

IEERG Research Briefing

Sydney Siege, December 2014:

A Semantic Social Media
Sentiment Analysis

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THE UNIVERSITY OF
SYDNEY



Team



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University of Münster



Associate Professor
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University of Wollongong



Professor
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The University of Sydney



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The University of Sydney

Agenda

Sentiment Analysis Approaches

Research Design

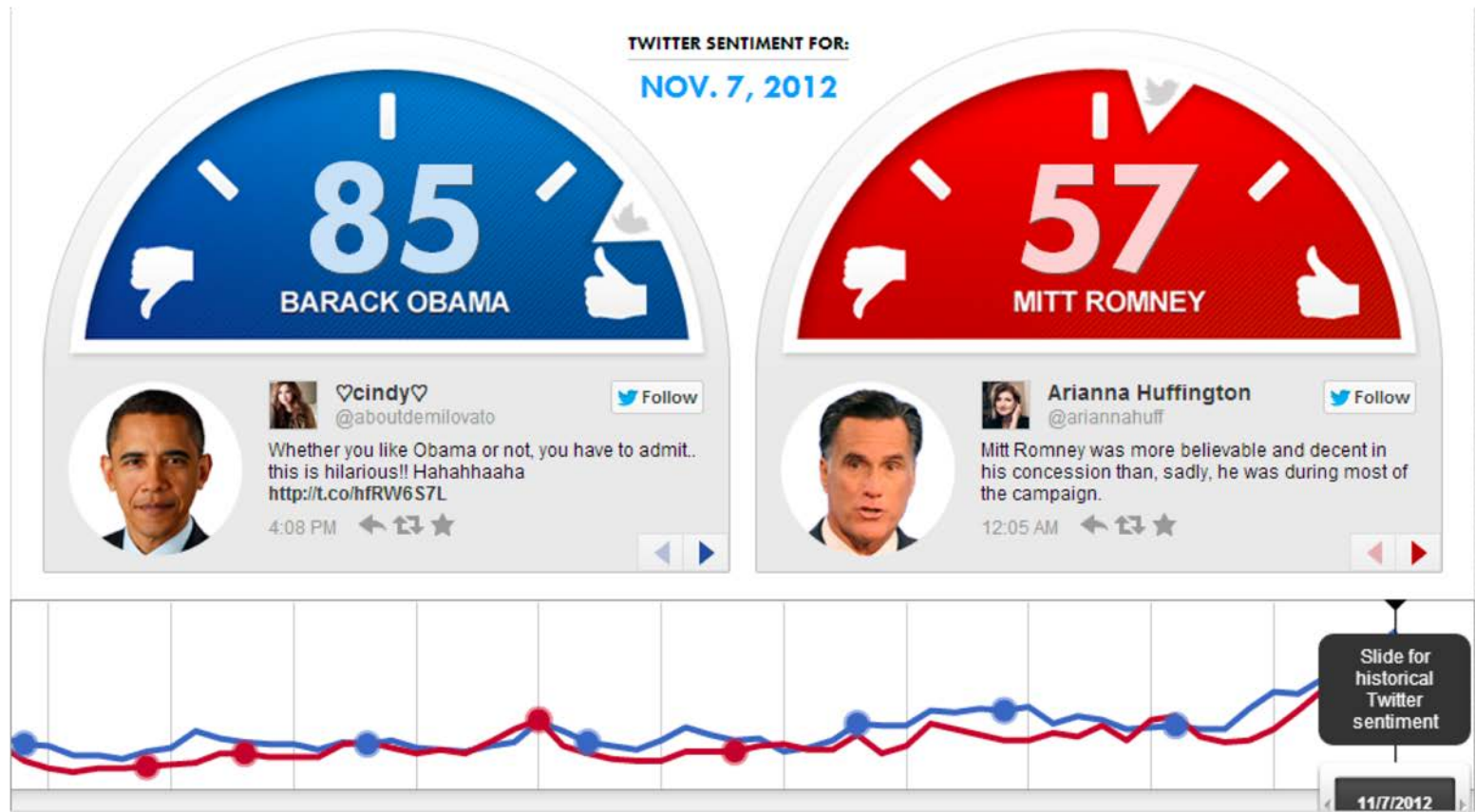
Case – 2014 Sydney Siege

Sentiment Patterns during 2014 Sydney Siege

Sentiment Analysis Approaches



Example of Sentiment Analysis Approaches



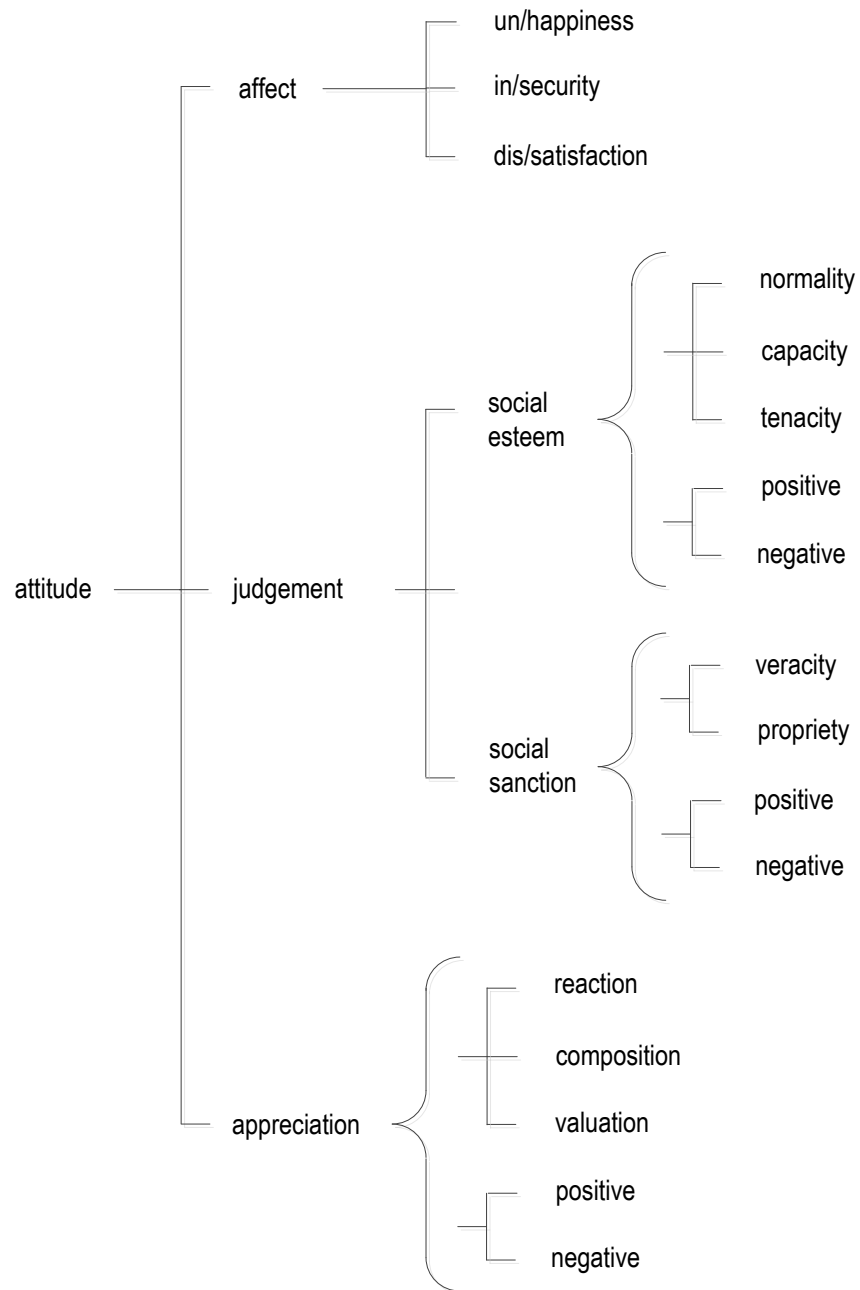
<http://okhin.com/blog/sentiment-analysis-methods/>

Problems with Sentiment Analysis Approaches

- Sentiment can indicate **feelings** and **emotions**, **opinion** and **reactions** or indicate **outlooks** or **perspectives** of those who are communicating
- Most sentiment analysis systems are **not based** on any specific theories of communicated sentiment
- Usual ways of determining social media sentiment are based on ‘bag of words’ algorithms where words are classified according to a **presumed emotional polarity**
- This gives us only **limited view** of what social media users are feeling about an extreme event

Towards Functional Linguistic Analysis Methods

- We are applying a functional linguistic theory of communication called **Systemic Functional Linguistics**
- We are using the **Appraisal Framework** to unpack the attitudes and sentiment of social media messages during extreme events



Software Prototype



User Interface to annotate Tweets

Training procedure for dictionary

- 1 Identify Clauses
- 2 Identify Appraisal Items
- 3 **Classify appraisal**

Appraised items and categorization

To feed the machine learning process with additional information, you can optionally chose an appraised item. Otherwise just categorize the appraisal items.

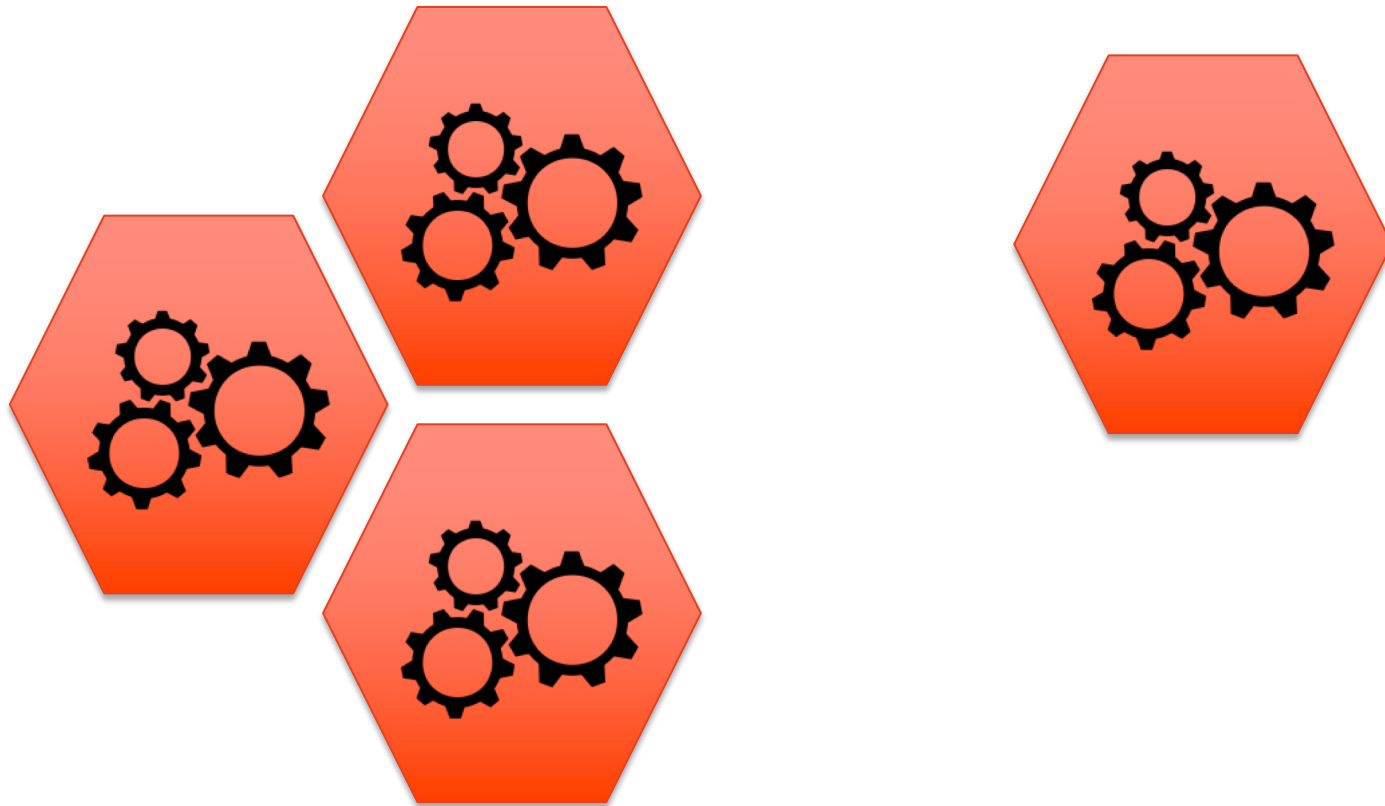
! By clicking on the classifier proposals, you can accept them.

	clause	appraisal item	appraised item
	Thinking of the hostages	hostages	
	at this terrible and frightening time	terrible	
	at this terrible and frightening time	frightening	

Classify HOSTAGES

Appreciation	Affect	Judgement	Amplification
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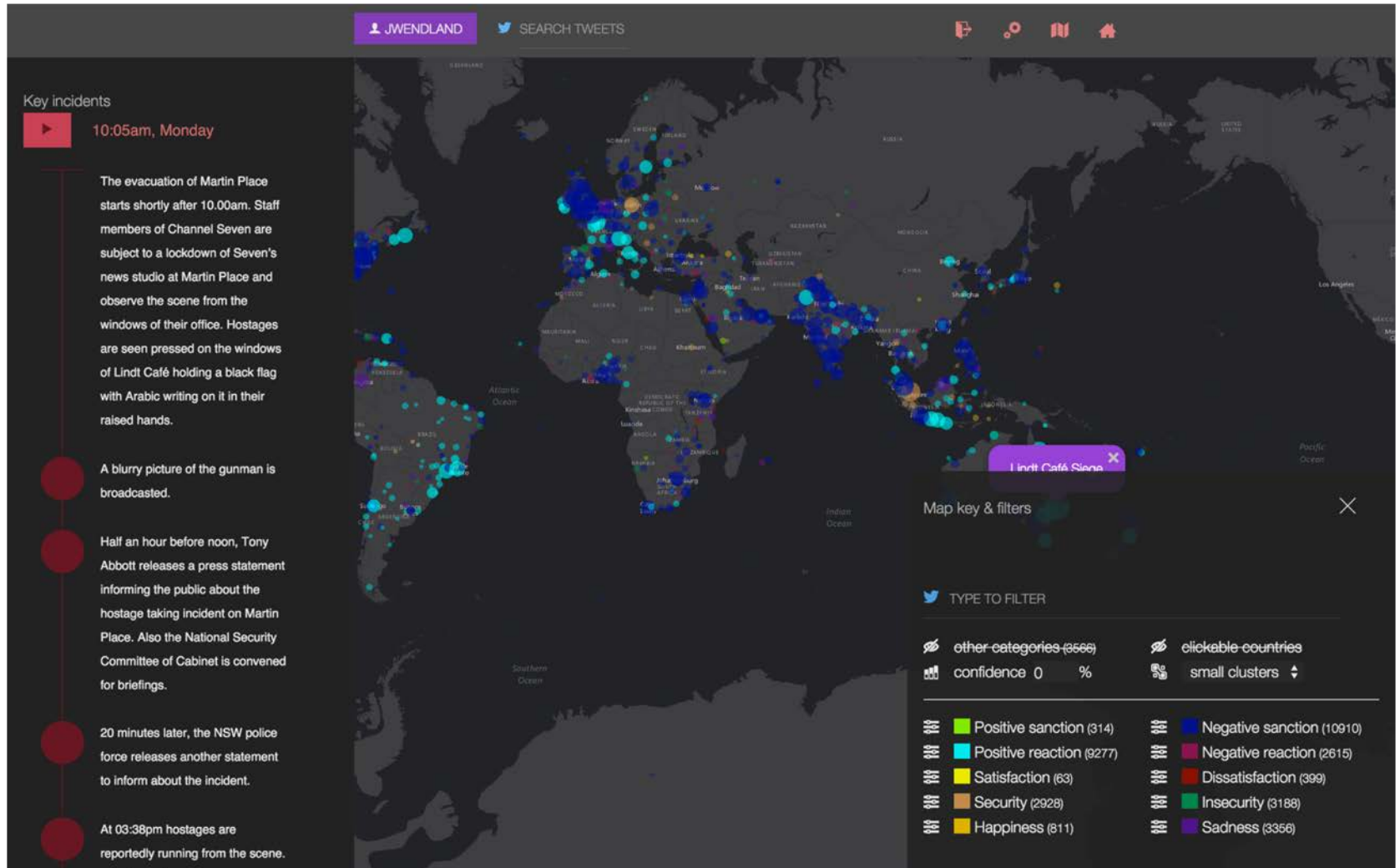
Machine Learning Classifier



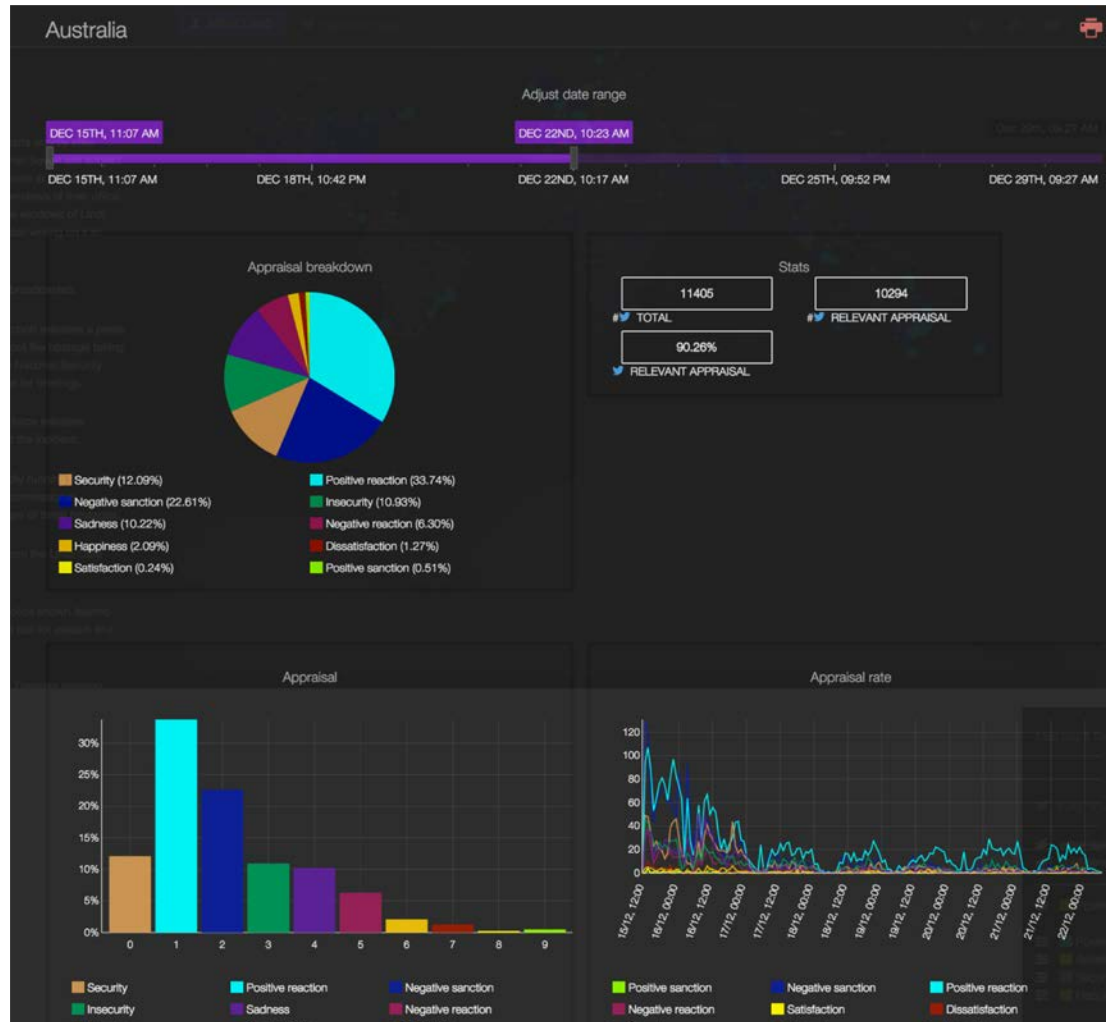
Machine Learning Classifier

Setting	Base Classifier	Feature Type	Appraisal Boost	MAP
Setting 1	Naïve Bayes	binary	X	46.59%
Setting 2	Naïve Bayes	TF/IDF	X	45.53%
Setting 3	Naïve Bayes	frequency	X	49.26%
Setting 4	Naïve Bayes	TF/IDF	1.7	45.98%
Setting 5	Naïve Bayes	frequency	1.7	49.72%
Setting 6	Logistic Regression	binary	X	48.59%
Setting 7	Logistic Regression	TF/IDF	X	44.63%
Setting 8	Logistic Regression	frequency	X	50.24%
Setting 9	Logistic Regression	TF/IDF	1.7	48.92%
Setting 10	Logistic Regression	frequency	1.7	51.46%

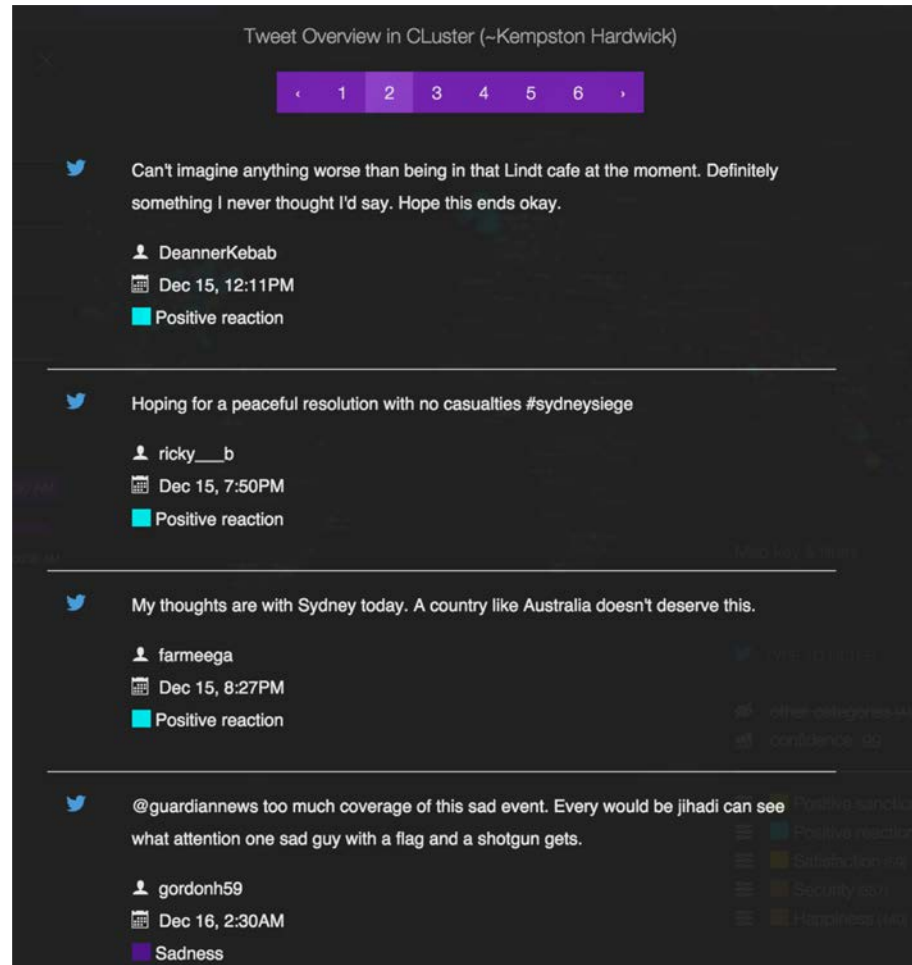
Analysis and Visualisation Tool



Analysis and Visualisation Tool



Analysis and Visualisation Tool



Sydney Siege 2014 - Timeline

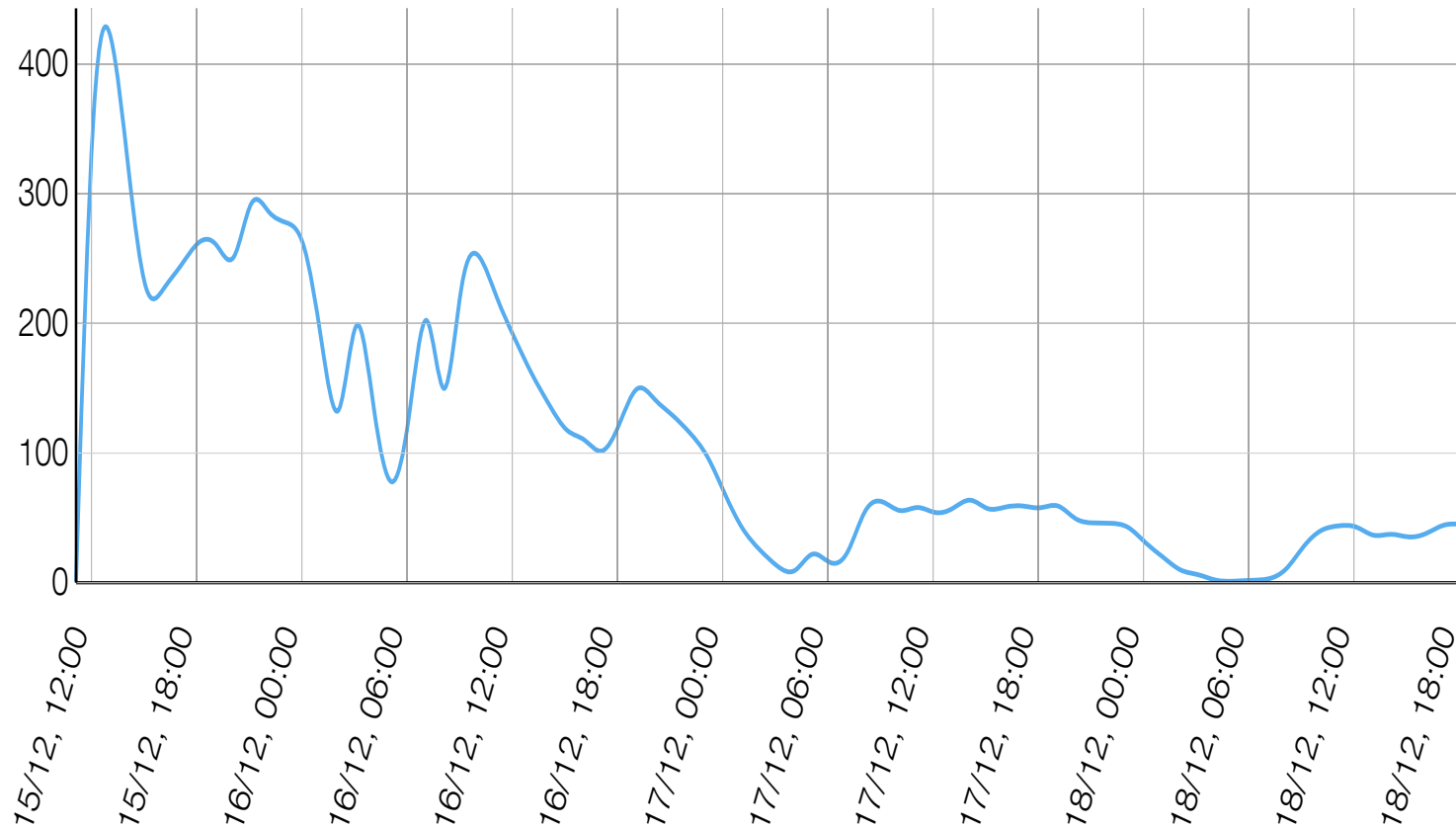


Timeline	Description
15th December 2014	
08:33 am	later hostage-taker enters the café
~09:40 am	hostage-taker speaks to the manager; hostage situation unfolds
09:41 am	forced call to 000 (Australia's emergency phone number)
09:49 am	Police arrives at Martin Place
10:20 am (approx.)	Hostages were forced to hold black flag against the window
10:45 am	Sydney Opera House was evacuated (caused by suspicious package)
03:37 pm	Three hostages escaped the building
04:58 pm	Two more hostages escaped through another exit
16th December 2014	
2:00 am	Six hostages were fleeing out of the building; followed by one gun shot.
2:11 am	Second gun shot. Hostage escapes.
2:13 am	One hostage was shot. Police are storming the café.
2:14 am	Ongoing firefight; One further hostage was killed by stray bullet
2:44 am	Hostage situation is declared resolved through a NSW Police Tweet. "Siege over. More details to follow"

Overview Dataset

Dataset Overview	
Collected Keywords:	“sydneysiege”, “martinplace”, “sydney”, “lindt”
Timeframe:	15 th – 29 th of December 2014
Collected Tweets:	5,429,345
Geotagged Tweets:	50,670

Hourly Tweet rate - Australia



Findings - Overview



APPRECIATION

Positive reaction

Negative reaction

AFFECT

Satisfaction

Dissatisfaction

Security

Insecurity

Happiness

Sadness

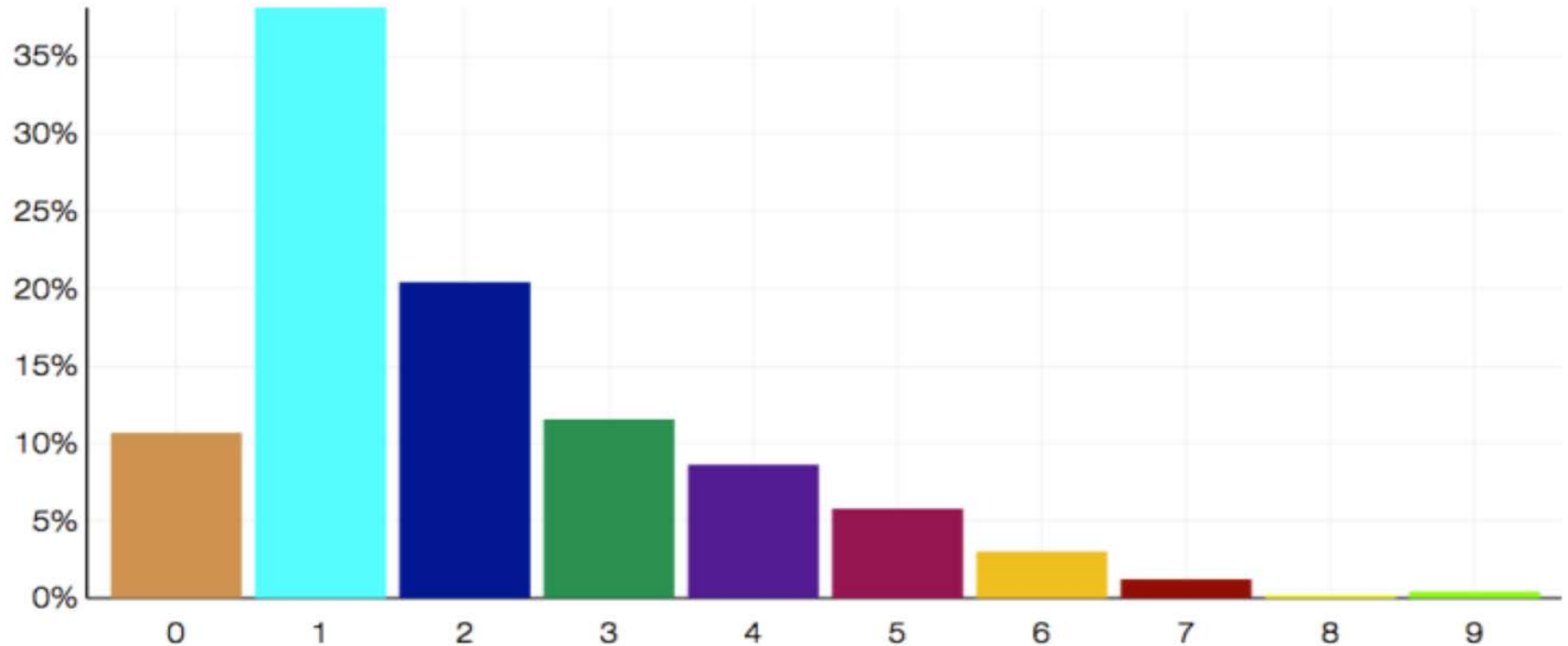
JUDGEMENT

Negative social sanction

Positive social sanction

- Overall Sentiment - Australia;
- Sentiment towards Victims - Australia;
- Sentiment towards Islam - Australia;
- and Sentiment around #Illridewithyou - Australia.

Findings – Sentiment Australia



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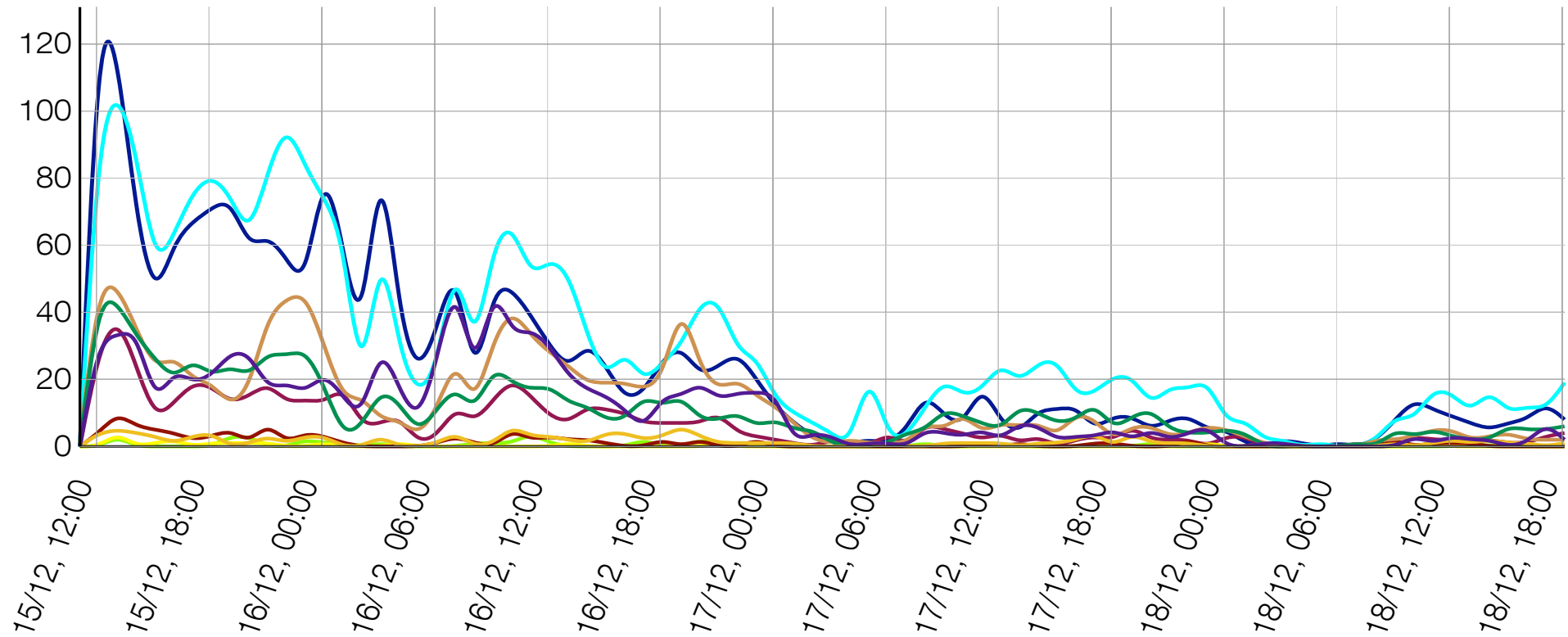
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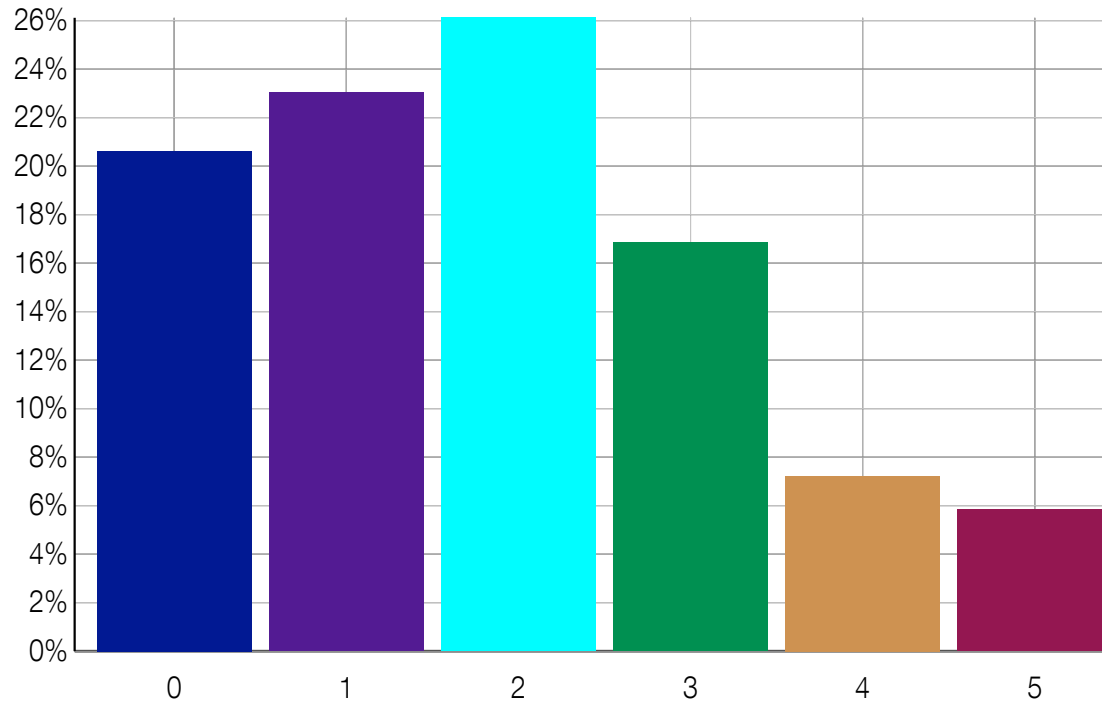
Negative social sanction

Positive social sanction

Findings – Sentiment Australia



Findings – Sentiment towards Victims, Australia



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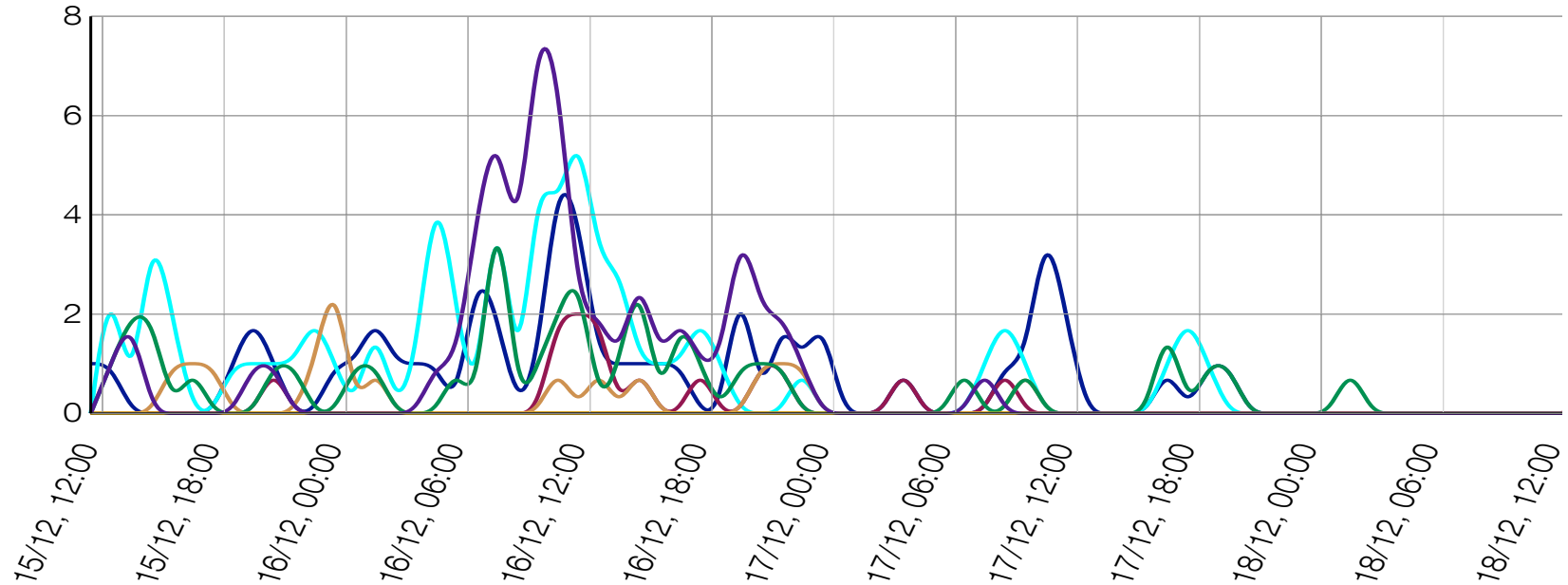
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Findings – Sentiment towards Victims, Australia



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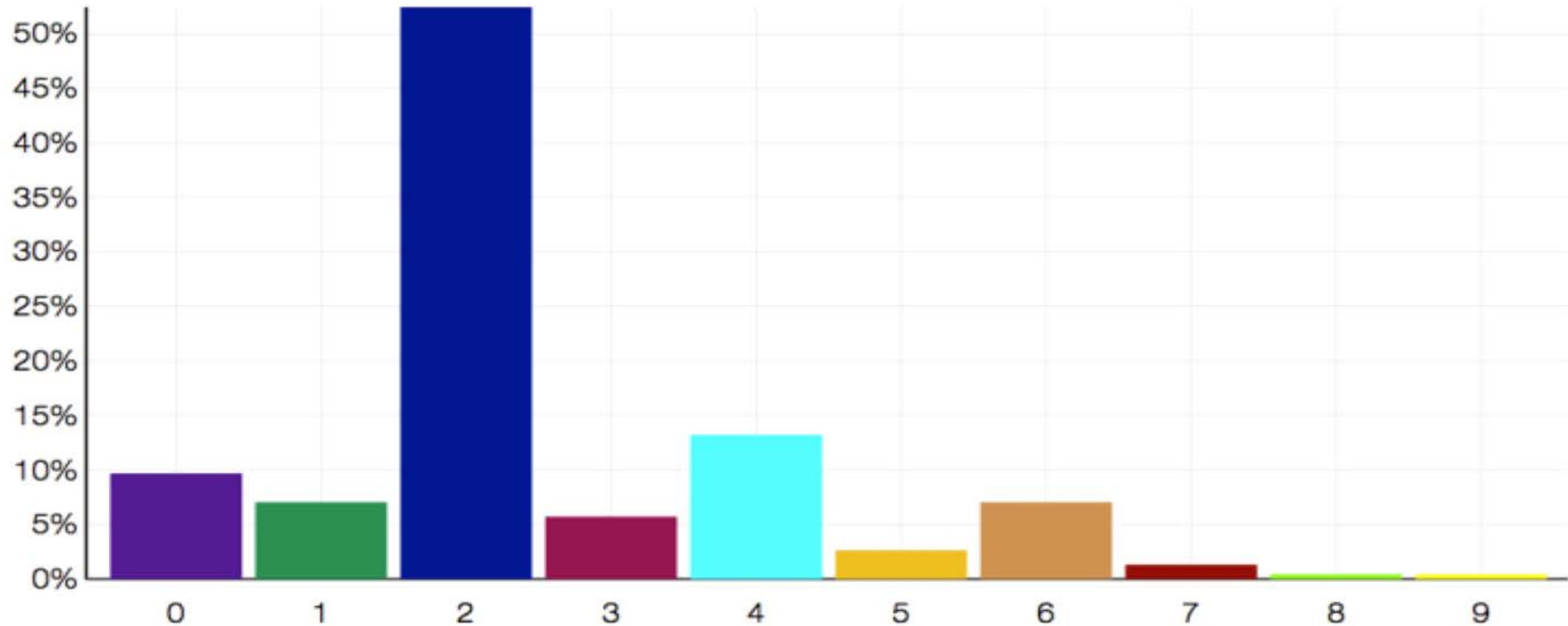
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Findings – Sentiment towards Islam, Australia



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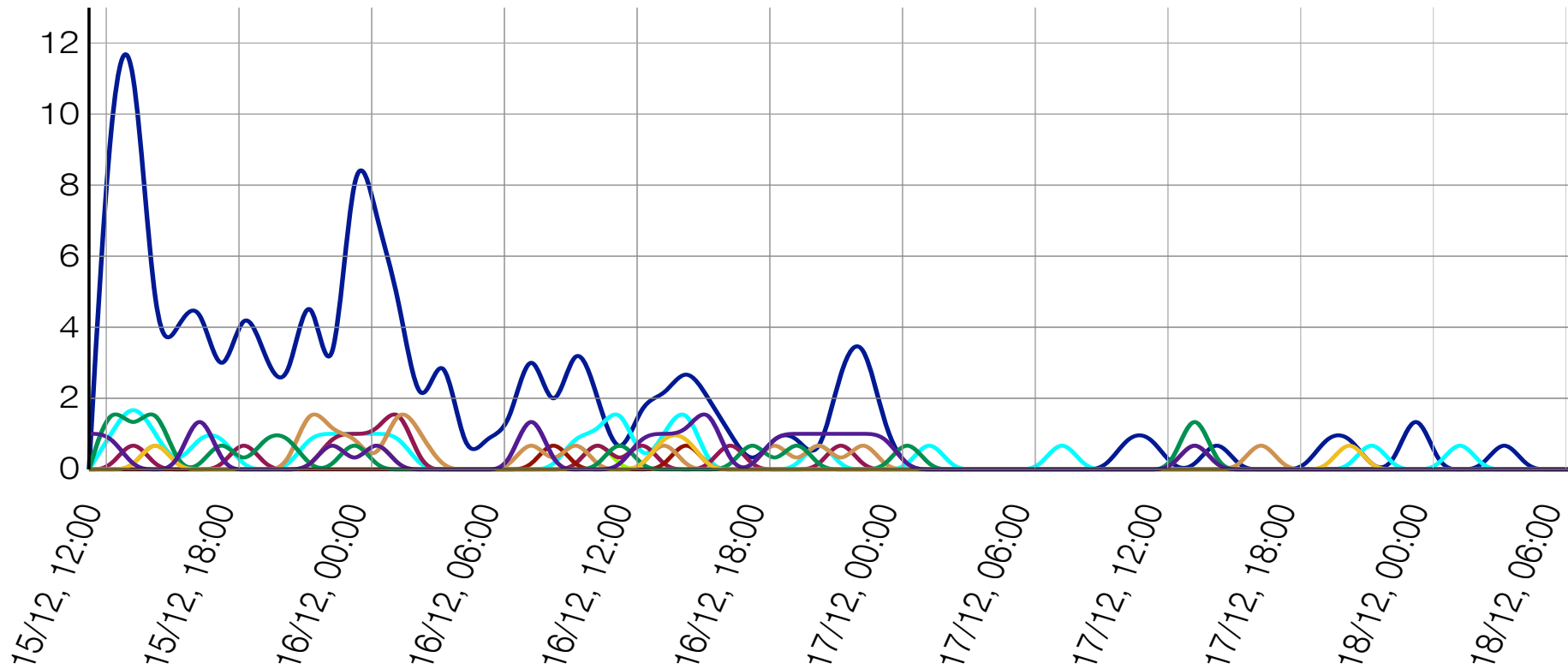
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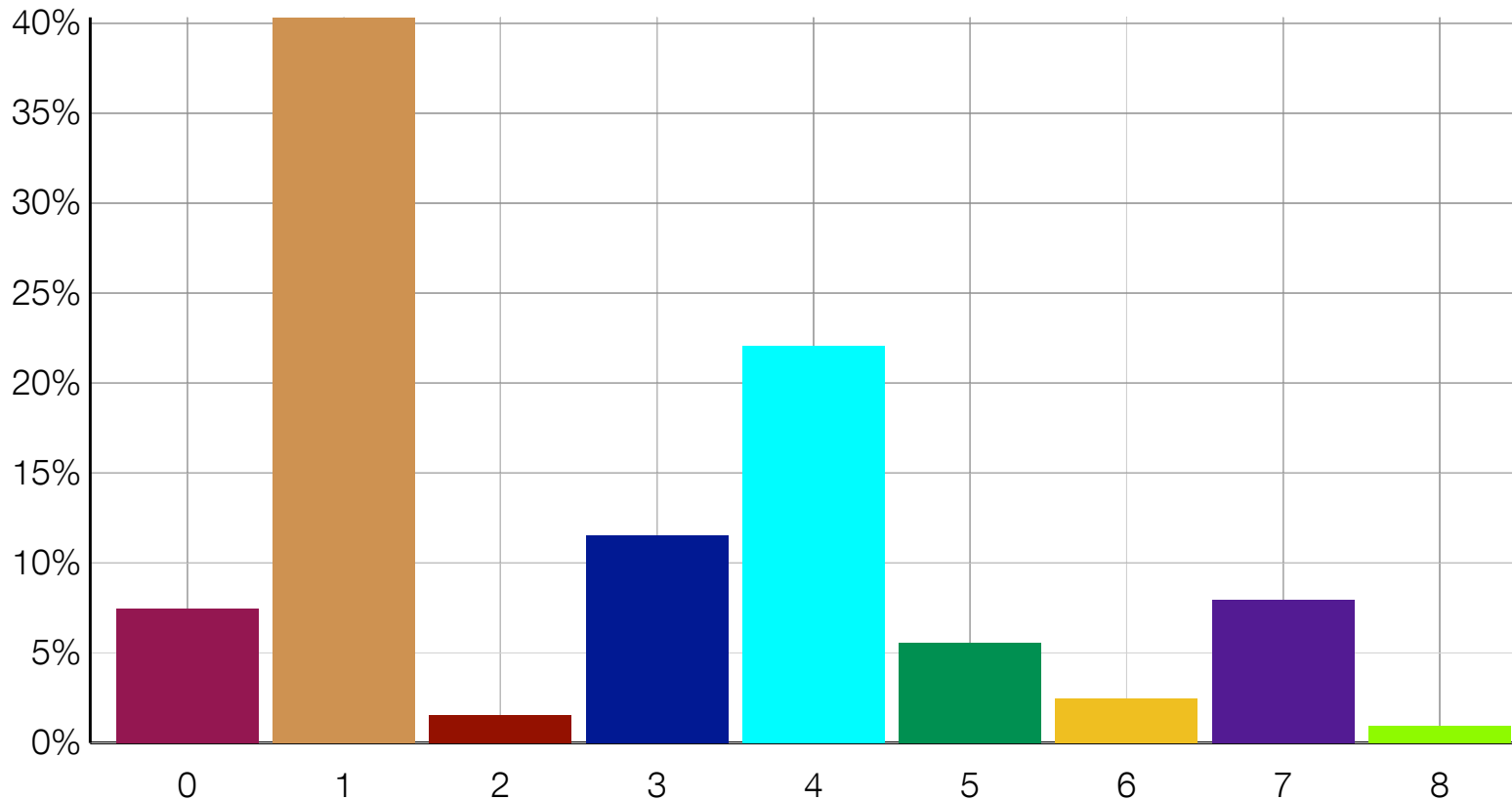
Negative social sanction

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Findings – Sentiment towards Islam, Australia



Findings - #illridewithyou in Australia



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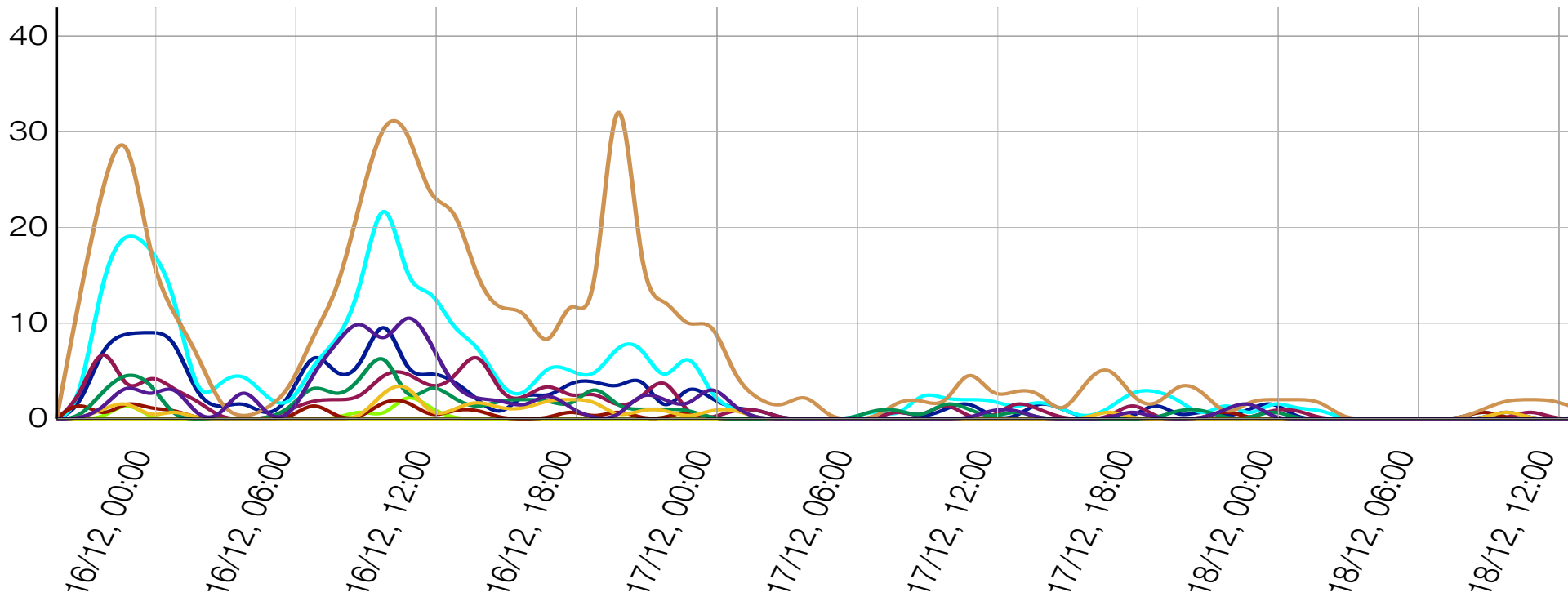
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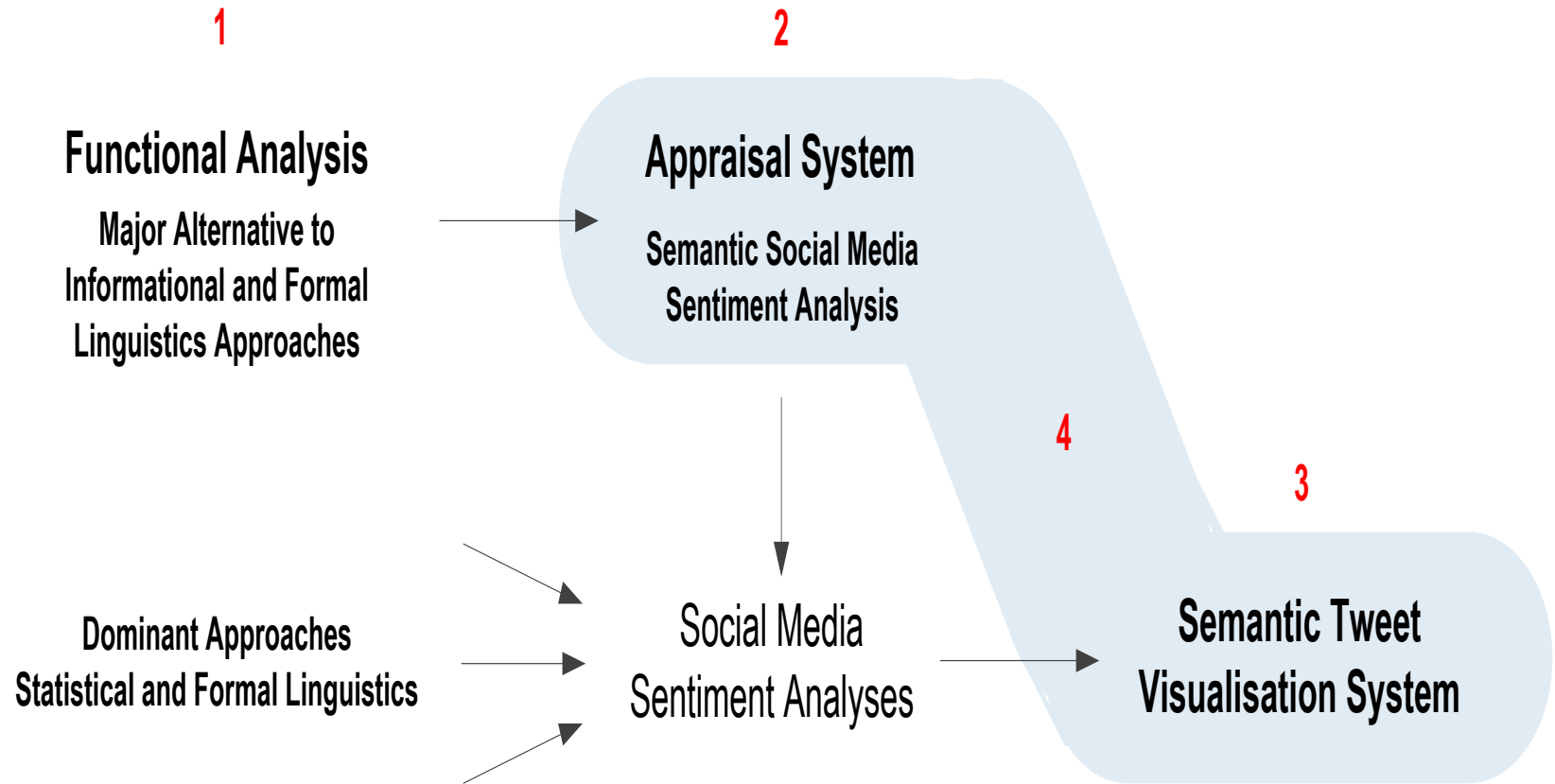
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Findings - #illridewithyou in Australia



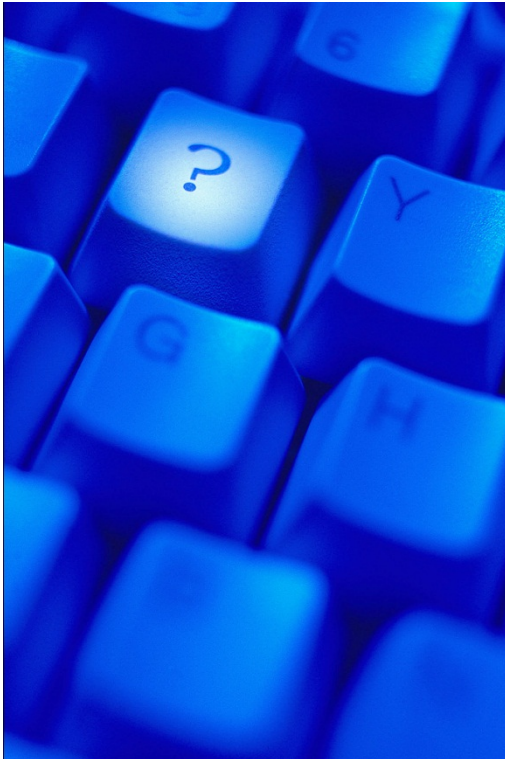
Contributions



Further Research

- Refining the Visualisation
- Real-time Analysis of Tweets
- Development of Event Fingerprints

Questions?



Wendland, J., Ehnis, C., Clarke, R., and Bunker, D. 2018. "Sydney Siege, December 2014: A Visualisation of a Semantic Social Media Sentiment Analysis," *15th International Conference on Information Systems for Crisis Response and Management (ISCRAM)*, Rochester, NY.

About me



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