



# CIVIQUE: DETECTING URBAN EMERGENCIES

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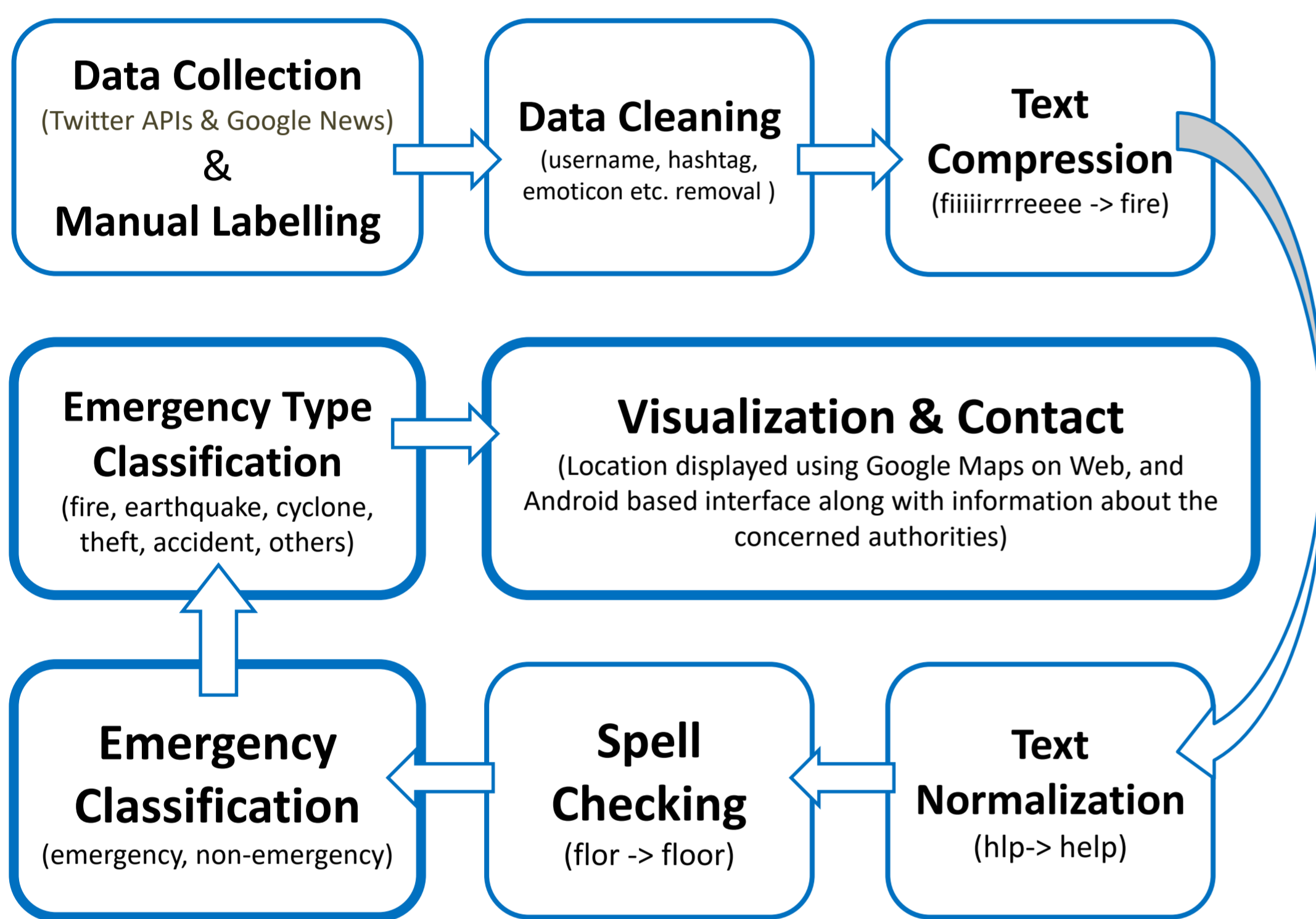
## MOTIVATION

- In 2015, **53%** of all unnatural deaths in India were caused by **car accidents**, and **6%** by accidental **fires**.
- The Indian subcontinent alone suffered seven **earthquakes** in 2015, with the recent Nepal earthquake alone **killing more than 9000** people and **injuring 23,000**.
- The need to *quickly bridge the gap between people and the concerned authorities*.
- The need was felt for a **twitter message based solution** to help bridge this gap.

## CHALLENGES AND SOLUTIONS

- **Location tagged tweets:** Otherwise, event detection techniques to extract the spatio-temporal data can lead to false alarms.
- A mechanism of **reliability score** of tweets in order to avoid false alarm, in case of extraction of spatio-temporal data.
- A **sophisticated language processing component** to sanitize the tweet input before event detection.
- A **channel with the concerned authorities** to take serious action, on alarms raised.
- An urban emergency such as a natural disaster could affect communications severely, in case of an earthquake or a cyclone/

## ARCHITECTURE & METHODOLOGY



- We choose Twitter, and Google News feeds as the platform for collecting data, and detecting emergency event / incidents.
- Using the APIs, we collect data for text classification, and label them manually for two steps:
  - **Emergency / Non – Emergency Tweet.**
  - **Emergency Type of the Tweet.**
- Our system performs cleaning and pre-processing via compression, normalization, and spell checking..
- Classification techniques such as Support Vector Machines (SVM), and Naive Bayes (NB) used for training, and testing.
- Twitter Streaming APIs are used to stream twitter data on a real-time basis.
  - The data is filtered through a set of rules.
- The system uses the first classifier to detect whether the tweet belongs to an Emergency event or not.
  - In case the first classifier detects a particular event as an emergency event, it then feeds the event to second classifier to get the type of emergency event.
- The event is then visualized on the web interface, and the android application interface, along with its location on the map.

## RESULT & ANALYSIS

- We evaluate our model using standard precision, recall and f-score based technique.
- Our system uses ~3200 manually labelled tweets to train the data.
- We perform ten fold cross validation for both SVM and NB.
- We choose SVM for classification step one, and NB for classification step two, based on F-scores, as shown in the table below.

- Manual Evaluation revealed **false positives** such as:

- I am sooooo so drunk right nowwwwwwwww.
- fire in my office , the boss is angry.

Classifier	Step One	Step Two
SVM	88.0%	90.5%
NB	67.9%	92%

## CONCLUSION

- We design and implement Civique, which is a system to detects urban emergencies like earthquakes, cyclones, fire break out, accidents etc.
- It visualizes them on both on a web interface and an Android application, along with the location.
- We collect data from micro-blogging sites like Twitter, ang Google News, and use language processing modules to sanitize the input.
- We display the positively classified tweets along with their type and location on a Google map, and notify our users to inform the concerned authorities, and possibly evacuate the area.

## FUTURE WORK

- We plan to establish a communication channel with the government authorities which could lead to effective communication, and thus minimize the loss of life.
- We also plan to look into active learning, and re-inforcement learning to categorize the emergencies in a better way, and create necessary categories, if required.