Text – Space – Time

- How does text semantics vary over space and time?
- Explore complex relationship between the three facets:
  - Time (level of topic popularity)
  - Space: cross-references to related social media posts

Proposed Visualization

“Cube” metaphor

\[ P \times S \times T \]

Slices and Projections

Approach Overview

Cube Creation

- TEXT is represented by a vector of topic weights
  - Topic is defined as a probability distribution over a given set of keywords
  - Latent Dirichlet Allocation (LDA) is a probabilistic topic-modeling method
  - Show all topics and let users pick the ones they want to explore
- TIME: divide into intervals that are meaningful to humans (e.g., weeks)
- SPACE: use individual and public activity locations, e.g., cities

Measure Calculation

- At each point (p, s, t), we can derive meaningful information
  - Popularity score
  - Keyword vector (set of keyword weights per point)

Interactive Exploration

Interactive Exploration

Analysis Summary: WHAT

- Data
  - A table where each item has 3 attributes
    - Text (unary and content-based)
    - Location (spatial)
    - Time (sequential)
- Derived
  - Depicting a discrete and finite representation of the cube
  - “Cube” metaphor
  - Measuring/decoding each attribute
  - Popularity score and keyword vector

Analysis Summary: HOW

- Encode
  - Metadata objects based on position in projection
  - Use geographic map with graphs
  - Size-code keyword based on importance
  - Indicate popularity score by linear ordering
- Manipulate
  - Pop-up window
  - 3D navigation
- Facet
  - Superimpose streams in time view (extended mode)
  - Labeled navigation
- Reduce
  - Filter with “level”
  - Aggregate with projection

Design interactive interface for exploring data

Make each data discrete and finite
Calculate measures for each point of the cube

Data Selector

Relationship Explorer

Location View

Time View

Topic View

Keyword View

History Panel

Any questions?

Thank you for your attention