

Brief Case Study of the OPD Pulse Shooting LIVECAD Logs

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Purpose: This document provides a brief case study of crisis affected area call patterns found in the publicly released 911 operator logs from the 2016 Orlando Pulse shooting.

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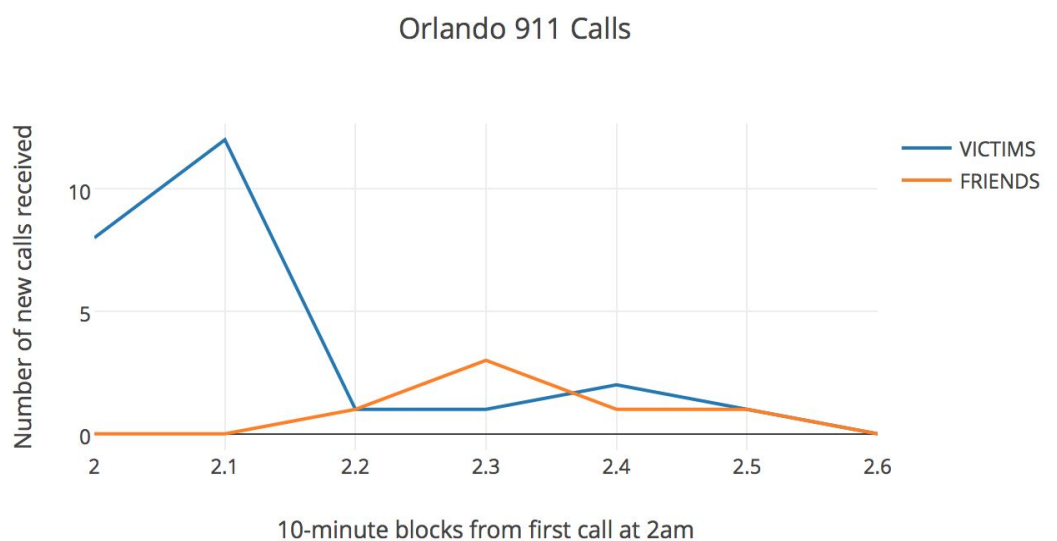
Case Study: Orlando 911 Log

After the tragic mass-shooting at the Orlando Pulse nightclub in June, the city publicly released a large set of documents related to the attack and the response. This included the 911 operators’ log from the incident--essentially a transcript from an internal chat room used to coordinate 911 operators that responding to multiple victims from the same event [3]. It includes references to all calls from individuals who were actively involved with the event, either directly (individuals trapped within the nightclub) or indirectly (offsite individuals who were in communication with someone trapped in the nightclub)¹. These chat messages note the time each call was received, information about the location of the caller (if/when known), and often summaries of the caller’s situation.

The chat transcript was used to create a data-set of call times, labeled with whether the callers were directly or indirectly involved in the crisis. Additionally, relevant situational information was found in the content of the chat messages.

Recent Call Frequency, Typed Call Behavior, and Anomalous Ego-Network Behavior

In the chart below, there’s a spike in **frequency** of calls to 911 (**typed call behavior**) from individuals in the nightclub, occurring within the first 20 minutes of the crisis (between 2am-2:20am). A secondary spike of calls occurs a bit later, between 2:30-2:40am; these calls originate from the friends and family (the **ego-networks**) of the victims trapped in the nightclub. Although the direct 911 call frequency has dropped by 2:20am, the attack is still ongoing; it has become a hostage situation, and many wounded are in deteriorating condition. We see that in a severe, ongoing crisis, anomalous call behavior spreads out across the ego-networks of the threatened individuals.



¹ Lower priority calls related to the event, i.e.. from callers who’d already reached positions of guaranteed safety/aid outside the threatened area and had no new information to contribute, appear to have been directed elsewhere.

High Centrality Individual Identification and Anomalous Subgraph Identification:

Additional relevant patterns of communication behavior were visible in the 911 operator logs. When the attacker moved to one of the two the downstairs bathrooms, and remained there until he was taken down by police, individuals trapped in the bathrooms began actively communicating with each other via text messages. Information about the attacker was rapidly texted by individuals within the threatened bathroom (who could observe the attacker, but weren't able to make a voice phone call directly to 911) to individuals in the neighboring bathroom, who were able to collect and pass this information on to 911 operators (who then passed it on to police). Information collected this way, by a self-organized information exchange network among victims, was denoted as "3rd-party" in the 911 logs (ie, because it was information the caller received by text, rather than observing personally).

This information-exchange network (an **anomalous subgraph** in the general text/call communications network) only apparently manifested around the attacker's bathroom where the situation was actively threatened and rapidly evolving. Unthreatened areas (office, dressing room) did not present the same behavior. This appears to support the hypothesis that anomalous subgraphs are indicative of active threats, dire needs, and high utility information sources for emergency responders.

We also hope to identify group leaders, if possible. Primary individuals in the bathrooms' information exchange network will have **high centrality** within texting networks; they sent many texts, to people who were also actively communicating. Apparent group leaders also existed in unthreatened areas (office, and dressing room); these leaders provided extensive information to responders about their group's location, medical condition, observations (ex. distant gunfire), and possible resources (ex. external air-conditioner that, when removed, enabled dressing room group to escape). However, leadership roles in unthreatened areas were distinguished by single (or a small number) of long-duration phone calls with 911 operators, rather than many calls to different recipients. Call length and recipient type may important factors to include for centrality estimates in this context.

Summary

Over the course of the crisis, situational information was spread across messages in the 911 operators' chat room, constrained by the operators' typing speed/accuracy and producing no quickly readable summary. Here our privatized social network analyses may be of use: If we can provide an automatically-generated, real-time, easily readable report covering a selection of key situational information (including identifying the onset of an attack, its location, severity, an estimate of the number of individuals within the threatened area, identification of likely group leaders (information sources) and possible actively threatened areas), this report could support emergency response dispatchers, helping them quickly orient themselves on the crisis status, collect new information and direct aid.

References:

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