



Tweets, Emergencies and the Encoding of Experience

Flood Tweets in Jakarta

PetaJakarta is a multidisciplinary **research program** for capturing and processing social media (tweets) to support the generation of crowd sourced flooding and hazard maps of benefit to citizens and emergency agencies. This research is conducted under the auspices of the Geo-Social Intelligence for Urban Resilience and Liveability Research Group, SMART Infrastructure Facility, University of Wollongong, Australia. PetaJakarta was developed in response to the frequent, and often devastating, flooding of Jakarta, one of Asian largest megacities and also one of the world's largest users of Twitter. Jakarta suffers from the worsening monsoons influenced by global warming. With huge numbers of tweets being collected there is a need to be able to identify those that contain information relevant to flooding and those that do not.

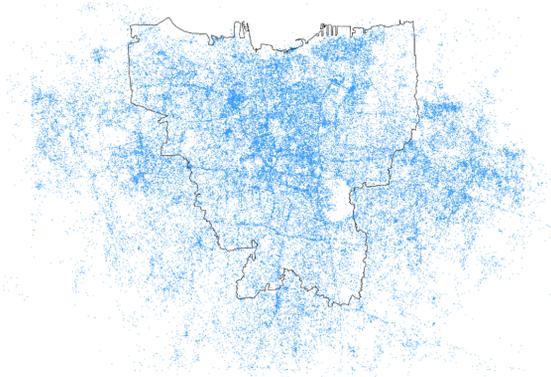


Figure 1 – Jakarta revealed through tweets

Existing approaches: lexical analysis

The dominant approaches for analysing social media messages are statistical in nature. Once a user activates the geolocation on their mobile device, tweets sent using a special hashtag #banjir (Bahasa Indonesian for 'flood') can be displayed on PetaJakarta's maps during times of monsoon and inundation. Tweet volumes and rates can be measured and analysed. The volume of tweets might signify the activity presumed to be associated with flooding activity. There is however a lot of noise in this kind of data and interpreting this information is difficult. The collected tweets have a strong diurnal cycle; it matters how many people are awake when you are only analysing tweets by counting them. Similarly during times of considerable flooding, all of the districts (kampongs) light up in red on the map just because of the huge volume of tweets.

New approach: message organisation

As useful as statistical approaches are, they can only consider what was said; that is, they utilize only the lexical (wording) aspects of social media messages. These approaches are incapable of determining the meanings of these messages. By employing a functional communication approach we can consider not only the meanings of what was communicated, it also becomes possible to explore how a social media message is organized as an instance of communication. When analysing social media messages, it's not what you say it's the way that you say it.

We apply a functional approach to communication to understand which **grammatical resources** are being used to formulate any given social media message. This opens up an entirely new approach to the analysis of social media; one that can be used to describe the semantics of social media messages in emergency contexts. By analysing how emergency social media messages are organized grammatically we can exclude a large proportion of messages that are otherwise irrelevant. Tools can be developed that use grammar to explore social media semantics. In effect, grammar provides many additional categories that can be used to filter, search and process the large collection of social media messages that can be collected during emergencies. Concentrating on grammatical resources provides us with an approach to separate out the chaff from the wheat. But which grammatical resources should we use?

Experiencing emergencies

The kinds of meanings we are interested in understanding during actual emergencies are those that enable us to represent experiences using language. One way in which the ongoing flow of experience can be described in language is as discrete experiences that are then ordered into language. The grammar of experience is called **transitivity** (Halliday 1978). There is a great many possible 'goings on' that can comprise experience, and the grammar groups this diversity into a small number of so-called **process types**. These are realized by verbal groups. Common examples of process types include **material processes** that either describe happenings (events) or doings (actions), or **mental processes** that are either about what sensed (perception), thought (cognition), or felt (affection).

There are six process types in all. Clearly process types are incredibly significant for describing the different kinds of experience including those encountered during emergencies. All of the tweets captured, need to be broken down into their constituent clauses, and each clause needs to be analysed using the system of transitivity. Another aspect of our experiences is the **circumstances** that surround them. These are realized by adverbial

groups or prepositional phrases. There are seven kinds of circumstances, most of which have subcategories. Three of them appear to be very relevant to the kinds of hazards found in the PetaJakarta program: Extent with its sub categories duration (temporal) or distance (spatial), location in time (temporal) and place (spatial) and Manner (means, quality, comparison). All of the associated clauses previously identified, need to be analysed for their circumstances, if any (Martin 1992).

Armed with these grammatical resources, it is possible to exclude from further consideration large amounts of irrelevant tweets collected using as part of the PetaJakarta project, not based exclusively on the content but on the semantic resources used to construct the social media messages (tweets). Areas that are undergoing flooding and inundation produce tweets that comprise material processes in a greater proportion than other process types. In other words there will be fewer messages about what people are saying, thinking or behaving, for example, and many more messages that encode meanings concerning what is happening and what is going on. We also expect to see specific types of circumstances associated with these processes in particular ones that refer to location, local and districts and those that involve duration. This approach will provide better forms of flooding and hazard description and visualisation than is possible with current methods which are dominated by statistical approaches.

References

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Martin, J. R. (1992) *English Text. System and Structure* Philadelphia/Amsterdam John Benjamins Publishing Company

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