICIOUS SUBJECT/CIRCUMSTANCE”).

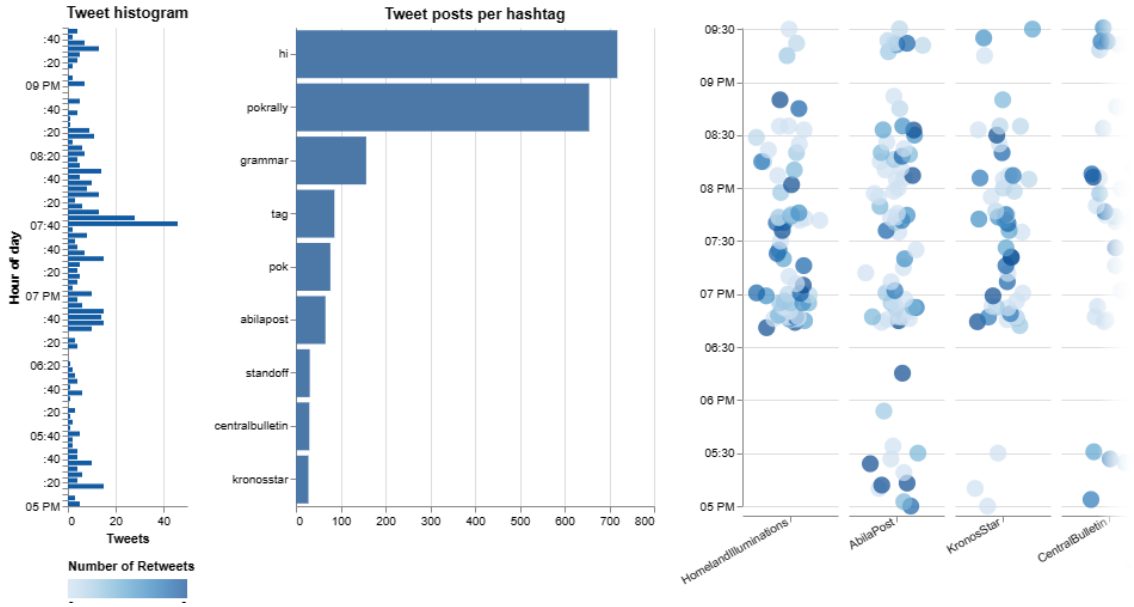

Figure 2 – Default view of the second group of visualizations. Source: the authors.

These differences are accentuated by filtering the timeline to show events from a specific time period. By doing so, the chronology of the cluster appearances in the map can be learned, as well as the most important messages, hashtags, and report descriptions. Complementarily, Figure 2 helps the user to further analyse the messages, see the opinions of the populace and media reports, and find more relevant (and irrelevant) hashtags. Since most messages lack coordinates, it is important to analyse this Figure (in particular, the strip plot) to acquire details of each event as it evolved.

In terms of spam messages (which were mostly filtered out of the visualizations), it was learned that most of them contained some link with `.kronos` in it, making it easier to eliminate these entries from the data.

Question 2. Use visual analytics to represent and evaluate how the level of the risk to the public evolves over the course of the evening. Consider the potential consequences of the situation and the number of people who could be affected.

As previously mentioned, four meaningful events were discovered from the messages with coordinates obtained from the data sets. This allowed the attainment of the following timeline:

1. **Rally:** between 5 and 6 PM, political speeches began appearing as the lower-left message cluster seen in the map (see Figure 1). Relevant individuals spoke at this

event.

2. **Dancing Dolphin fire:** at approximately 6:20 PM, reports surfaced on a fire in a residential building. This took place on the upper-right message cluster (see Figure 1). A fire was detected in the second floor of the building, thus making all residents leave it in a hurry as first responders handled the situation. Around 9:40 PM, an explosion was reported in the same building.

3. **Cyclist incident:** around 7:20 PM, messages were posted talking about a biker being run over by a black van on the lower-right message cluster (see Figure 1). First responders were called to the scene to take care of the victim.

4. **Police confrontation:** at approximately 7:40 PM, a situation appeared near an establishment named Gelato Galore, on the upper-left message cluster (see Figure 1). Individuals in a black van (possibly the same one that injured the biker minutes ago) began confronting the police after being pursued. It was learned, as the situation escalated, that two criminals had two hostages in their possession. A SWAT squad was dispatched to the area, shots were exchanged, and a police officer was injured in the process. The situation apparently ended with the criminals being arrested without other casualties.

In terms of risk to the population, it can be argued that the fire affected most people at the end of the day, since it made all residents leave their homes. However, this event was predictable once it began, unlike the black van: a point can be made that the behavior of the criminals was unpredictable, leaving margin to speculations about what was in that van and what was their intention and motive.

The event wherein a biker was run over by the black van could be defined as the same event as the confrontation with the police. However, if it were to be analysed separately, it could be said that, albeit unfortunate, this event was relatively minor. Lastly, the political rally seemed to be a peaceful event, without meaningful incidents near its location.

Question 3. If you were able to send a team of first responders to any single place, where would it be? Provide your rationale. How might your response be different if you had to respond to the events in real time rather than retrospectively?

Based on what was clarified in the previous question, if we were to make a retrospective decision, we would opt to send first responders to pursue and mitigate the black van situation, as it culminated in casualties and involved hostages.

On the other hand, if this decision were to be made in real time, we would have sent the first responders to the Dancing Dolphin, as this event happened hours before the black van incidents and had the potential to affect many citizens and families.

To see, analyse, and interact with the visualizations and their source-code, see the `.ipynb` and `.html` file on `@imatheussm/vast-2021-tweets`.