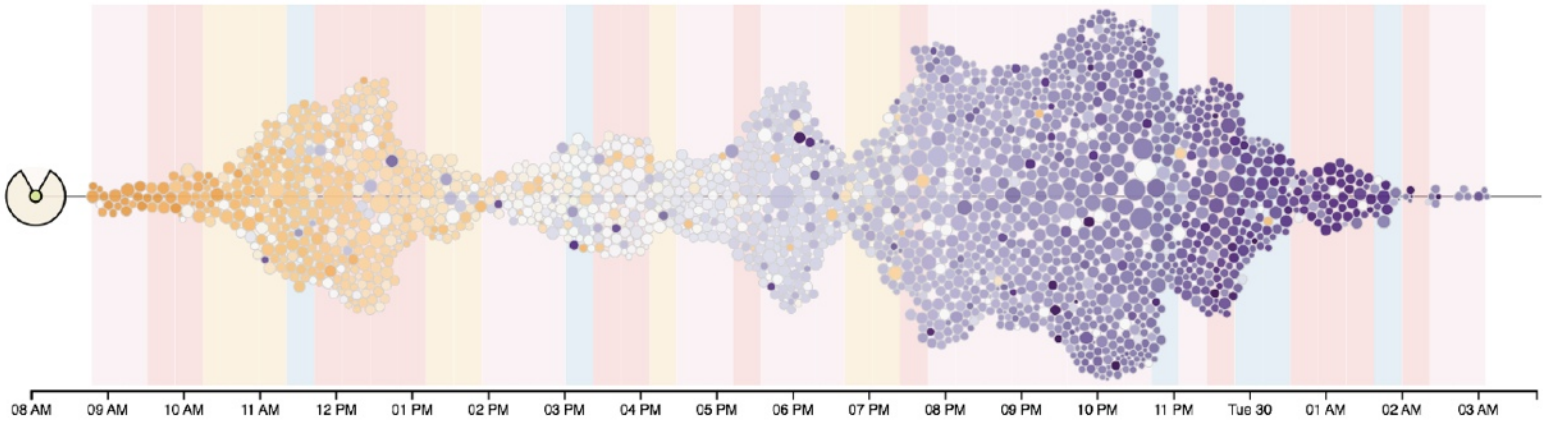
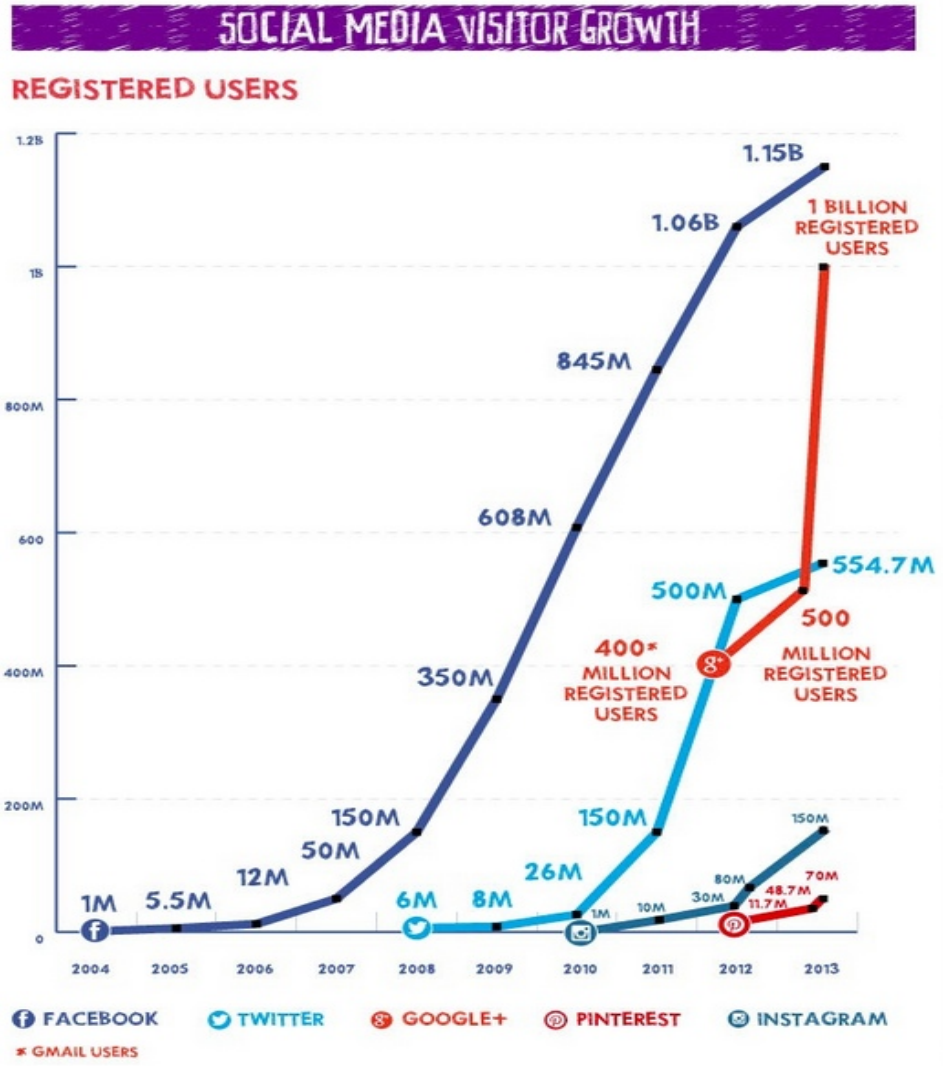


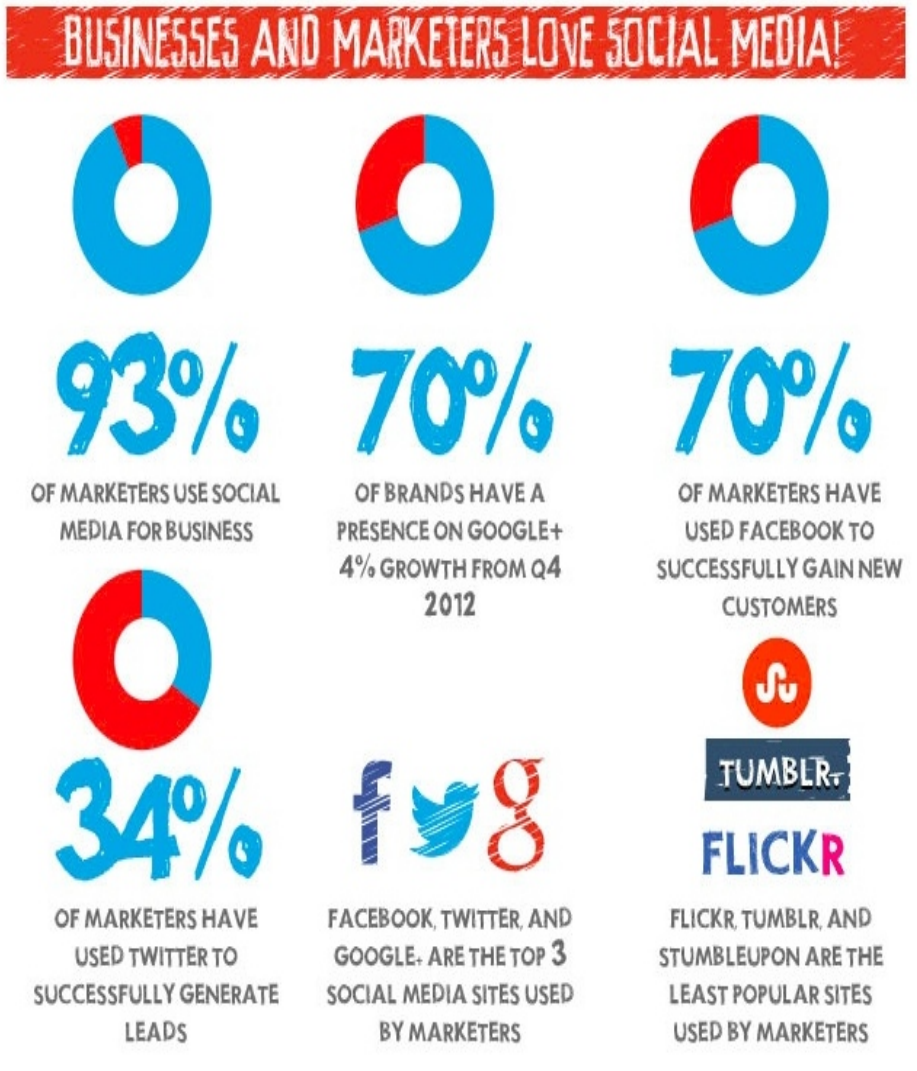
#FluxFlow: Visual Analysis of Anomalous

Jian Zhao, Nan Cao, Zhen Wen, Yale Song, Yu-Ru Lin, Christopher Collins.

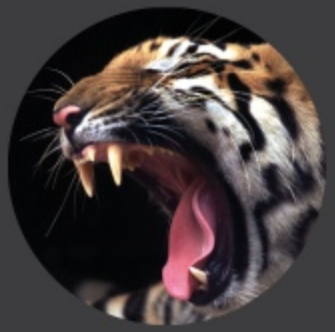
Presenter: Keqian Li

What: SOCIAL MEDIA





Why: Abnormal conversational threads



Rioters attack London zoo and release animals

Rioters cook their own food in McDonald's

Police 'beat a 16-year-old girl'

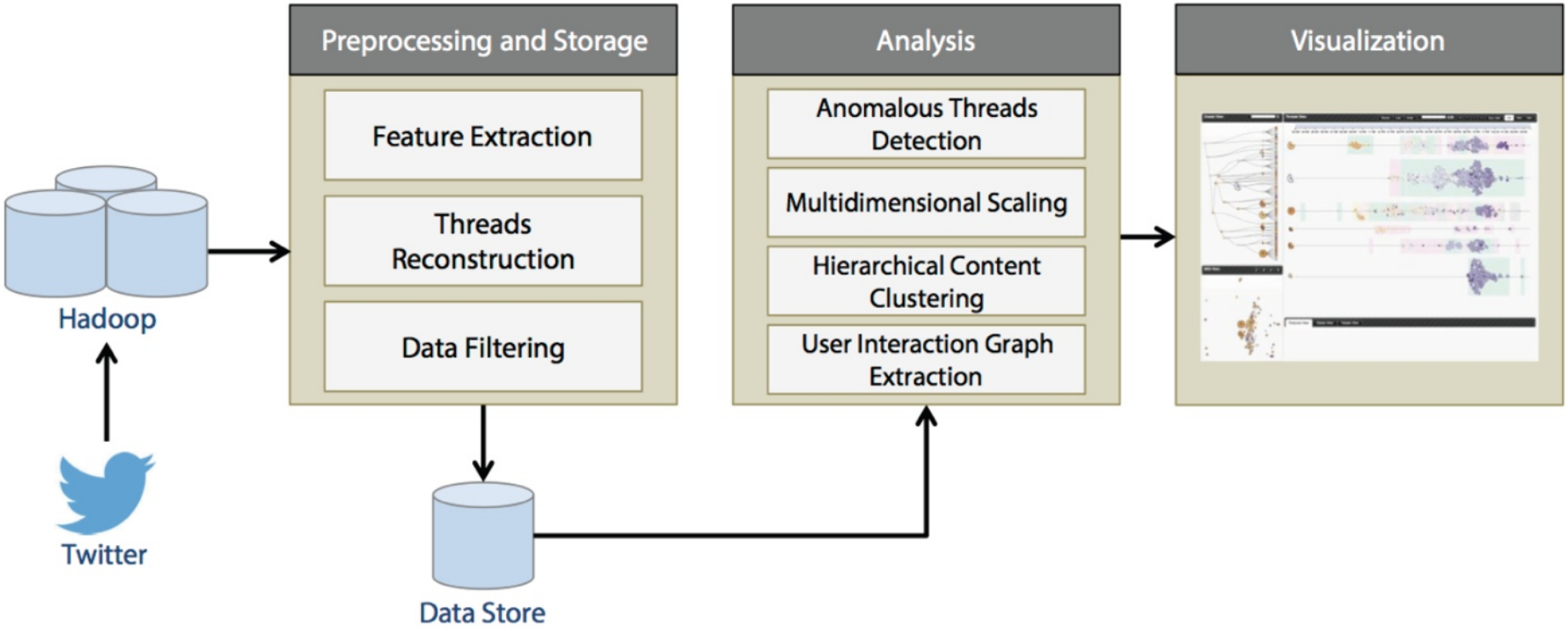
London Eye set on fire

Rioters attack a children's hospital in Birmingham

Army deployed in Bank

Miss Selfridge set on fire

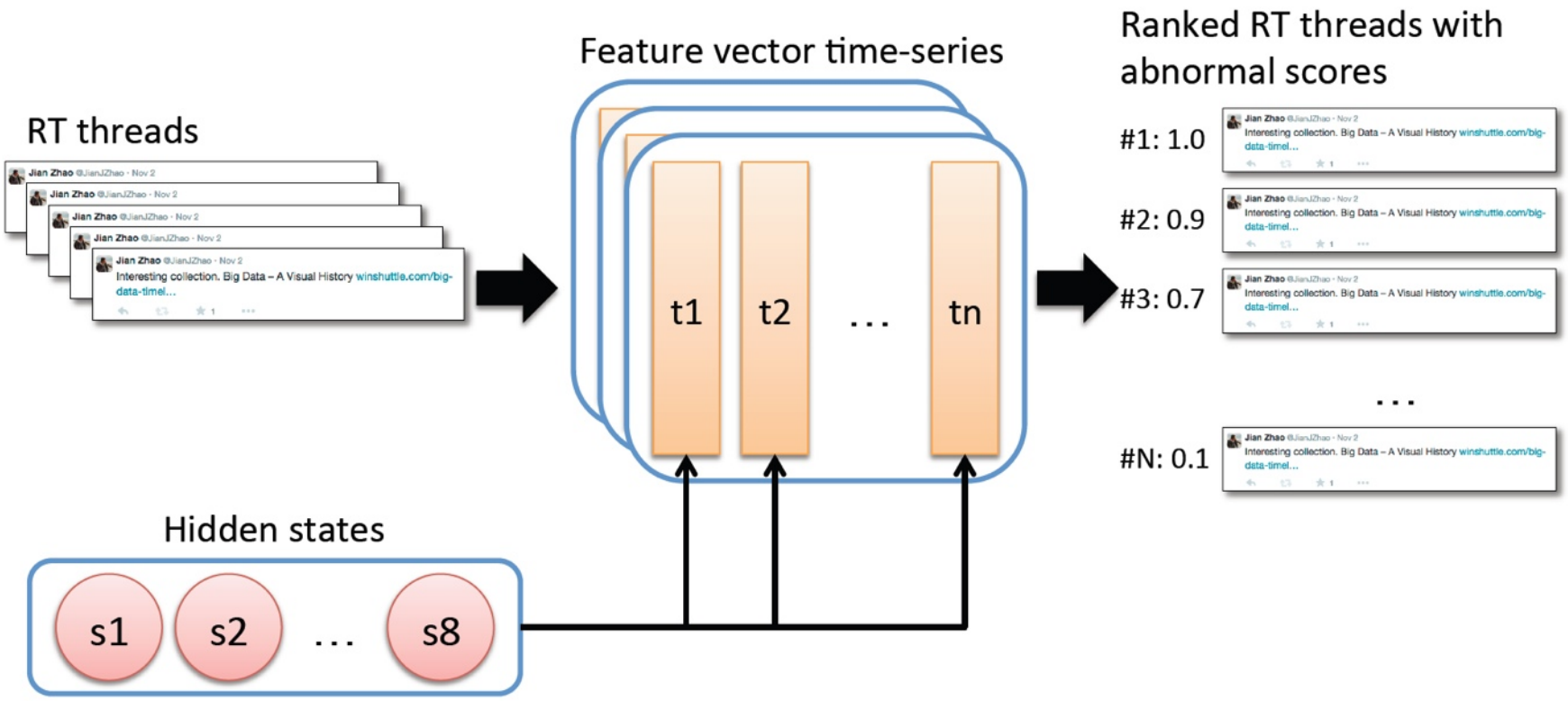
How: FluxFlow



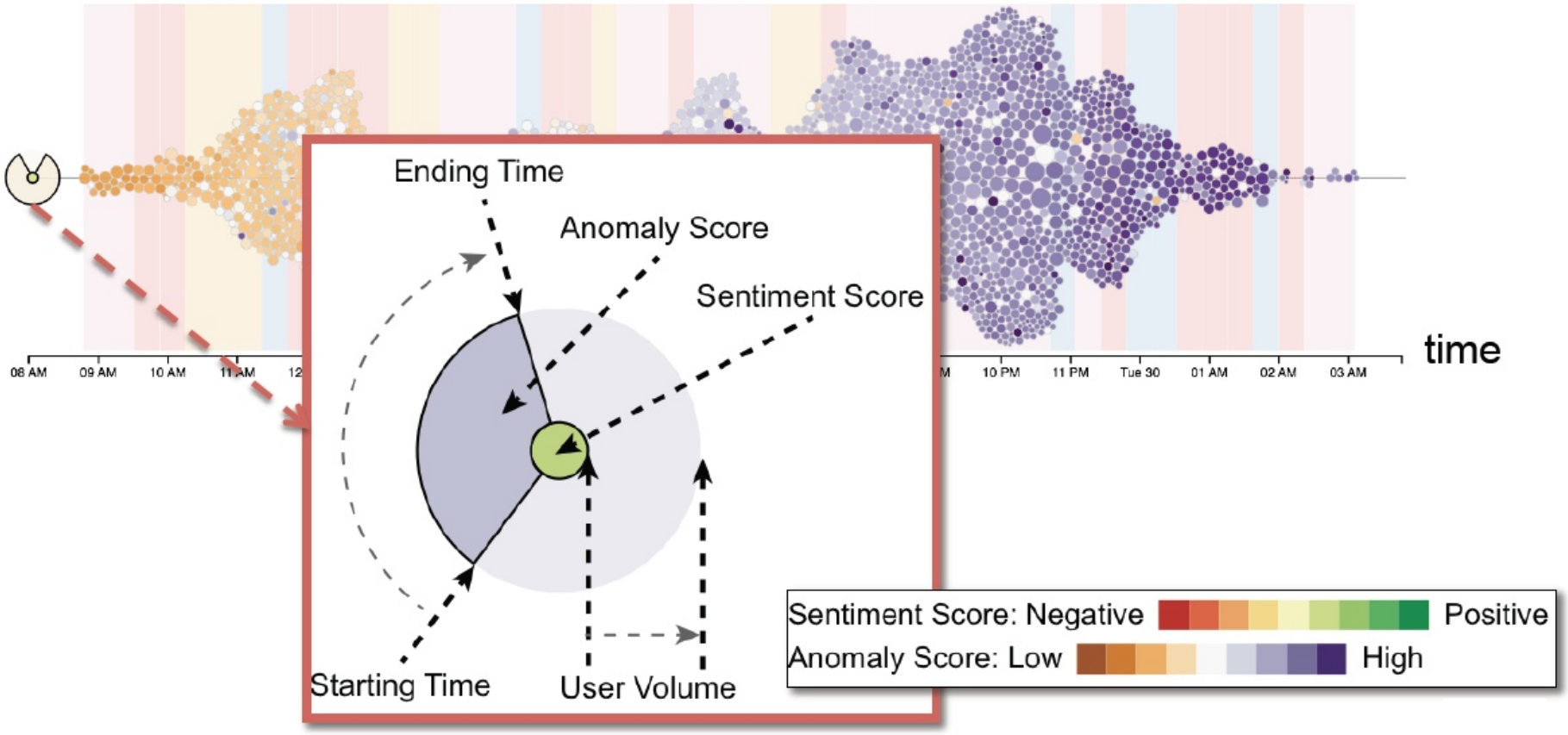
Abnormal Retweet Threads Detection: A Data mining approach

- One-Class Conditional Random Fields Model (OCCRF)
  - temporal dependency, due to mechanism in RT time series data
  - one-class nature. There is little to no example (or even a clear definition) of true anomalies
  - contains a set of hidden variables to capture the underlying sub-structure of the sequential data
- Extracted Feature for each single retweet
  - User profile features: counts of followers, friends, status
  - User network features: in-degree and out-degree
  - Temporal features: intervals between two adjacent tweets in the sequence

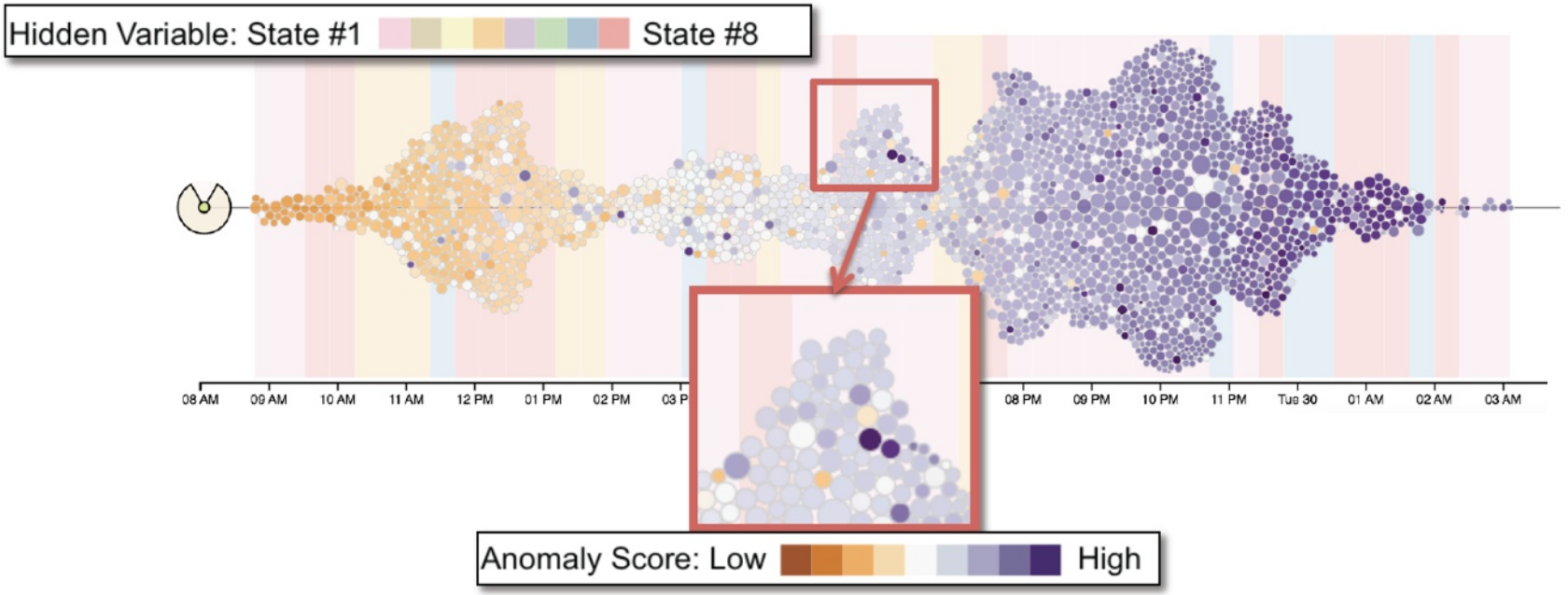
Data mining pipeline



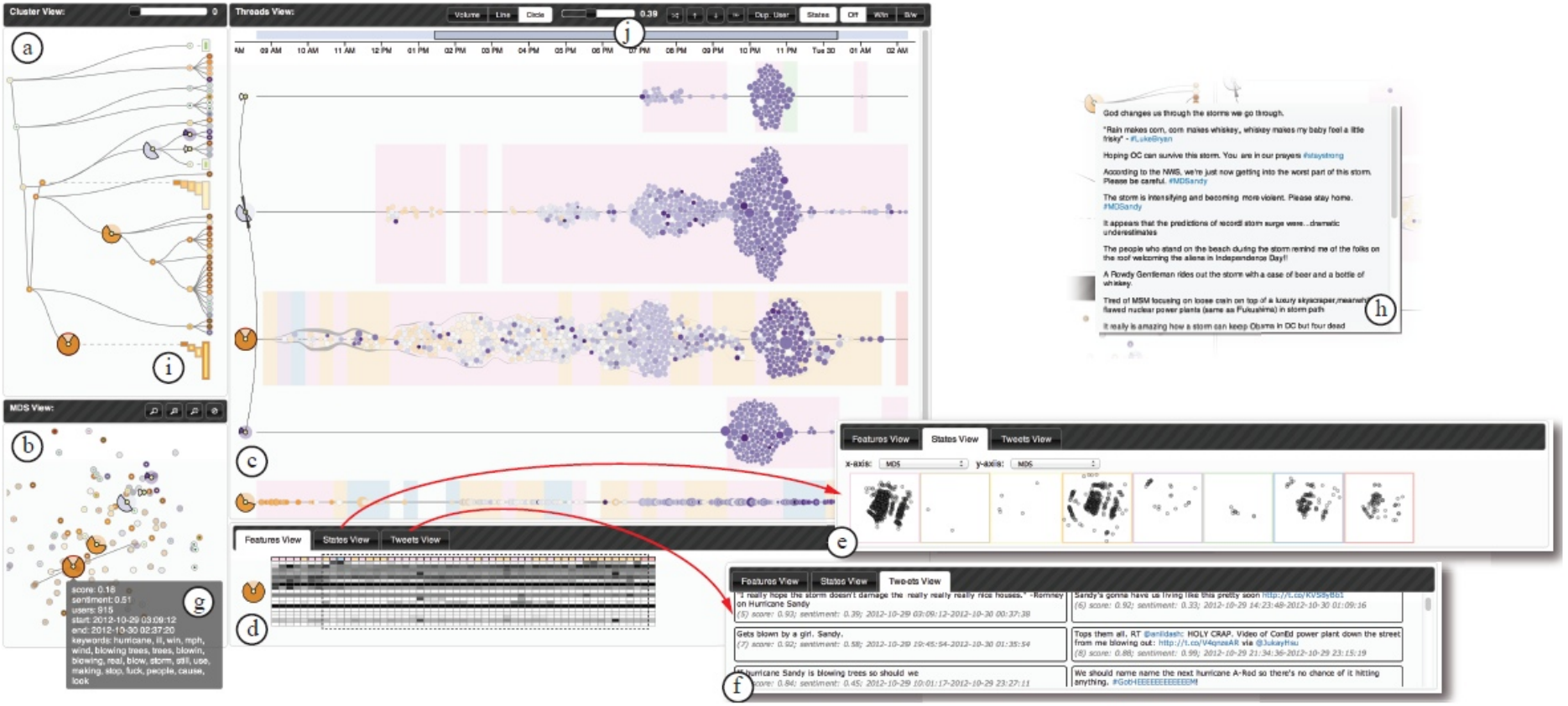
RT Thread Visualization: RT Thread Glyph



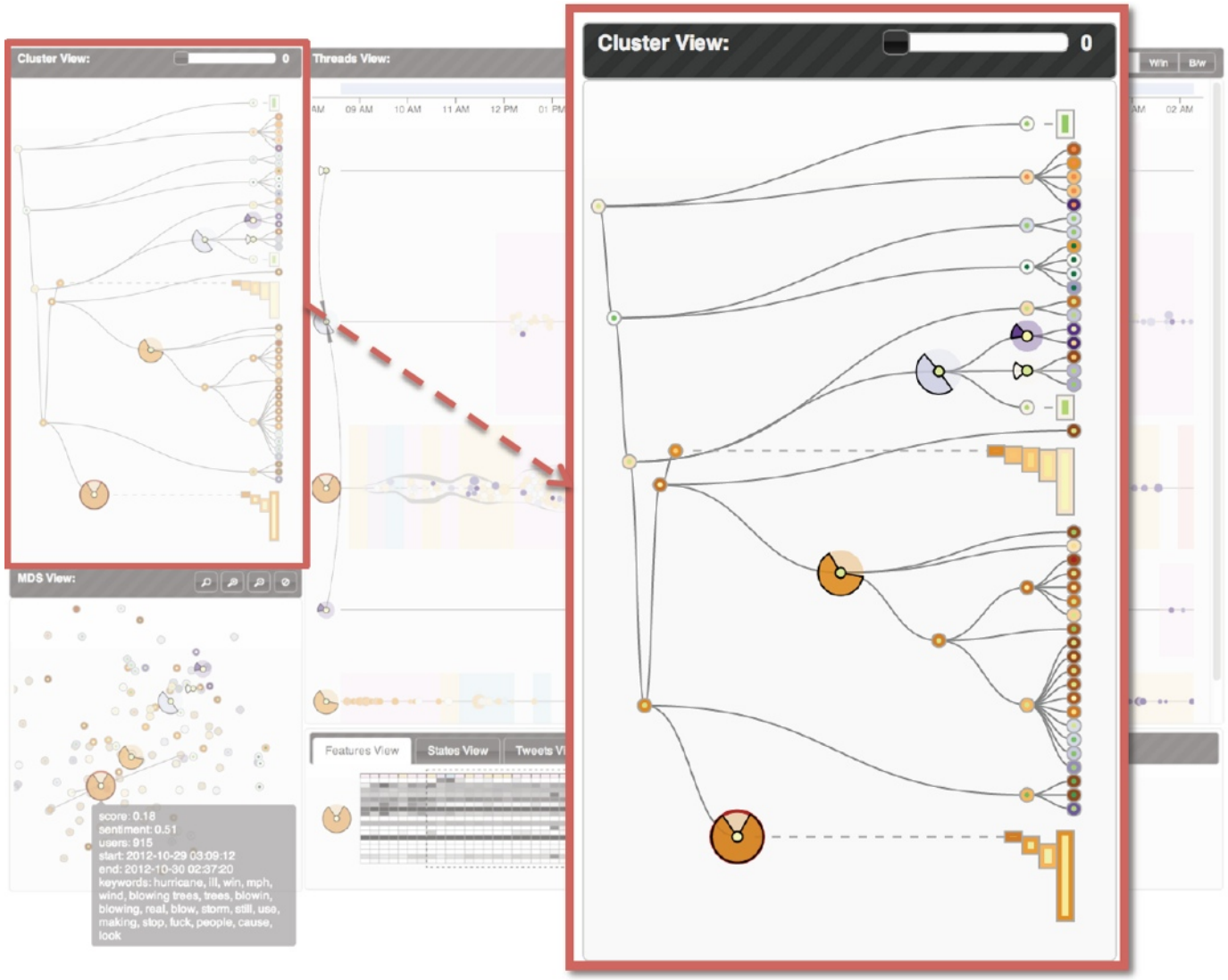
RT Thread Visualization: RT Thread Timeline



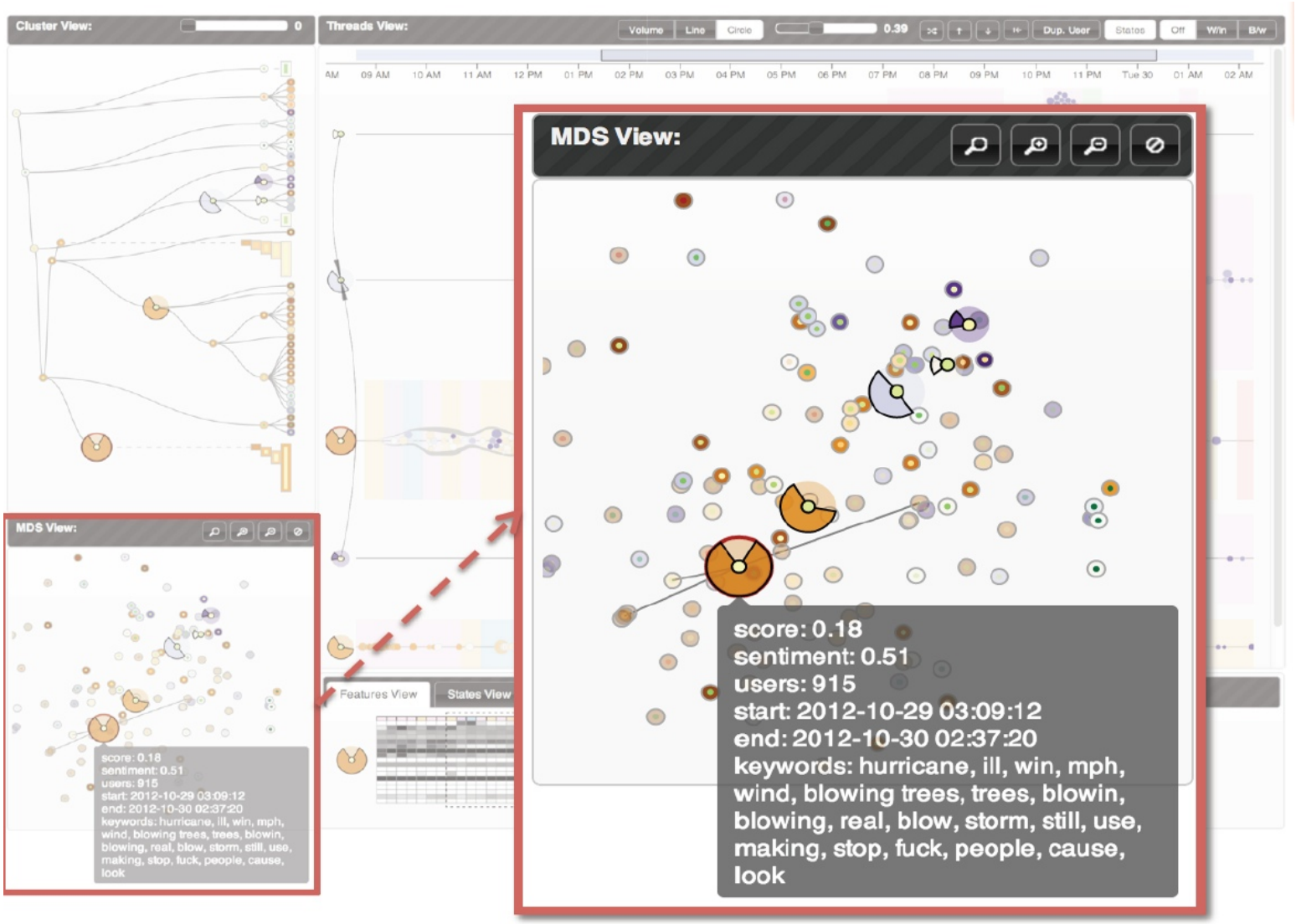
System interface



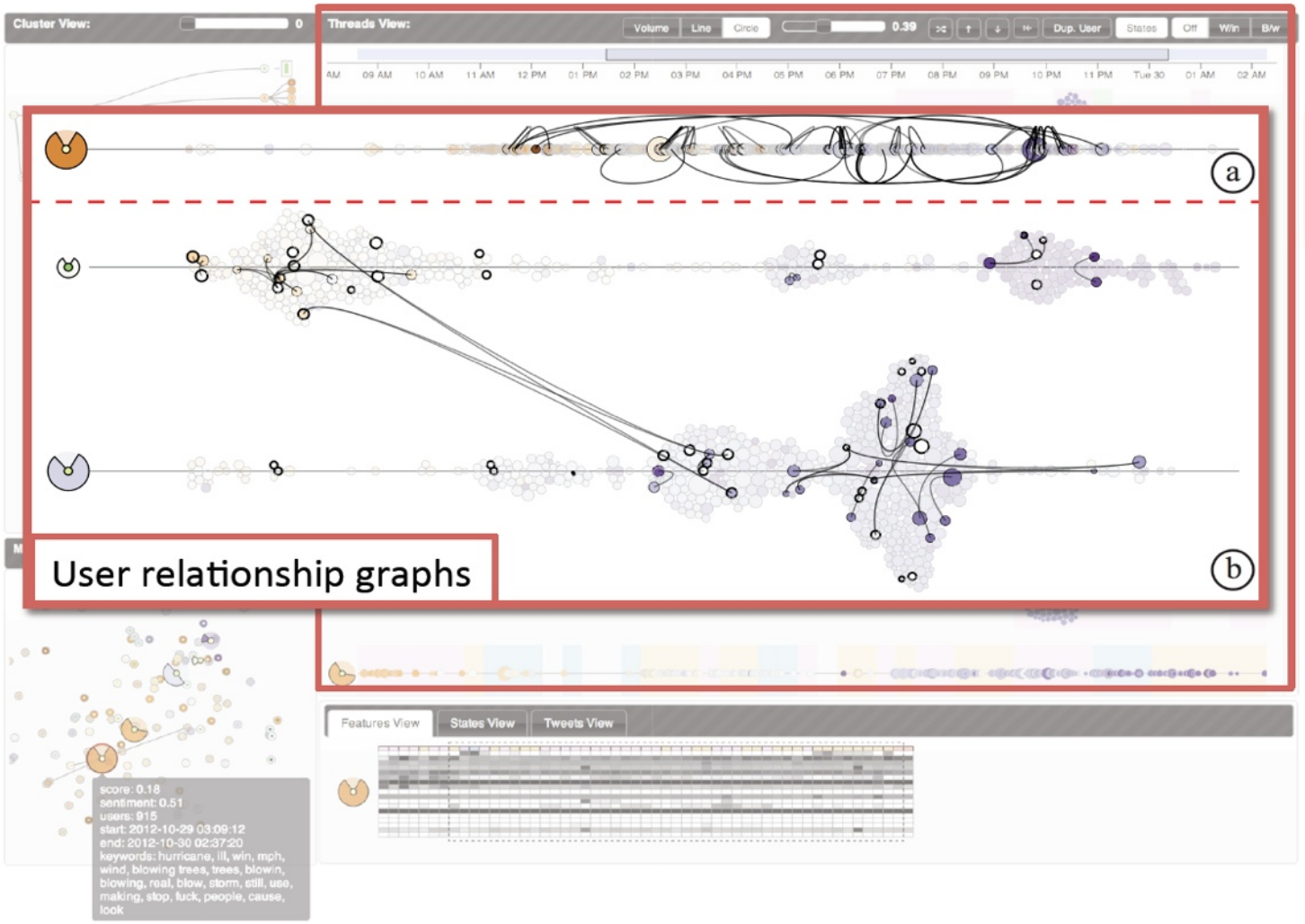
Hierarchical
cluster of RT threads by topics



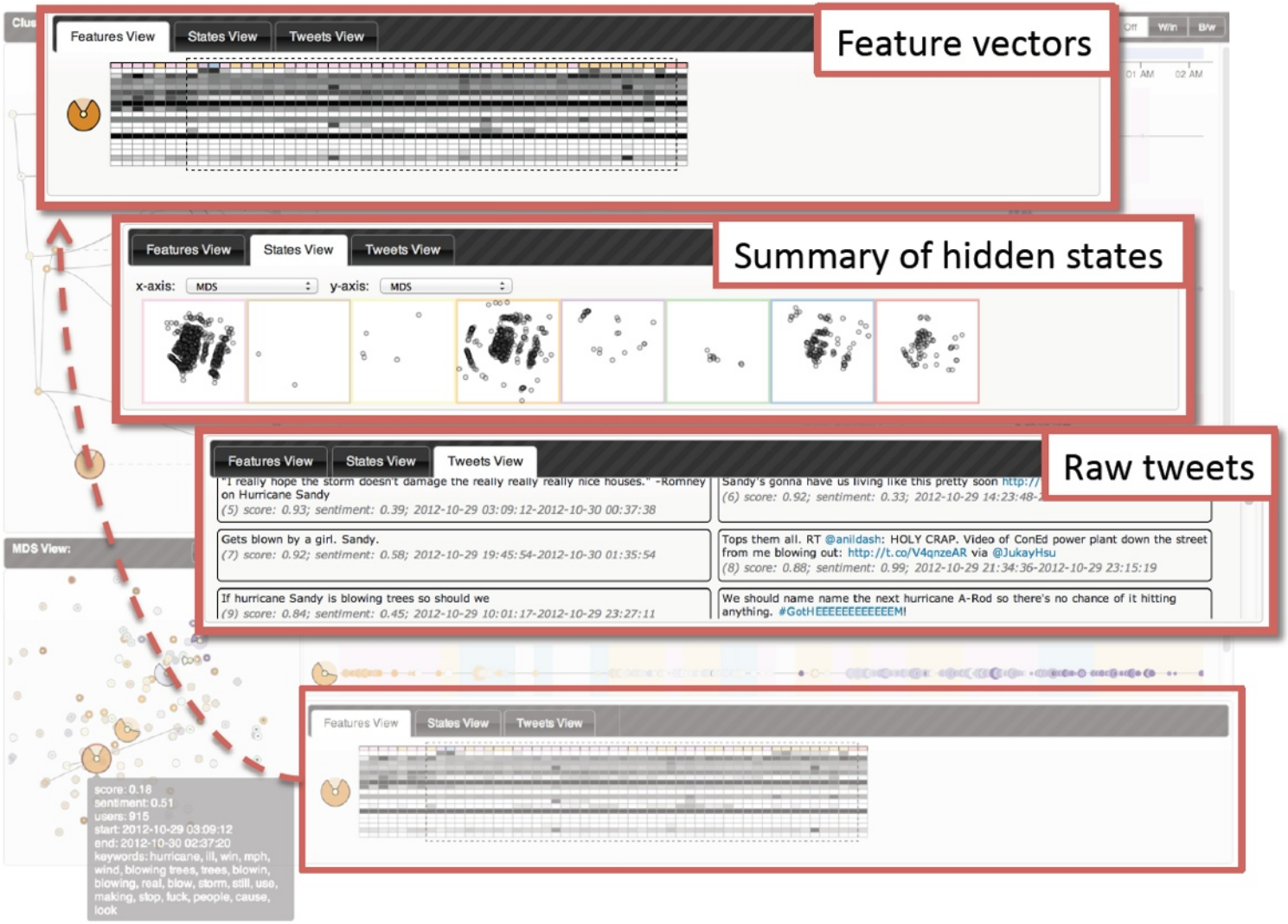
MDS view of threads from high dimensional feature space



User social connections at the intra- or inter-thread level



Deep-Level Information for Input feature vectors, model hidden states, raw tweets



Visualization techniques summary

How:Encode	Glyph, Thread Timelines
How-Facet	Multiform, Overview/ Detail. linked highlighting.
How: Reduce	Item filtering, Item aggregation, Attribute aggregation, Elide, Superimpose
How: Manipulate	Highlighting, Project, Zoom

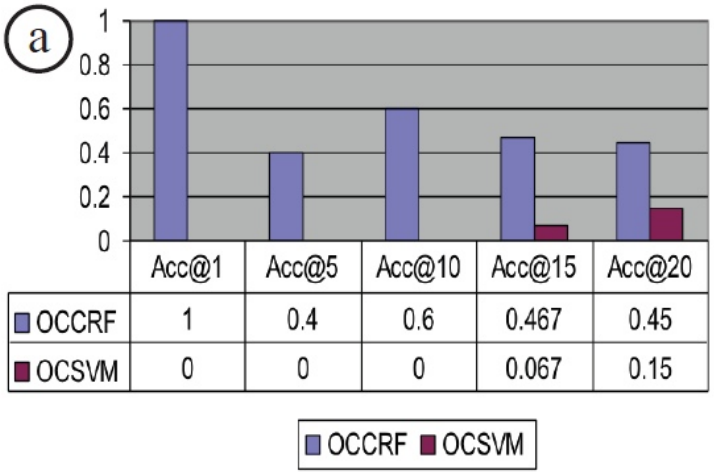
Task Summary

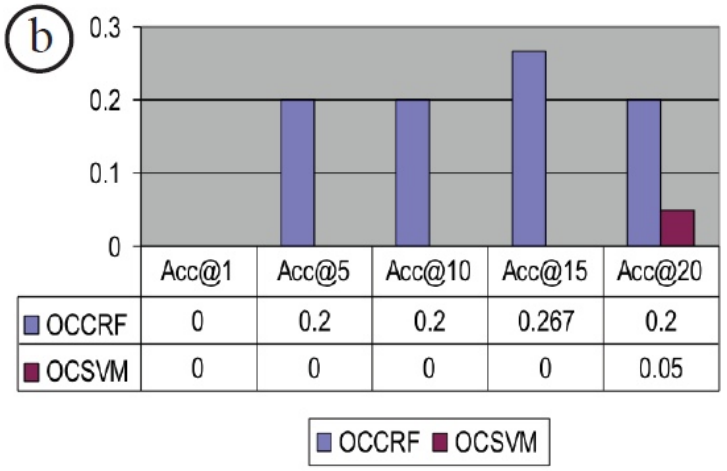
- T1 Summarizing and aggregating important features of retweeting threads.
  - Glyph, Cluster View, MDS View
- T2 Indicating characteristics and connections of involving users.
  - User relationship graphs
- T3 Revealing temporal patterns of information spreading.
  - Thread Timeline
- T4 Facilitating visual data comparisons and correlations.
  - Cluster View, MDS View
- T5 Accessing deep-level information of the model and input.
  - Thread Timeline, Features View, Status View, Tweets View

Evaluation

- Datasets: two 10% Twitter feed datasets collected during two significant events:
  - 2012 Hurricane Sandy(52 million tweets)
  - 2013 Boston Marathon Bombing(242 million tweets)
- Baseline: One-Class SVM (OCSVM) [Scholkopf et al., 2001]
- Ground truth: manually labeled by three annotators to based on reports after the events

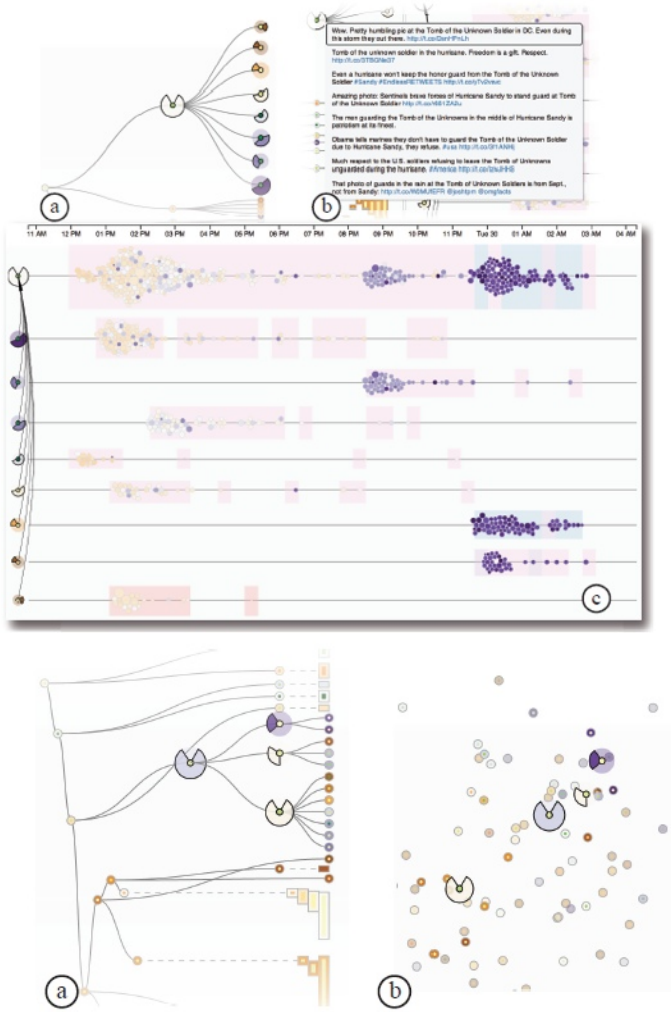
Comparison Results

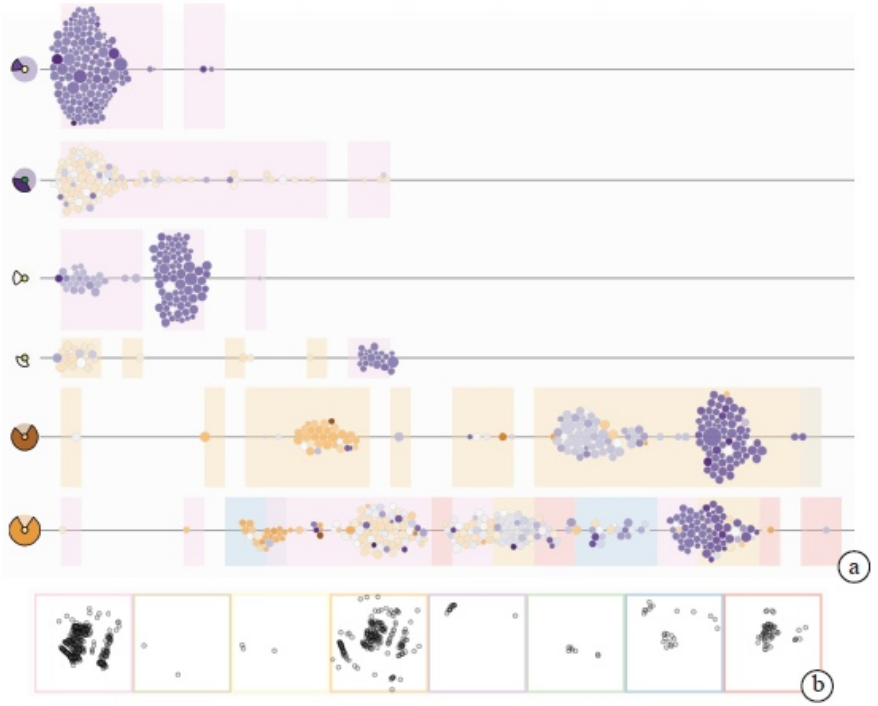




Accuracies of OCCRF and OCSVM in correctly detecting rumors in the top-K retweeting threads ranked by the models in datasets: a) Hurricane Sandy, and b) Boston Bombing.

Case Study of Hurricane Sandy





Critiques

- Data
  - Incorporate further content attribute(e.g., topics, tags, deeper semantic analysis)
- Data mining algorithm
  - Improve on algorithm scalability and response time
  - Decouple with specific models
  - More insights about the model beyond hidden states, e.g. interactions of model parameters
- Visualization
  - Timeline visualization need better reducing techniques to be scalable for real social network data
  - Better to show the “chain” of retweeting, and influence between users
- Evaluations
  - Stronger ground truth for quantitative evaluation

Thank you