

# Mixed-Initiative Visual Exploration of Social Media Text and Events

## IEEE VAST Challenge 2021 MC3 Award for Strong Human-in-the-Loop Analysis Methodology

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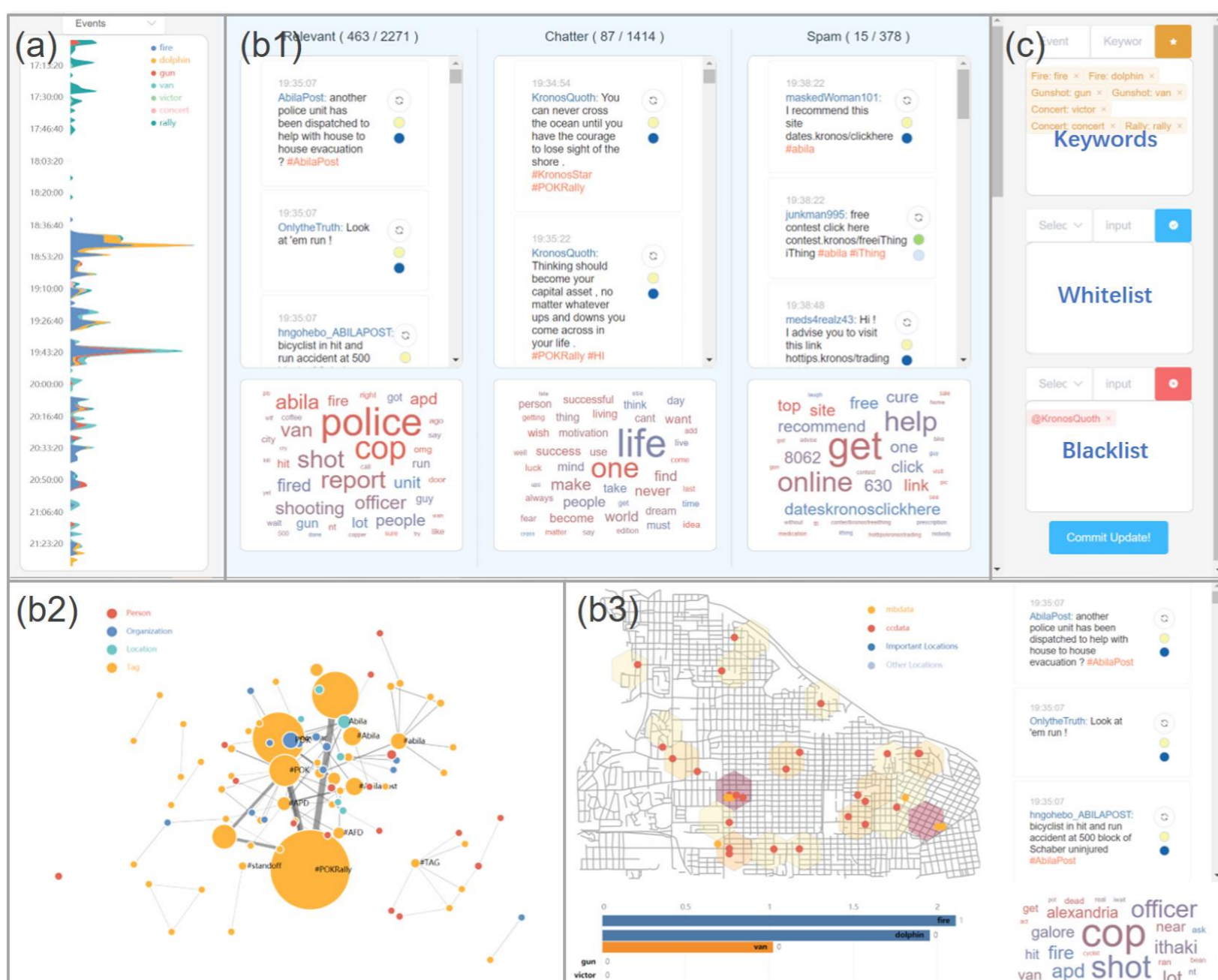
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### Introduction

IEEE VAST Challenge 2021 Mini-Challenge 3 requires participants to retrospectively detect and evaluate public risks in Abila City during an evening. The provided data are microblog records and emergency dispatch records from local police and fire departments. We design an interactive visualization system which enables interactive classification and mining of social media texts, supports user-defined event analysis, and displays risk of public temporally and spatially. It features mixed-initiative visualization design and human-in-the-loop analysis process. Generally, our visual analytics solution has two integrated interactive steps: microblog classification (step 1) and detailed analysis (step 2). The user may first start from an interactive classification and mining process of microblog records to identify relevant information, chatter and spam (step 1). After observing crucial information, he or she may then interactively explore user-defined risk events in the spatial temporal scenarios (step 2). During the whole analysis process, the user's knowledge of the situation deepens through the iterative exploration.

### Design



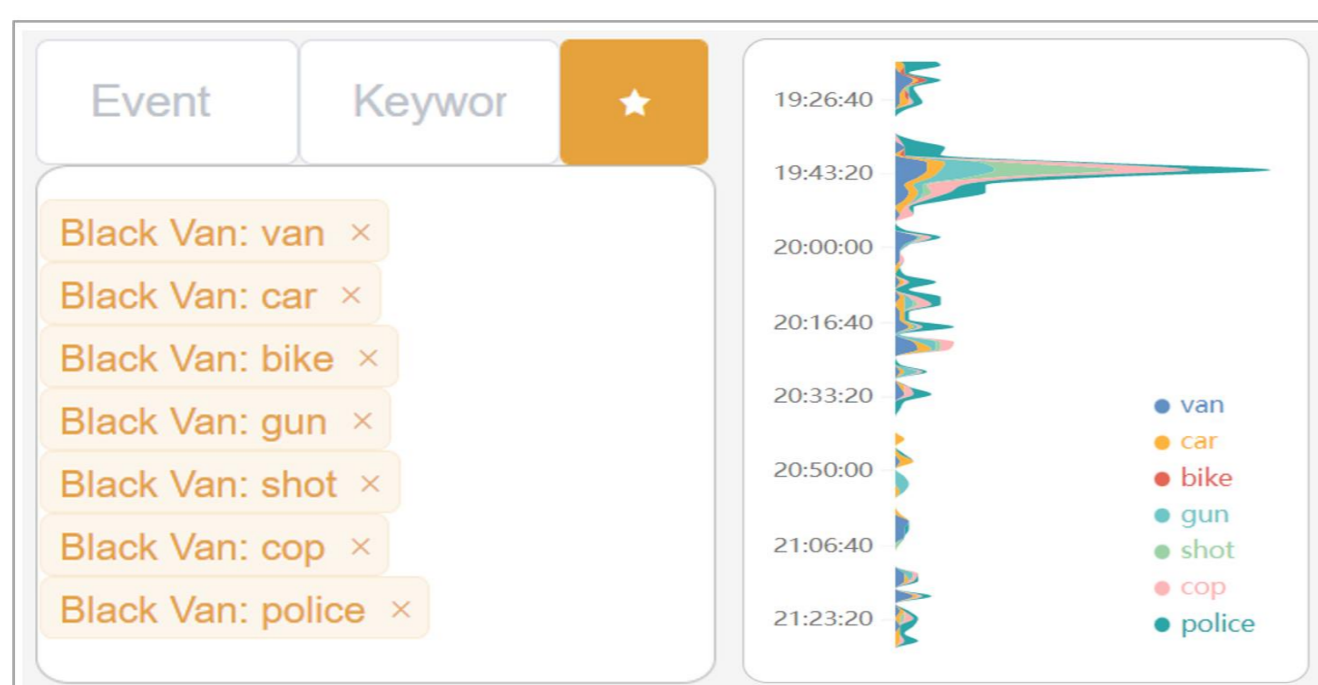
The system interface has a brushable timeline on the left (a), a filter panel on the right (c), and a scrollable central view which can switch between the message view (b1), the entity graph (b2), and the general analysis view (b3).

**•Timeline (a):** All the other views are linked to the timeline, and the timeline itself can be rendered based on message type, classification result, user-defined keywords, or sentiments.

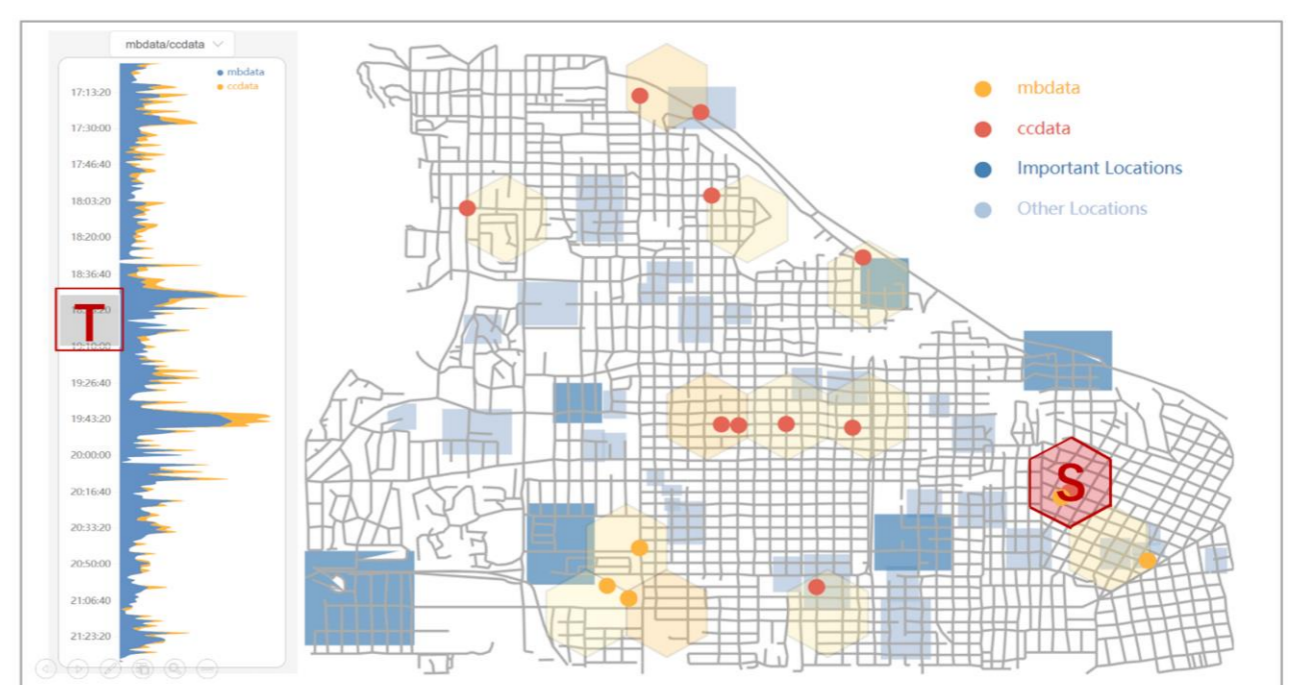
**•Message View (b1):** Each category of messages is displayed with its corresponding word cloud. We use a combination of machine learning and human interaction to pre-classify relevant messages, chatter and spams. Users can directly relabel a certain message by clicking on the relabel button.

**•Black List and White List (c):** Users can do batch operations with the help of the black list and the white list. He or she can add bloggers or tags into the black list to prevent them from appearing in the relevant message set.

**•Entity Graph (b2):** From the raw texts, we extract entities such as authors, tags, organizations, locations, and persons to build an entity graph. Two entities are linked together if they both appear in one microblog record.



**•Event Keyword Tool:** Having explored with the messages, the word clouds and the entity graph, users may become curious about several keywords of different events that happen during the evening. Users can input self-defined events with corresponding keywords into the event keyword tool. The system will render the timeline with the appearance of keywords, generate a bar chart race under in the general analysis view, and highlight message cards that contain a keyword.



**•Map:** We provide a map of Abila City marked with relevant information. The blue rectangles approximately represent the public places that we identify in Abila City. During a certain time period, we mark the locations of microblogs and emergency dispatches on the map. We define risk level in hexagon S during time region T. And the color of hexagons represent the computed risk level in the area. The higher the risk level is, the redder the hexagon will be coloured.

### Acknowledgements

The authors would like to thank all the participants involved in the work for their valuable feedback and the reviewers for their constructive comments