

VISUALIZING TEXT

Slides adapted

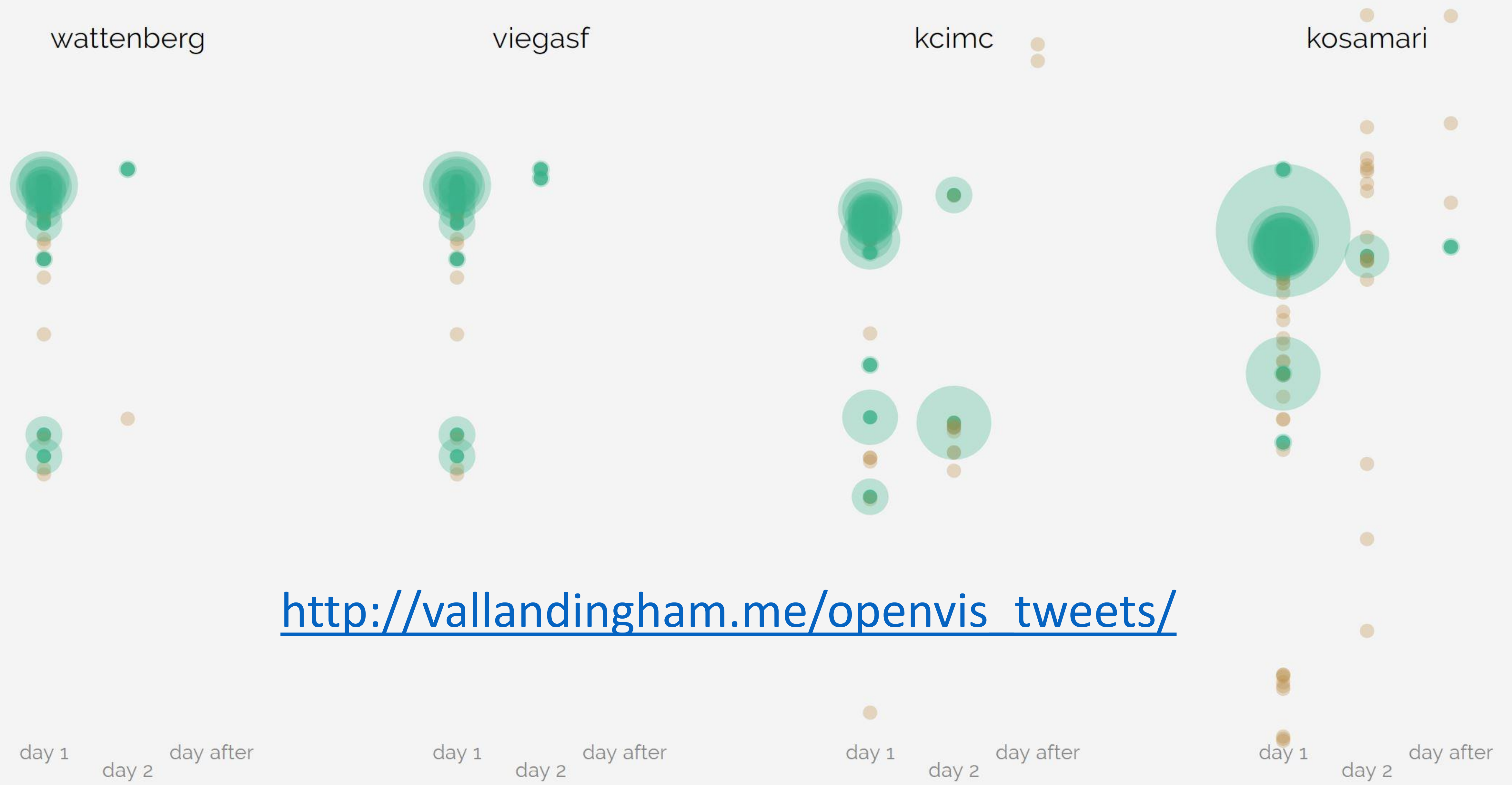
from Hendrik Strobelt, Irene Ross, Jeff Herr and Alex Lex

You are scrapping twitter for tweets about **Bob Ross** to create a visualization communicating the **time, number of retweets** and whether the tweet is **positive, negative, or neutral**.
So far you've scraped:

Topic	# of tweets	sentiment
Happy trees	5	3 neutral, 2 positive
Bob's hair	6	3 positive, 3 negative
Bob being a former drill Sargent (Yes this is true).	7	1 positive, 4 neutral, 2 negative

This captures the popularity of the content produced by or for a speaker, but not the popularity of their talk.

2016 ▾



http://vallandingham.me/openvis_tweets/

Challenges of text and language

abstract and unstructured

Structured Data

- Graphs
- Tables

Unstructured Data

Video

Images

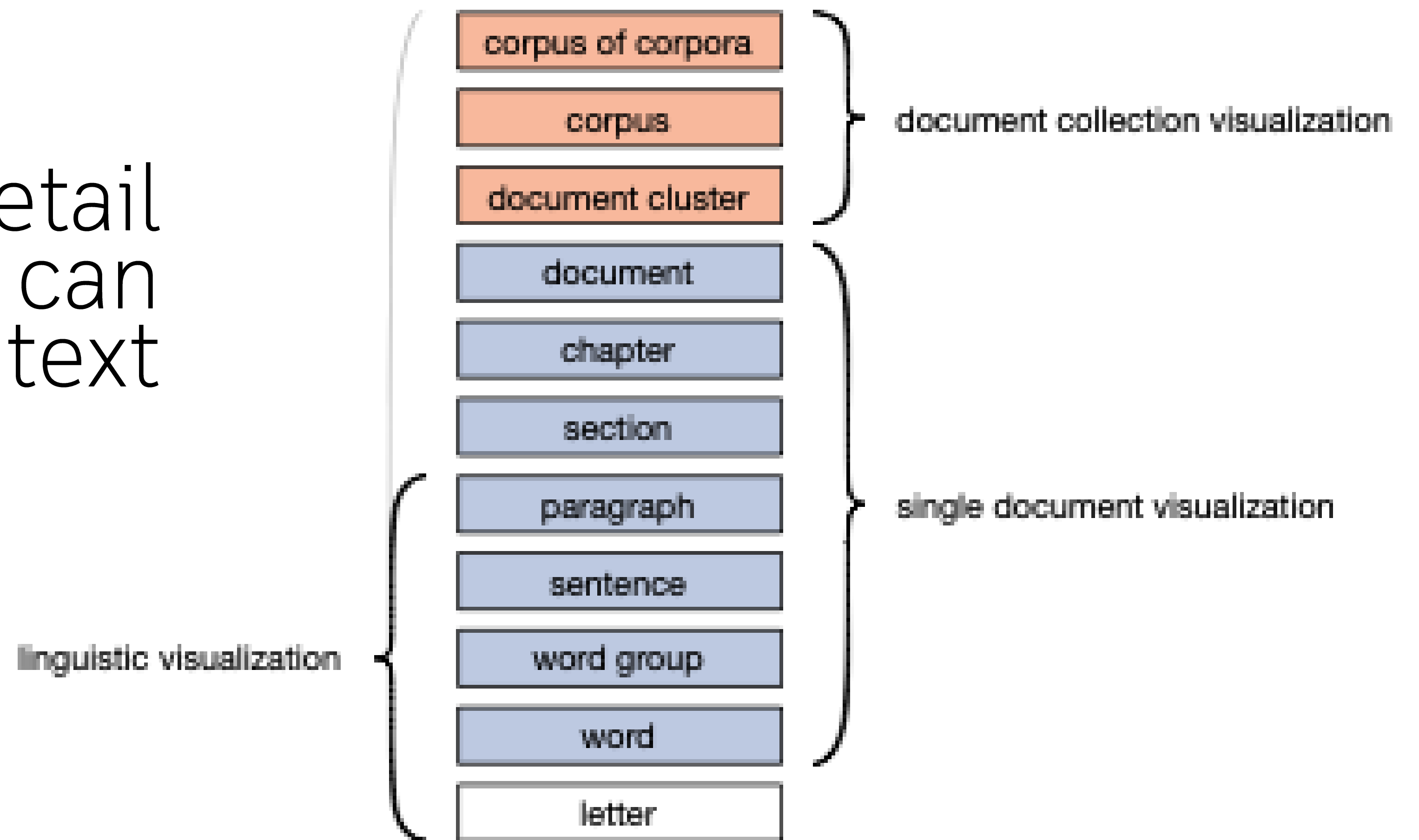
Text

Text is semi-structured

- Grammatical rules
- linear perception
- Words → Sentences → Paragraphs → Documents

Text Unit Hierarchy

Level of detail
that we can
analyze in text



Language

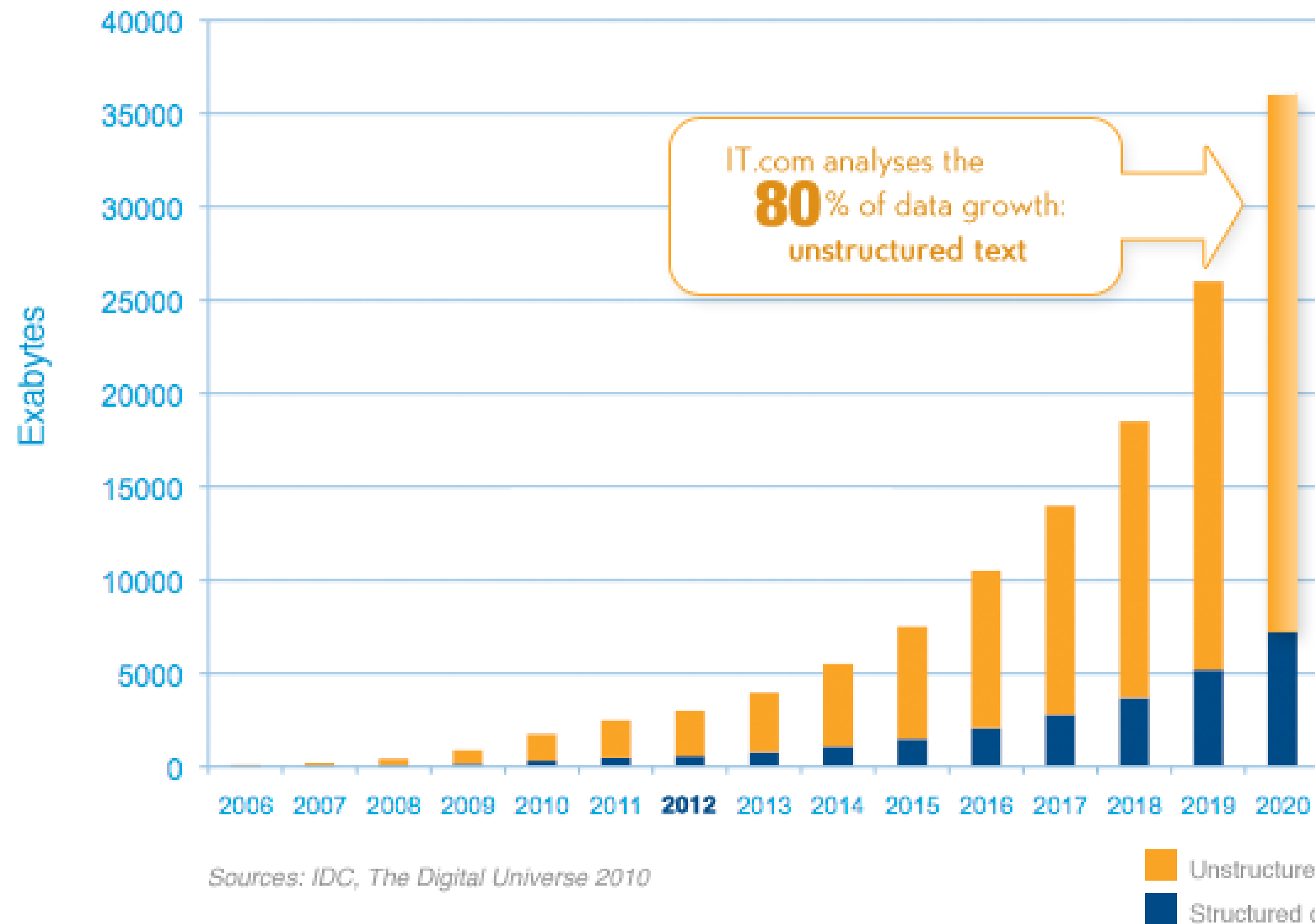
Main medium for communication

- Extremely expressive for **communicating complex ideas**
- **More expressive** than visualization
- different across population groups (countries, accents, religions,...)

Why visualize text?

Why Visualize Text?

Worldwide Corporate Data Growth



**More
abundant
than
structured
data**

Design and Text

Typography

Style, arrangement, or appearance of printed letters on a page

Visual medium for language

Typography

Sans Serif, **Serif**, **Bold**, *Italic*

point size (10pt, 12pt, 24pt, 36pt..)

line length (alignment: left, right, justified)

Leading: vertical line spacing

Tracking: spacing between groups of letters

Kerning: space between actual letters

combining letters to a glyph ligatures

A**V** **W****a**
No kerning

A**V** **W****a**
Kerning applied

ß

fi → fi

fl → fl

Erik Spiekermann, self described typomaniac



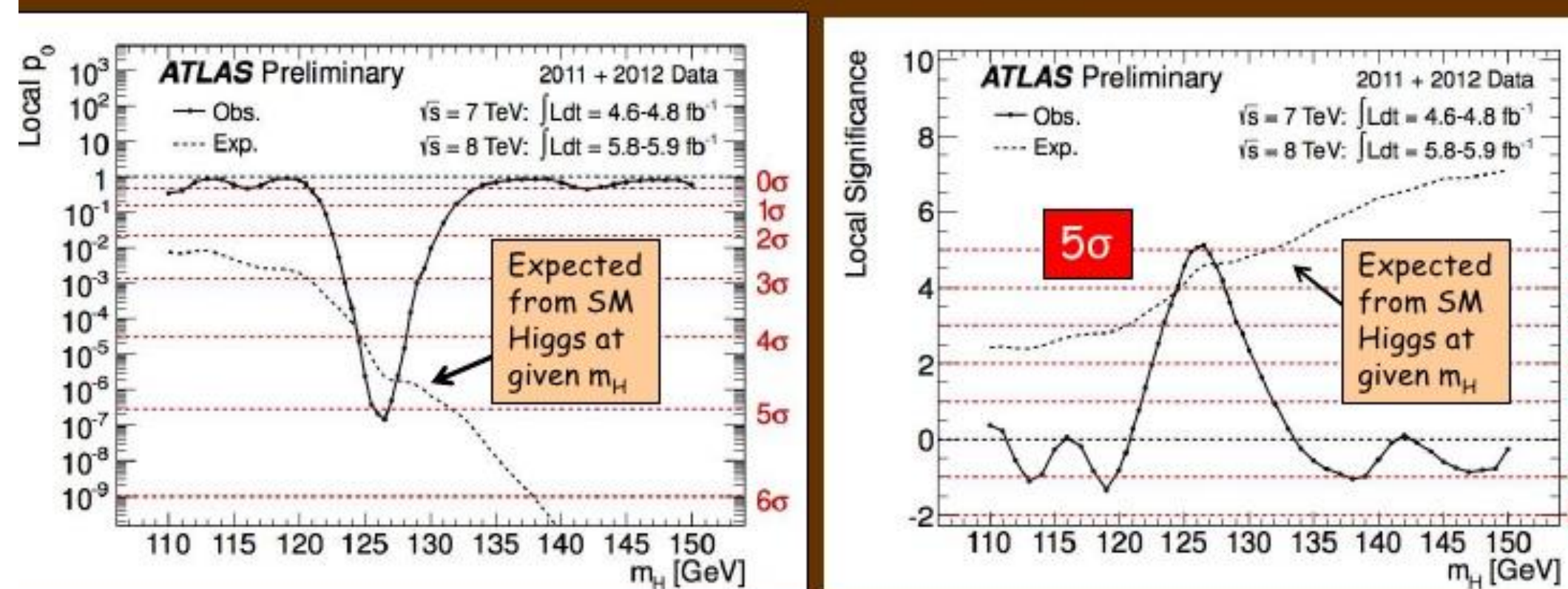
Creating a font requires profound design knowledge

We [designers] are interpreters, not merely translators, between sender and receiver. **What we say and how we say it makes a difference.** If we want to speak to people, we need to know their language. In order to design for understanding, we need to understand design.

Design choices influence your message

Comic Sans/Higgs Boson catastrophe of 2012

Combined results: the excess



Taking the god particle seriously

One of the most important scientific discoveries in the last 100 years

Presented their work in Comic sans.

Does the medium fit the message?

Maximum excess observed at	$m_H = 126.5 \text{ GeV}$
Local significance (including energy-scale systematics)	5.0σ
Probability of background up-fluctuation	3×10^{-7}
Expected from SM Higgs $m_H=126.5$	4.6σ

Global significance: 4.1-4.3 σ (for LEE over 110-600 or 110-150 GeV)

<http://www.comicsanscriminal.com/>

Other recorded offences of bad font choices



Does Papyrus Belong Here?

Hi, I'm [Emily](#). Let's talk about Papyrus.



No.

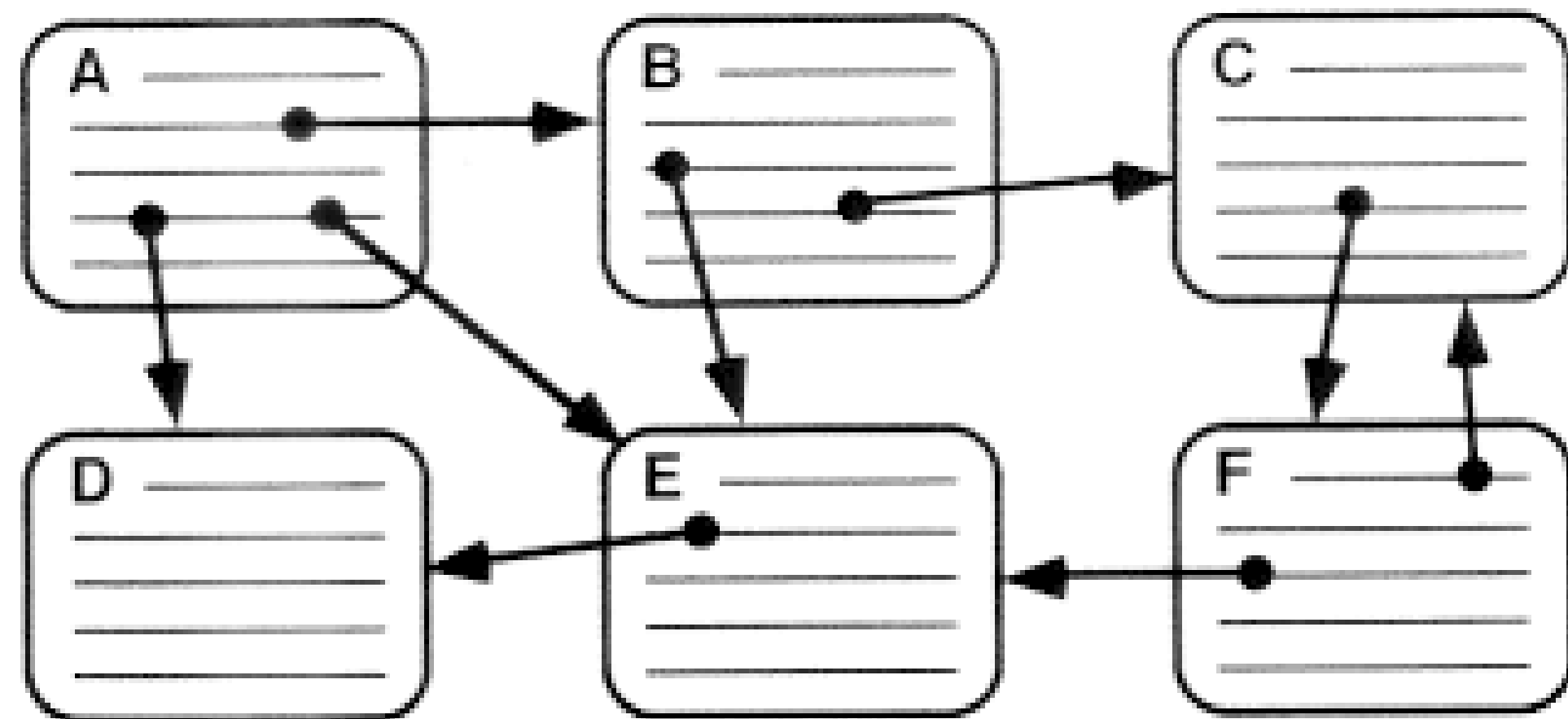
Nov 4th, 2011
1 note



 doespapyrusbelonghere posted this

We use text visualization on a daily basis...

Visualization for “Raw” Text



Enriched text - hypertext linking (graph navigation)

The screenshot shows the homepage of The New York Times. The main headline is "Putin Orders a Surprise Army Exercise Near a Fragile Ukraine". Other articles include "Kingpin's Arrest Is Unlikely to Break Mexico Drug Cartel", "Senate Report Says Credit Suisse Helped Clients Hide Billions", "Most Democrats Want Clinton Bid in '16, Poll Shows", "Mystifying Deaths for 2 Anti-Piracy Guards", "Crude Weapons Help Fuel Unrest in Venezuela", "Paco de Lucía, Master of Flamenco Guitar, Dies at 66", and "A Weeknight Fish Chowder Reminiscent of the Shore". The sidebar on the right includes "The Opinion Pages", "MARKETS", "BUSINESS DAY", "DINING & WINE", and "PERSONALITIES".

Visualization for “Raw” Text

Highlighting semantics

```
21 export class CPTDictionary {
22   public codeDict = {
23
24     'PT' : {
25       'physical therapy evaluation' : [97001, 97002], //combined ev
26       'therapeutic excercises' : [97110],
27       'manual therapy' : [97140],
28       'therapeutic activities' : [97530],
29       'self-care' : [97535],
30       'home management training' : [97535],
31       'neuromuscular re-education' : [97112],
32       'aquatic therapy' : [97113],
33       'physical performance test' : [97750],
34       'physical performance measurement' : [97750],
35       'Extremity muscle testing' : [95831],
36       'trunk muscle testing' : [95831]
37     },
38
39     'injection' : {
40       'injection' : [
41         62310, 62312, 62313, 62314, 62315, 62316, 62317, 62318,
42         62320, 62321, 62322, 62323, 62324, 62325, 62326, 62327
43       ]
44     },
45
46     'surgery' : [
47       'surgery' : [63030],
48     ]
49   }
50 }
51
52
53 export function create() {
```

```
54   }
55
56   /**
57    * Utility method
58    * @param pat
59    * @returns {Date}
60    */
61   export function findMinDateCPT(pat) {
62
63     let minDate = new Date();
64     for (let index = 0; index < pat.length; index++) {
65       if (!pat[index]['PROC_DTM']) continue;
66       if (this.parseTime(pat[index]['PROC_DTM'], null).getTime() <
67         minDate.getTime()) {
68         minDate = this.parseTime(pat[index]['PROC_DTM'], null)
69       }
70     }
71     return minDate
72   }
73
74   /**
75    * Used in calc for pat promis scores
76    * @param pat
77    * @returns {Date}
78    */
79   export function findMaxDateCPT(pat) {
80
81     let maxDate = this.parseTime(pat[0]['PROC_DTM'], null);
82
83     for(let index = 0; index < pat.length; index++) {
84       if (!pat[index]['PROC_DTM']) {continue;}
85       if (this.parseTime(pat[index]['PROC_DTM'], null) > maxDate){
86         maxDate = this.parseTime(pat[index]['PROC_DTM'], null);
87       }
88     }
89   }
90 }
```

Visualization for “Raw” Text

Overview and detail views

The image shows a PDF viewer interface for the 'Boot Camp Installation & Setup Guide'. On the left, a vertical sidebar displays a series of document thumbnails numbered 1 through 5. The second thumbnail is highlighted with a blue circle containing the number 2. The main viewing area is split into two sections. The top section features the Apple logo at the top center, followed by the title 'Boot Camp Installation & Setup Guide' in a large, bold font. The bottom section is titled 'Contents' and contains a table of contents with page numbers and chapter titles.

Contents	
3	Introduction
4	Installation overview
4	Step 1: Check for updates
4	Step 2: Prepare your Mac for Windows
4	Step 3: Install Windows on your Mac
4	Step 4: Install the Windows support software
4	Step 1: Check for updates
5	Step 2: Prepare your Mac for Windows
5	If you have problems creating a partition
6	Step 3: Install Windows on your Mac
7	If you have problems installing Windows
7	If you get a message saying "Installer Disc Not Found" when installing Windows
7	If Windows doesn't install properly
7	If the Windows installer isn't responding
7	If you insert the wrong disc during installation
7	Step 4: Install the Windows support software
8	If the Windows support software doesn't install successfully
8	If you have problems using Windows on your Mac
8	If you see "No Boot Disk Attached" when starting up your Mac
9	If the screen is blank or distorted
9	If you can't rename the Windows partition
9	If you have a RAID configuration
9	Start up using OS X or Windows
9	Set the default operating system
10	Select an operating system during startup
10	Remove Windows from your Mac

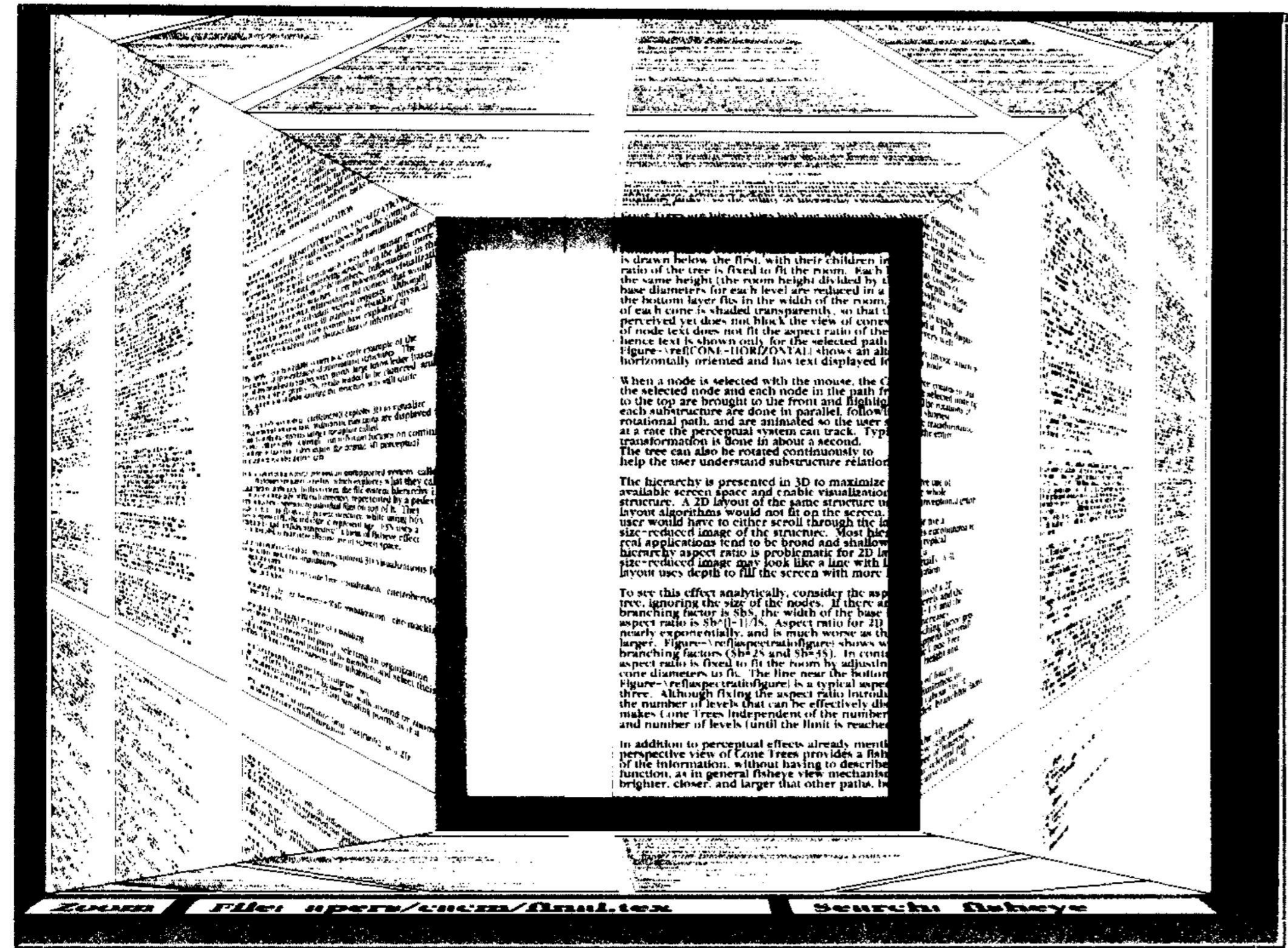
Visualization for “Raw” Text

Document Lens

‘93

Focus and Context

Zoomed area of interest
Without losing context
of the whole document



Robertson, George G., and Jock D. Mackinlay

The document lens

Proceedings of the 6th annual ACM symposium on User interface software and technology. ACM, 1993.

Visualization for “Raw” Text

Visualizing Search Results

To find keywords in an overview

Thumbnail view shows location of keywords or phrases

Document Thumbnails with Variable Text Scaling 2012

Document Thumbnails with Variable Text Scaling

A. Stoffel, H. Strobel, O. Deussen, D. A. Keim
Computer Graphics Forum, volume 31 issue 3 pp.

Abstract

Document reader applications usually offer an overview of the layout for each page as thumbnail view. Reading the text in these becomes impossible when the font size becomes very small. We improve the readability of these thumbnails using a distortion method, which retains a readable font size of interesting text while shrinking less interesting text further. In contrast to existing approaches, our method preserves the global layout of a page and is able to show context around important terms. We evaluate our technique and show application examples.

1. Motivation

The user interface of

such as Adobe Reader, consists of a detail view and one or more views for navigation within documents, such as a table of contents, and a thumbnail view providing page previews. In addition, most document viewers offer a keyword search functionality where the occurrence of keywords is highlighted in the detail view. However, the navigation views of document viewers (e.g. thumbnails) typically do not show

the occurrence of keywords in the documents. So the user

has to step through all occurrences of the keyword within the detail view as scrolling the pages.

To avoid this, we propose to highlight the keywords in the thumbnail view. Using the thumbnail view reduces the

and the user is pointed

pages. In addition, thumbnails can be useful for retrieval if the users are trying

know [CvDRH99, DC02]. Due to the small size of text in thumbnails, the highlighting should in addition increase the size of the keywords and their context, at first to make the text better readable and second to allow a simple disambiguation of keywords by their context. For instance, it

about “user” or “user interface” keyword “user” would

The technique we present to create the thumbnails is a general distortion technique for document content that high- to a user defined interest

The global structure of a page, namely the position of images and columns, is preserved. An example is shown in Figure 1. In the keyword search application, an interest function

is used that highlights the keywords and their context. Other applications might use a different interest function, for instance a sentiment score could be used to create thumbnails for sentiment analysis.

2. Related Work

Three different techniques are currently used for handling document overview and navigation: abstraction from the document with pixel based representations, thumbnails with different highlighting techniques, and semantic zooming.

A common pixel based technique is TileBars [Hea95], which visualizes the length of documents and the distribution of search terms within these documents with a rectangular pixel-based visualization. Byrd [Byr99] combines the scrollbar of the document view with a pixel visualization of

allowing the user to scroll

reference of the terms. Both techniques do not show the context

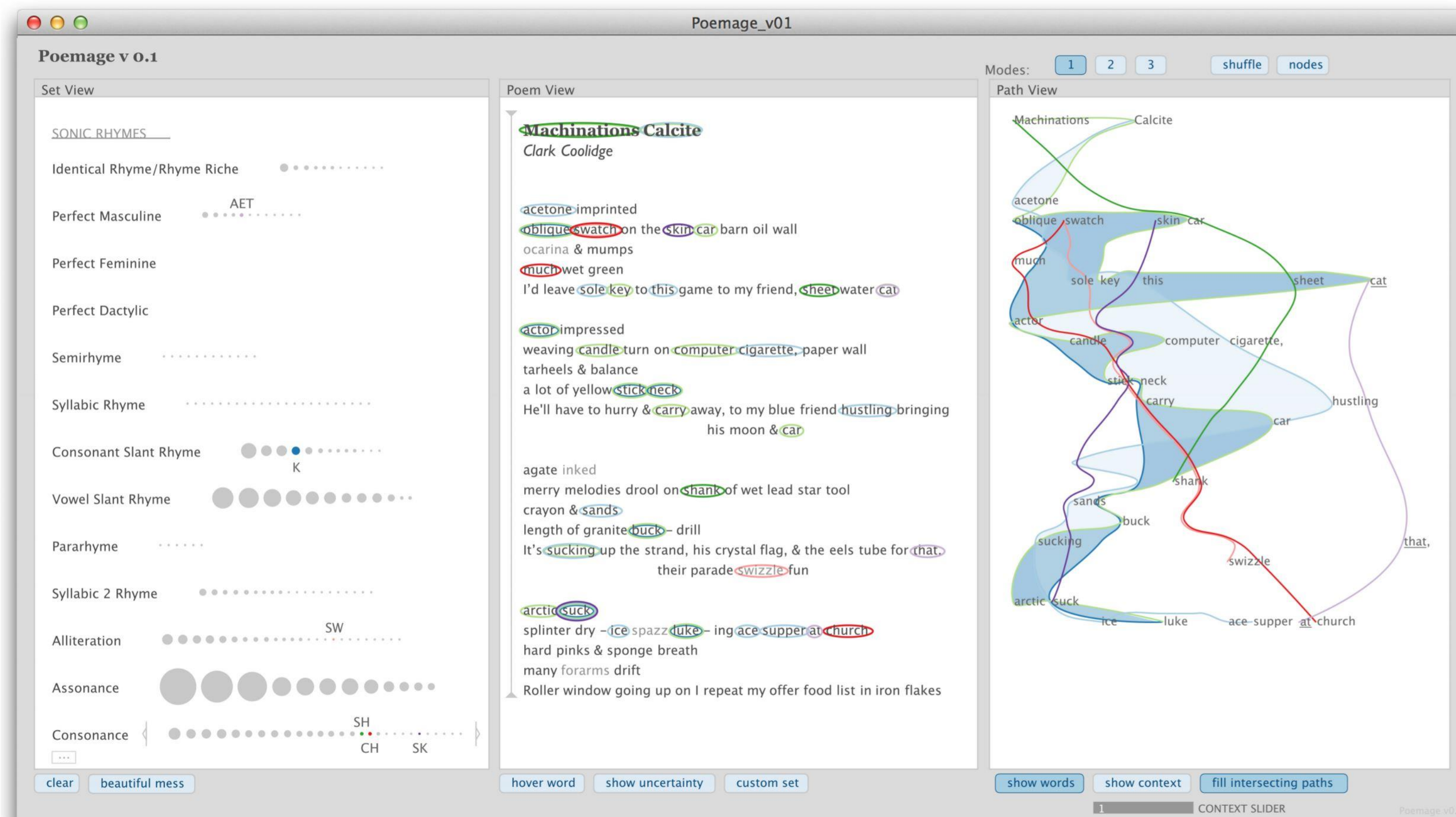
of the search terms and a user has to

order to access the context of the search terms.

Thumbnails, small version of the document or page, are commonly used for overview and navigation. The space-filling thumbnail approach of Cockburn et al. [CGA06] avoids scrolling in the overview of a document, by positioning the thumbnails of all pages on a grid on the screen and resizing the thumbnails to fit the window size. Suh et al. [SWRG02] combined the thumbnails with popouts, which highlight search terms by rendering them in a readable size with a semi-transparently colored background above of the original thumbnail. Woodruff et al. [WRM02] pre-

Visualization for “Raw” Text

Poemage: Visualizing the Sonic Topology of a Poem



complex structures from the interaction of **sonic patterns** in the poem

'15

Working with Text

Call me Ishmael. Some years ago -- never mind how long precisely -- having little or no money in my purse, and nothing particular to interest me on shore, I thought I would sail about a little and see the watery part of the world. It is a way I have of driving off the spleen, and regulating the circulation. Whenever I find myself growing grim about the mouth; whenever it is a damp, drizzly November in my soul; whenever I find myself involuntarily pausing before coffin warehouses, and bringing up the rear of every funeral I meet; and especially whenever my hypos get such an upper hand of me, that it requires a strong moral principle to prevent me from deliberately stepping into the street, and methodically knocking people's hats off -- then, I account it high time to get to sea as soon as I can. This is my substitute for pistol and ball. With a philosophical flourish Cato throws himself

Generally want to convert raw text to features



4 x 't'
3 x 'u'
2 x 'r'
2 x 'e'
...

structured data

Steps of Processing to derive Text Features

The cleanup:

- Sentence splitting
- change to lower case
- Removing punctuation
- Stop word removal (most frequent words in a language)
- Stemming - [demo porter stemmer](#)

Steps of Processing to derive Text Features

Understanding the structure:

- **N-grams, bag of words**
- Concordance: Keyword in context
- Co-occurrence : Phrase Net
- POS tagging (part of speech)
- Sentiment analysis for twitter
- NER (name entity recognition)
- deep parsing - try to “understand” text.

Measuring Structured Text Features

- Simple counts (bag of words) used for similarity measures
- One of the most basic measures for text analysis
- Divide text into n-grams
- If texts share similar words, may be similar in content

	princess	dragon	castle
doc1	1	1	1
doc2	0	0	1

Wordle vs Tag Cloud

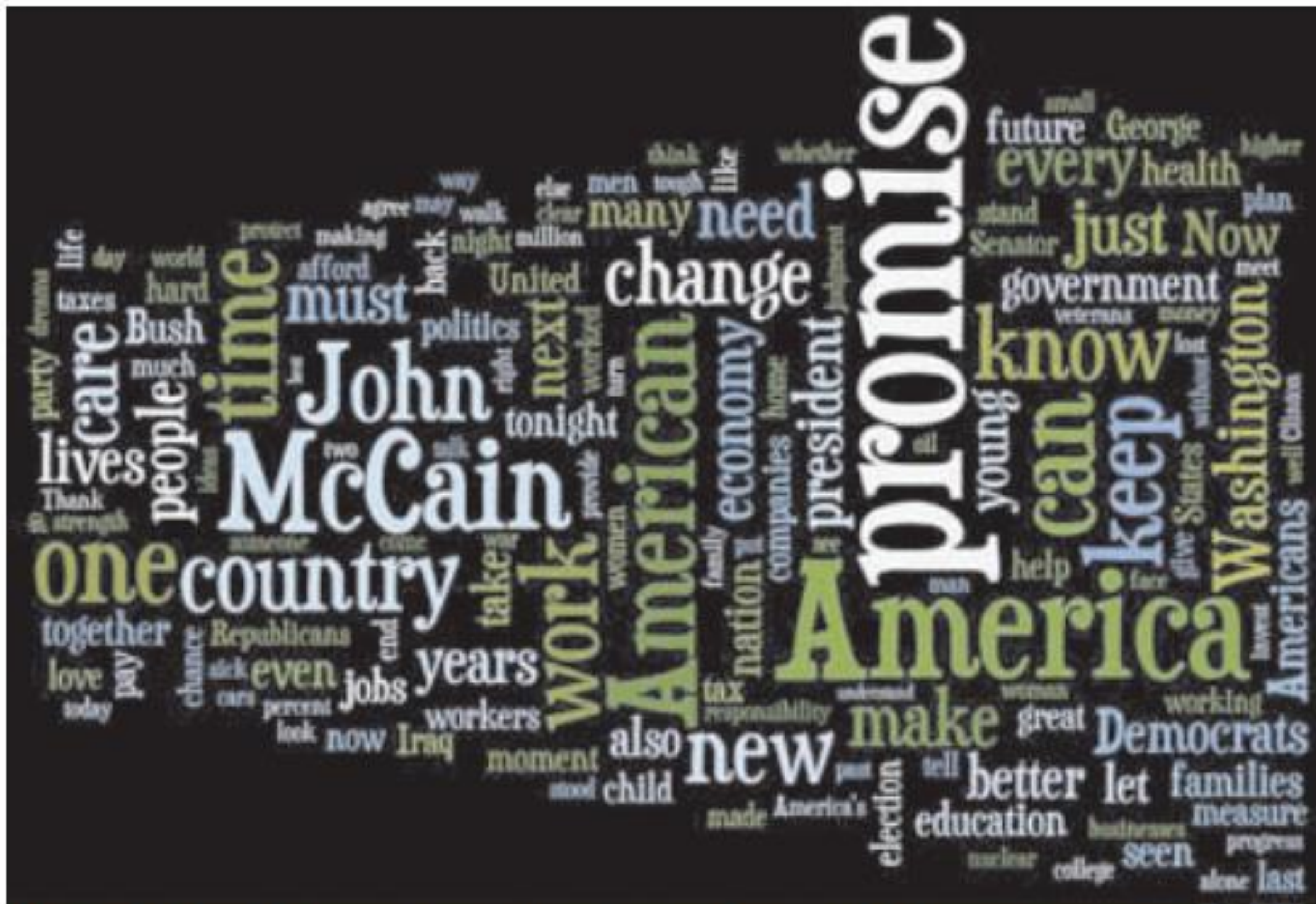


Fig 2: Wordle vs. Tag Cloud of Barack Obama's speech at the Democratic Convention in 2008.

Can quickly see dominant words
Not for precise comparisons and similarity measures

Weighting

Frequency count

log frequency : **$\log(1 + \text{tftd})$**

Normalized for proportion

Text Frequency by inverse document frequency - **TF IDF**

Limitations

Frequency may not be meaningful

Does not show the structure

Does not explain the context/grammar/POS

Steps of Processing to derive Text Features

Understanding the structure:

- N-grams, bag of words
- **Concordance: Keyword in context**
- Co-occurrence : Phrase Net
- POS tagging (part of speech)
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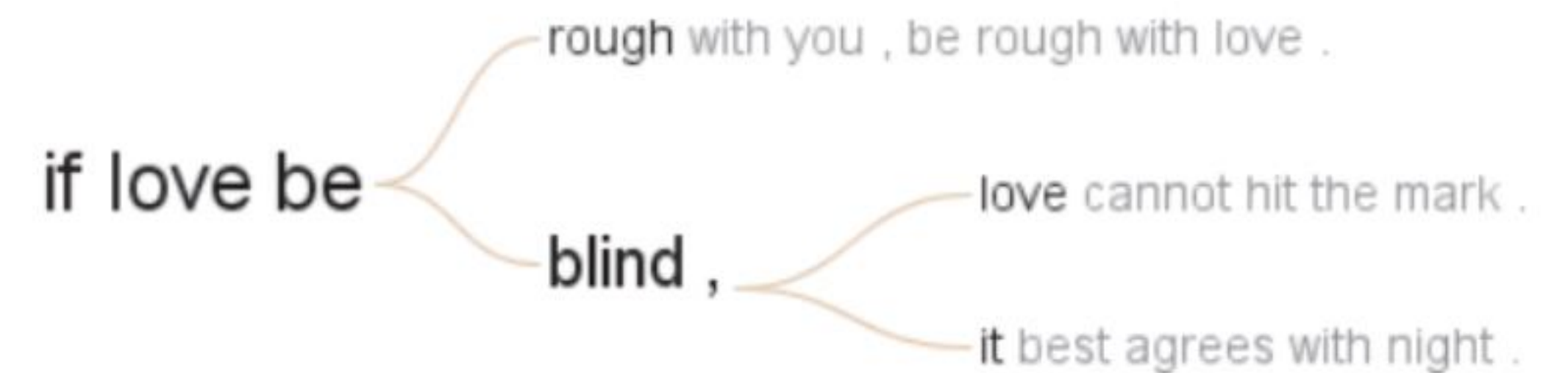
Concordance: Keyword in context

Word Tree

if love be rough with you , be rough with love .

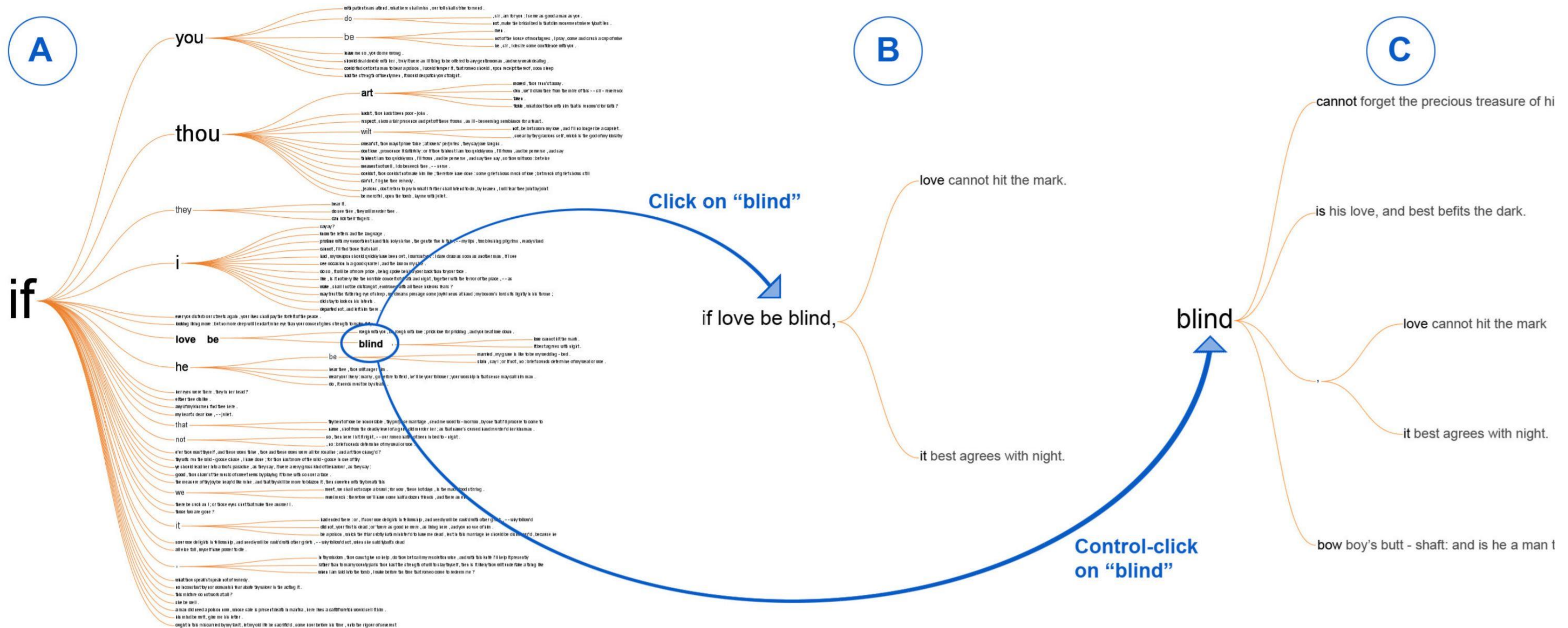
if love be blind , love cannot hit the mark .

if love be blind , it best agrees with night .



What is the local context of the word?

Search for "if" in Romeo & Juliet



The word tree, an interactive visual concordance
M Wattenberg, FB Viégas
Visualization and Computer Graphics, IEEE Transactions on 14 (6), 1221-1228



The word tree, an interactive visual concordance
 M Wattenberg, FB Viégas
Visualization and Computer Graphics, IEEE Transactions on 14 (6), 1221-1228

Steps of Processing to derive Text Features

Understanding the structure:

- N-grams, bag of words
- Concordance: Keyword in context
- **Co-occurrence : Phrase Net**
- POS tagging (part of speech)
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Phrase Net

We are looking for specific linking patterns

1 You create the word sequence filter:

WORD1 and **WORD2**

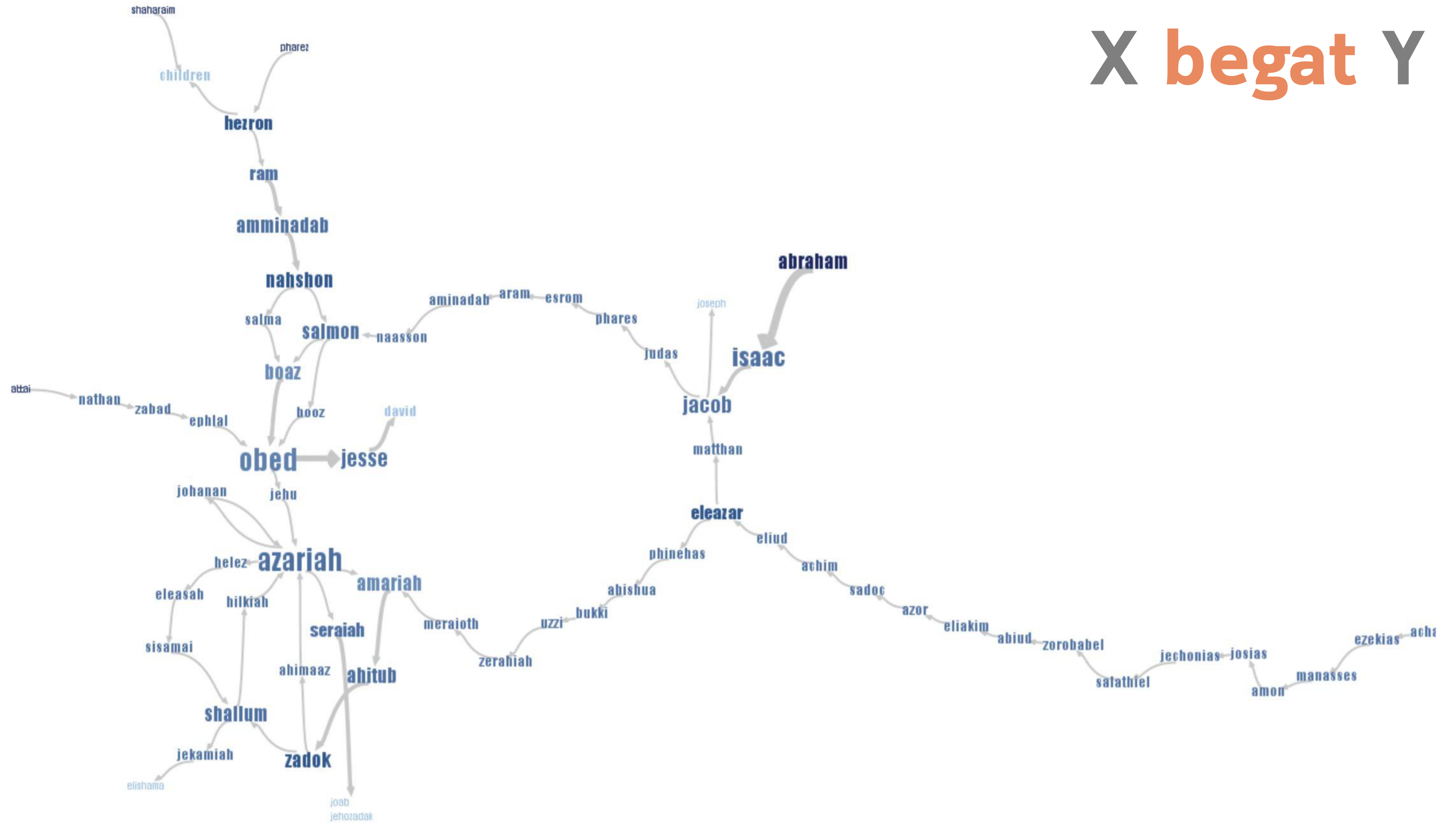
2 Many Eyes finds this word relationship in Jane Austen's text:

Her manners were pronounced to be very bad indeed, a mixture of **pride and impertinence**; she had no conversation, no stile, no taste, no beauty.

3 Many Eyes creates the word graph:

pride → **impertinence**

X begat Y



Steps of Processing to derive Text Features

Understanding the structure:

- N-grams, bag of words
- Concordance: Keyword in context
- Co-occurrence : Phrase Net
- **POS tagging (part of speech)**
- Sentiment analysis
- NER (name entity recognition)
- deep parsing - try to “understand” text.

Part of Speech Tagging

Labeling words in text as a specific part of speech

How is a word **used in the scope** of a phrase?

Distinguish meaning of the word.

“I am going to the fair.” vs **“That is fair”**

Explain the **syntactic role** of a word

Infer semantic information from this due to our knowledge of syntactic role

[Part of Speech Tagging Demo](#)

Steps of Processing to derive Text Features

Understanding the structure:

- N-grams, bag of words
- Concordance: Keyword in context
- Co-occurrence : Phrase Net
- POS tagging (part of speech)
- **Sentiment analysis**
- NER (name entity recognition)
- deep parsing - try to “understand” text.

Sentiment Analysis

Subjective information (opinions and attitudes) from text.

Social media is a huge data resource for this.

Basic task is identifying **polarity**:

positive, neutral, negative

[Tweet sentiment visualization](#)

Steps of Processing to derive Text Features

Understanding the structure:

- N-grams, bag of words
- Concordance: Keyword in context
- Co-occurrence : Phrase Net
- POS tagging (part of speech) = demo
- Sentiment analysis
- **NER (name entity recognition)**
- deep parsing - try to “understand” text.

Name Entity Recognition

Reveals major people, organizations, and places.

Used for **tagging and categorizing** of documents and articles

[Demo for NER](#)

Steps of Processing to derive Text Features

Understanding the structure:

- N-grams, bag of words
- Concordance: Keyword in context
- Co-occurrence : Phrase Net
- POS tagging (part of speech)
- Sentiment analysis
- NER (name entity recognition)
- **deep parsing - try to “understand” text.**

Text features are complicated

- *Toilet out of order. Please use floor below.*
- *One morning I shot an elephant in my pajamas. How he got in my pajamas, I don't know.*
- *Did you ever hear the story about the blind carpenter who picked up his hammer and saw?*

Visualizing Collections of Documents

- Identify **themes** across documents
- Identify **groupings** of documents
- Identify **differences** between collections
- Understand adjacent information about a **particular topic** in the collection

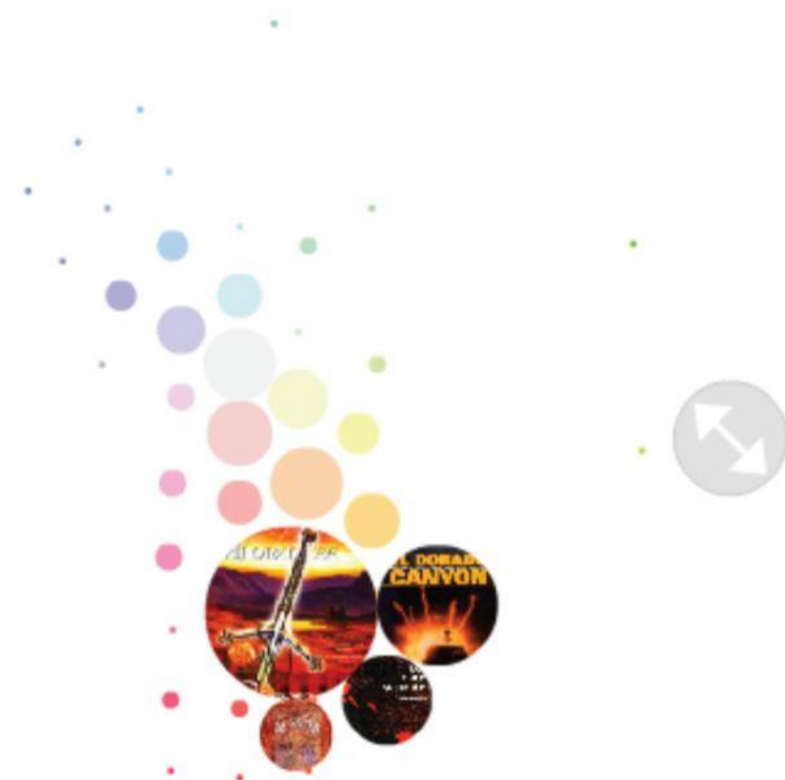
The Bohemian Bookshelf

Open ended book exploration in the library

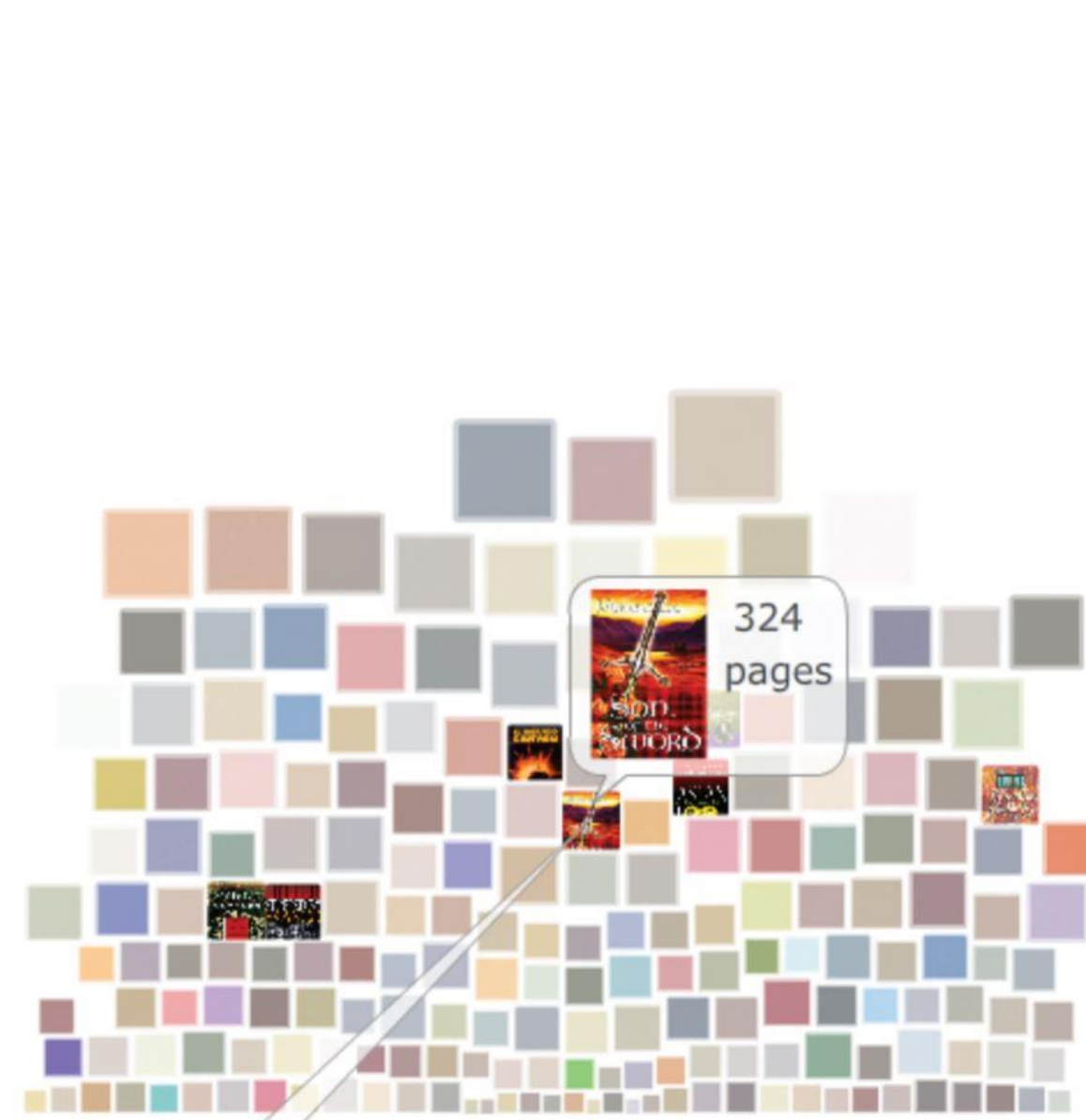
Highlight adjacencies between books

Flexible visual pathways

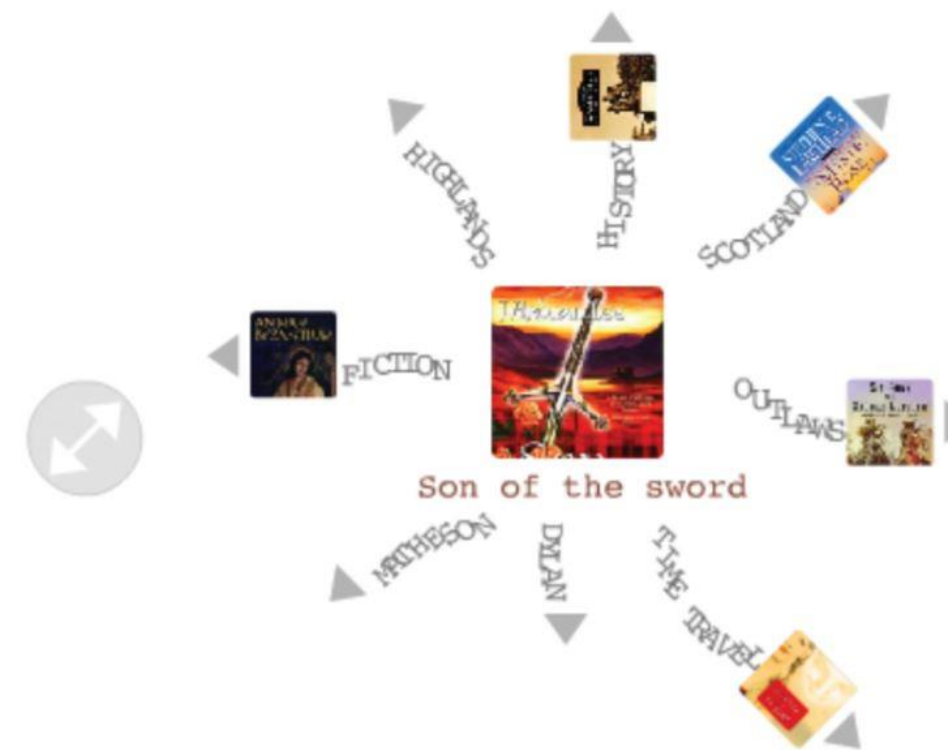
COVER COLOUR
Browse Books by Colour



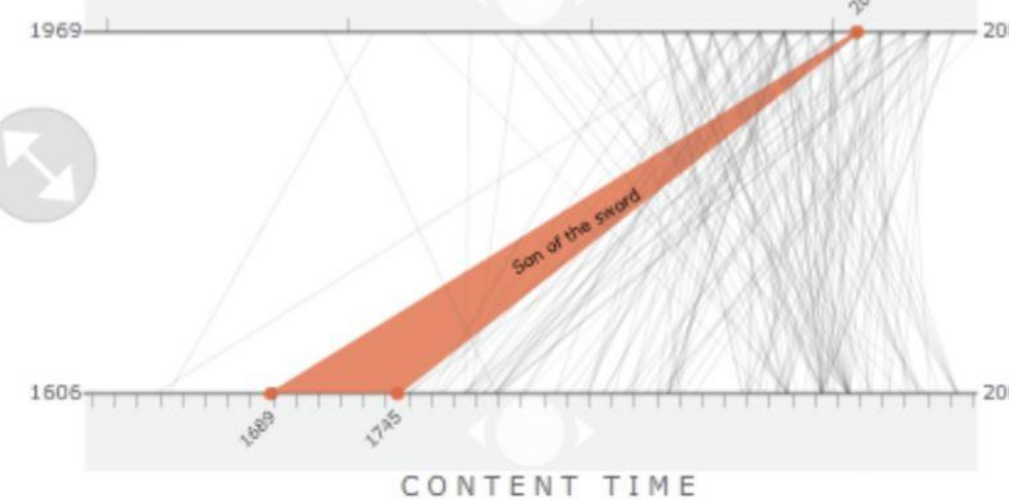
NUMBER OF PAGES
Browse Books by Page Count



KEYWORDS
Follow Keyword Chains to New Books



TIME PUBLISHED



TIMELINES

Compare Publication Year and Content Time

AUTHORS
Browse Books by Author Name



Son of the sword
by Lee, J. Ardian, 2001

Times: 1689-1745
Pages: 324

Keywords: Fiction, Matheson, Dylan, Time travel, Outlaws, Scotland, History, Highlands

In this earnest mix of history and romance, in the tradition of Twain's Connecticut Yankee, a contemporary American travels back in time, here to 1713 Scotland, where Jacobite rebels are in deep trouble. Alas, his story fails to generate much excitement until the poignant ending. England and Scotland have fought off and on over the centuries, with the English usually victorious. After yet another Scottish defeat, the faerie Sinann Eire holds up a great sword and calls upon it to 'bring me a hero, a Cuchulain'. The

Alice Thudt, Uta Hinrichs and Sheelagh Carpendale.

The Bohemian Bookshelf: Supporting Serendipitous Book Discoveries through Information Visualization.

CHI '12: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 2012

[webpage](#) with video

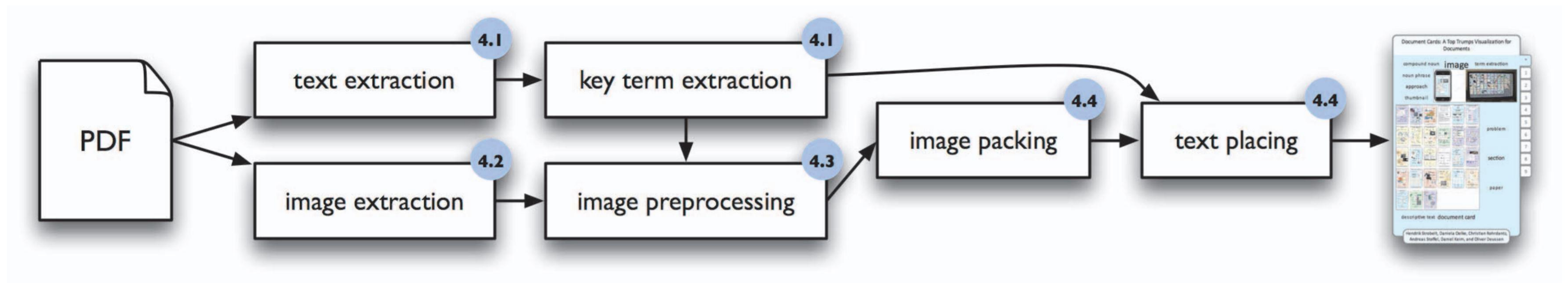
JigSaw- investigate document collections

The image displays the JigSaw software interface, which is used for investigating document collections. The main window is titled "Document Cluster View" and features a grid of clusters, each represented by a group of colored squares. The clusters are labeled with terms such as "center, faa, air", "director, departments, agency", "ksm, interrogation, 2003", "muslim, islamic, fight", "staff, professional, member", "muslims, saudi, governments", "terrorist, unit, state", "studied, pause, reflect", "attacks, operators, talibwn", "binalshibh, atta, flight", "interview, general, agents", "committee, senate, department", "flight, 11, centers", "deputy, staff", "interview, 2004, fdny", "towers, north, south", "agency, officers, department", "offices, director, moussaoui", "9/11, saudi, deceased", "agency, officers, department", "islamic, v, laden", and "9/11, saudi, deceased".

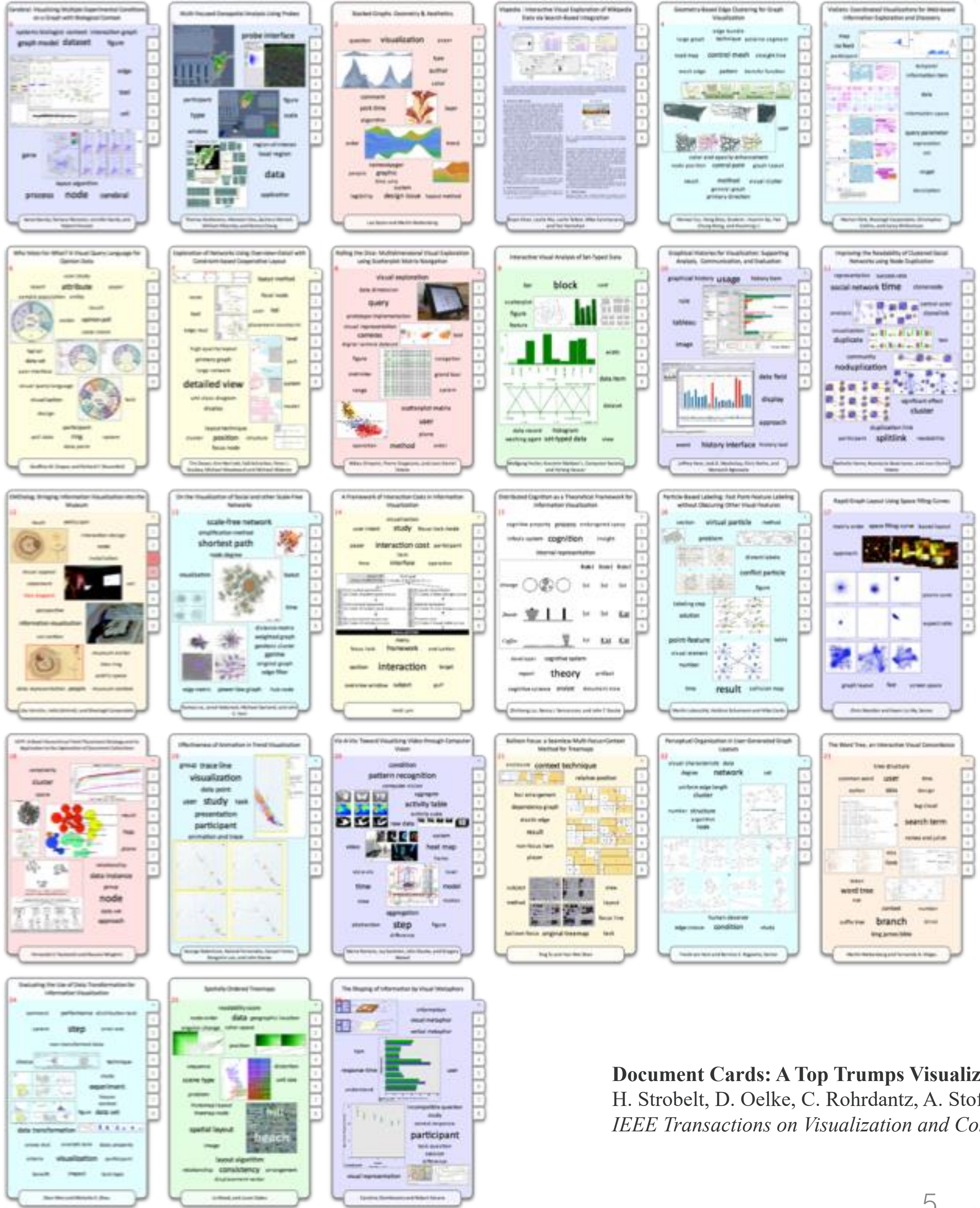
On the left side, there is a "Filters" panel with a "Highlight Viewed Documents" button and a "Filters" section containing "All Filters". Below this are buttons for "Group by Filters", "Undo Filters", and "Hide Unfiltered". The "Clusters" section includes a dropdown menu set to "Text (Default)" and a slider for "Freq Words" and "Unique Words". A list of clusters is shown at the bottom left, including "All Documents", "center, faa, air: 54", "staff, professional, member: 3", "national, director: 24", "ksm, interrogation, 2003: 38", "muslim, islamic, ladin: 5", "muslims, saudi, governments: 21", "terrorist, unit, state: 28", "studied, pause, reflect: 2", "ladin, qaeda, attacks: 90", "deputy, staff: 1", and "binalshibh, atta, hitakere: 41".

On the right side, there is a "List View" panel with a search bar and a list of names. The list includes: "Bill Clinton", "George W. Bush", "Usama Bin Ladin", "Richard Clarke", "George Tenet", "Condoleezza Rice", "Dick Cheney", "Nawaf al Hazmi", "Donald Rumsfeld", "Ramzi Binalshibh", "Dale Watson", "Khalid al Mihdhar", "Samuel Berger", "Janet Reno", "Hugh Shelton", "Waleed al Shehri", "James Pavitt", "Khalid Sheikh Mohammed", "Ramzi Yousef", "Salem al Hazmi", "Stephen Hadley", "Zacarias Moussaoui", "Ahmed al Ghamdi", "John McLaughlin", "Abu Zubaydah", "Ayman al Zawahiri", "Saddam Hussein", "Abdullah", "Charles Allen", "Mohamed Atta", "Roger Cressey", "Ahmed al Nami", "Ali Abdul Aziz Ali", "Andrew Card", "Bob Woodward", "Colin Powell", "Gary Schroen", "Hani Hanjour", "Marwan al Shehhi", "Saeed al Ghamdi", and "Satam al Suqami".

DocumentCards



summarize using important terms and important figures



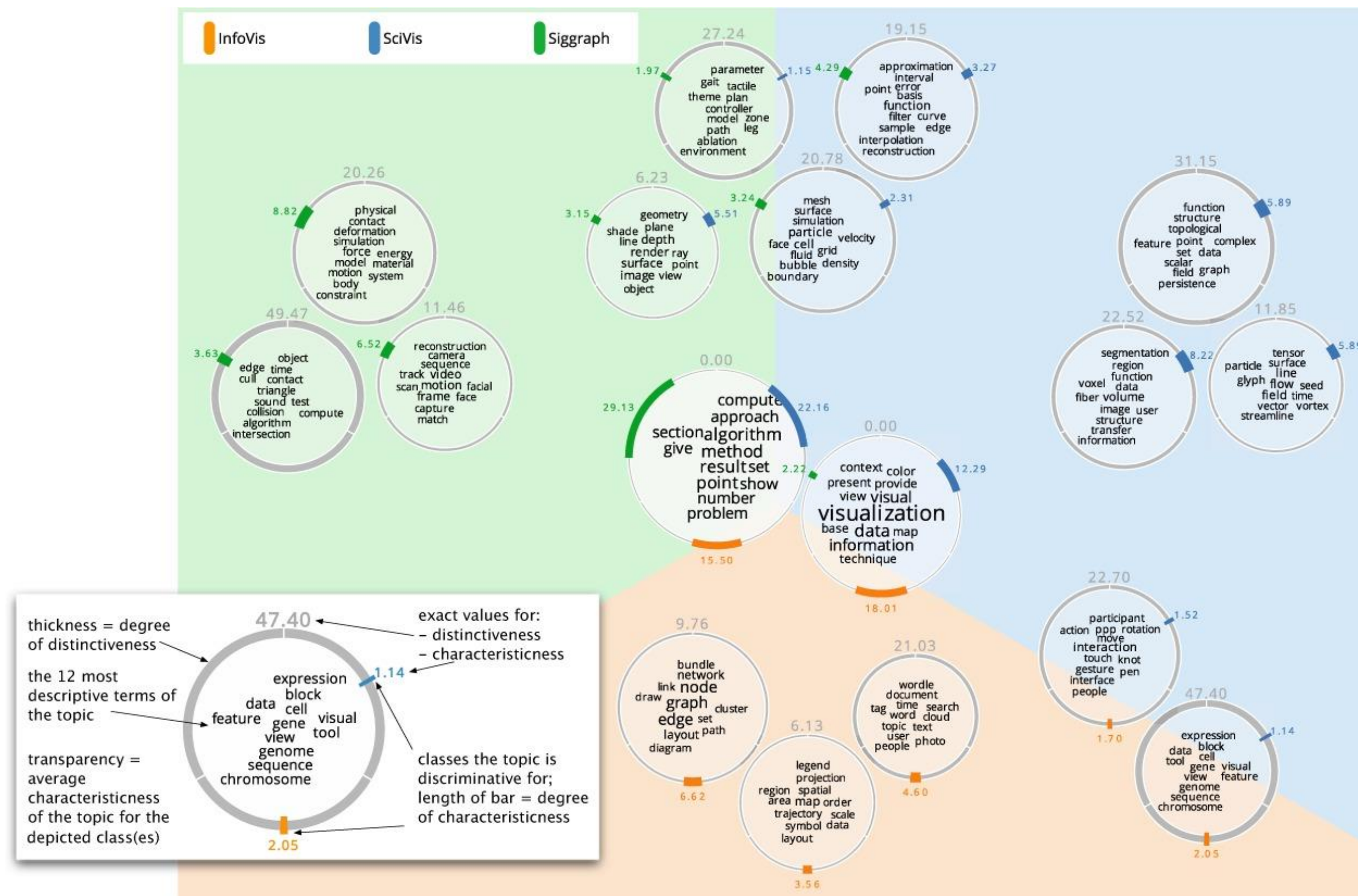
content as a mixture of figure and textual representatives

Document Cards: A Top Trumps Visualization for Documents
 H. Strobel, D. Oelke, C. Rohrdantz, A. Stoffel, O. Deussen, D. Keim
IEEE Transactions on Visualization and Computer Graphics (TVCG - InfoVis), 2009



Compare Corpora

Compare topics between text collections



Use probabilistic topic modeling to identify topics that discriminate one collection from others.

Comparison of papers between conferences.

Comparative Exploration of Document Collections: a Visual Analytics Approach (<http://ditop.hs8.de>)
 D. Oelke, H. Strobel, C. Rohrdantz, I. Gurevych, and O. Deussen



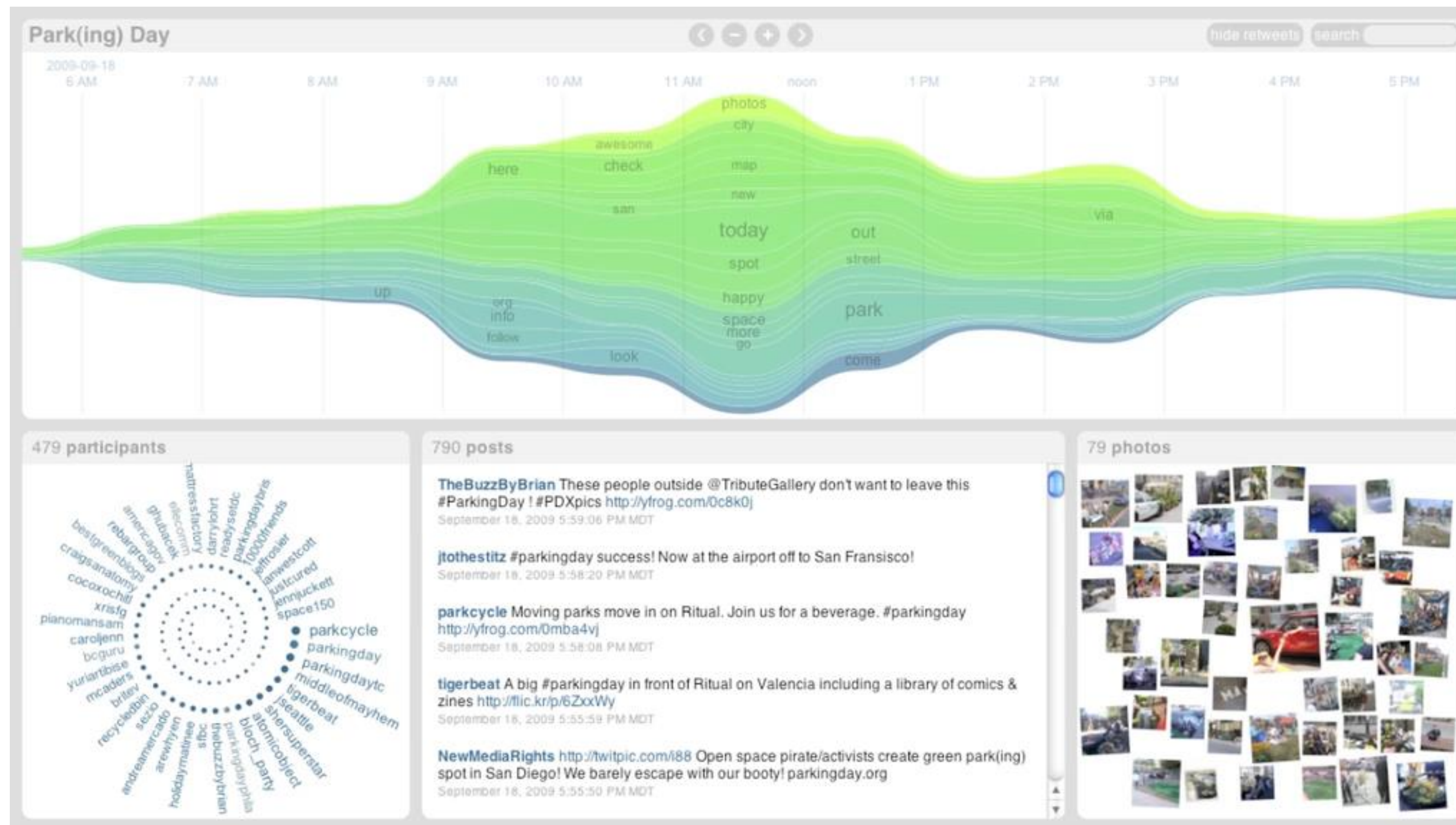
Visualizing and tracking changes

How did this document evolve?

Traces Project

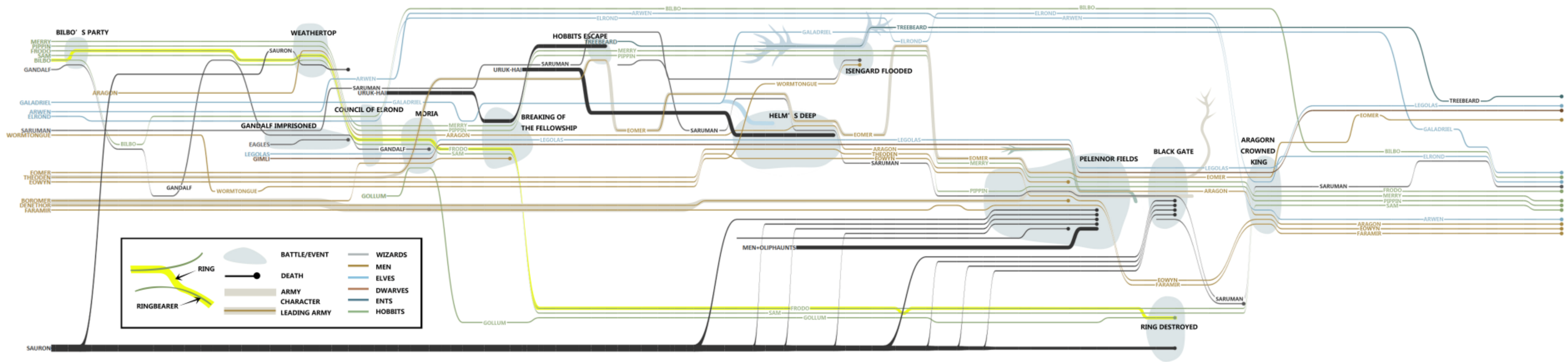
Vis for Time-Evolving Document Collections

Visualizing tweets in an overview to show saliency of past and present happenings in the context of the evolving conversation

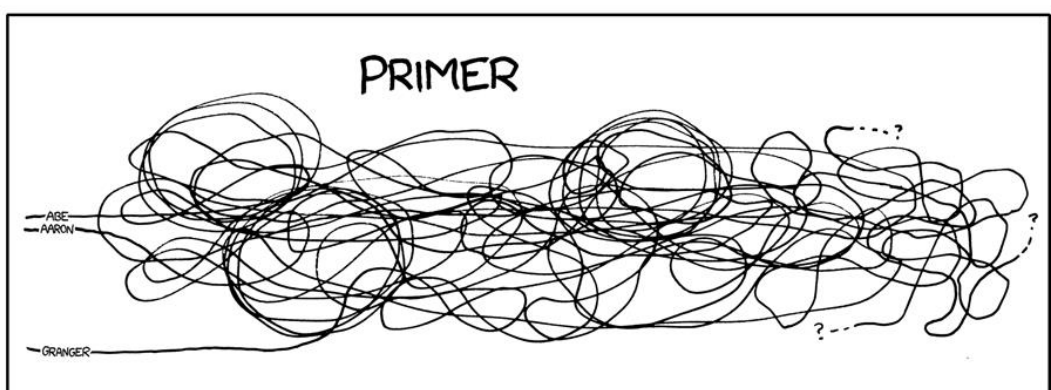
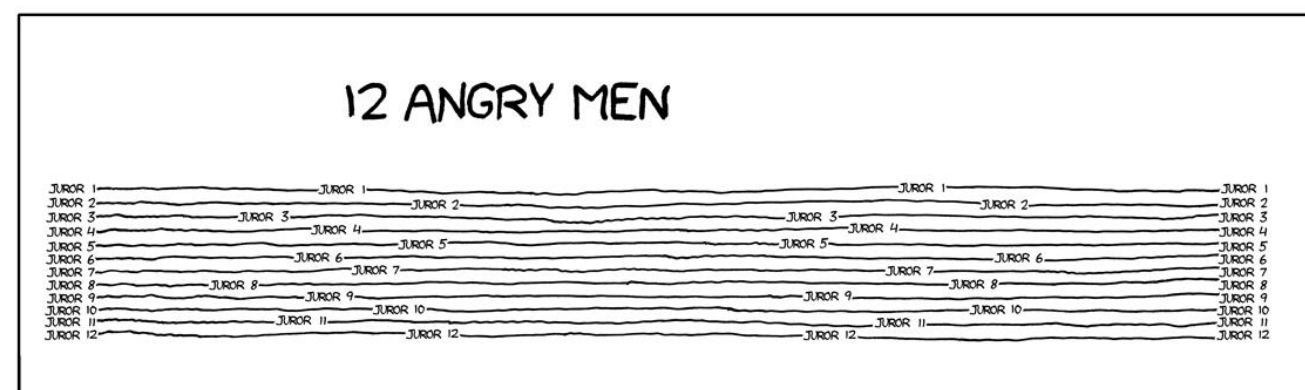
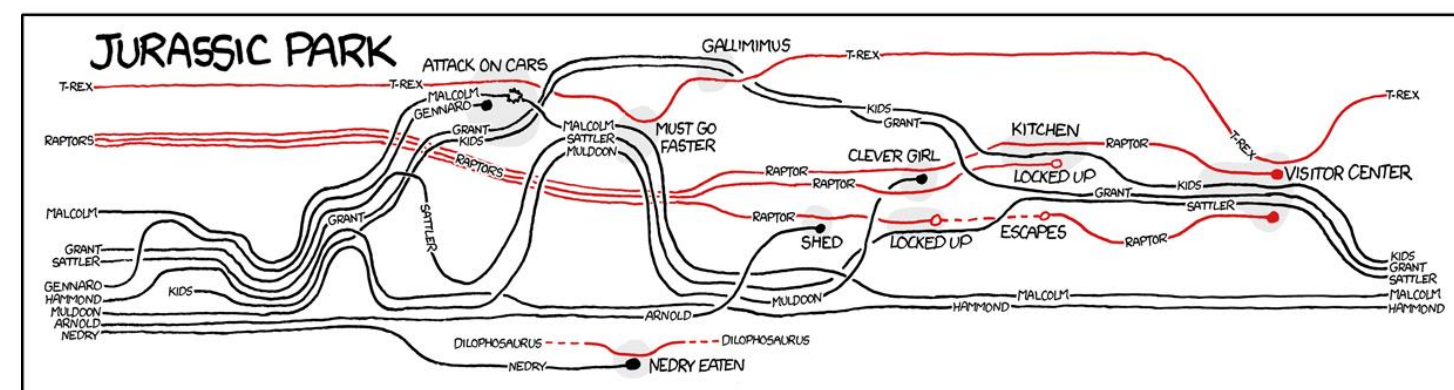
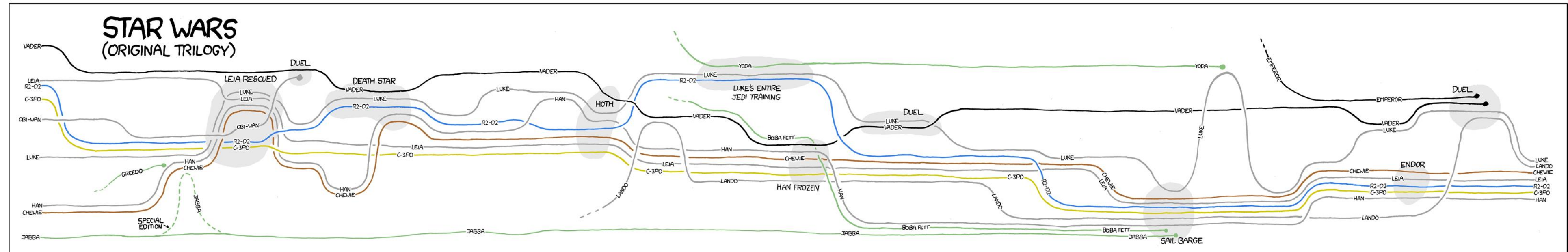
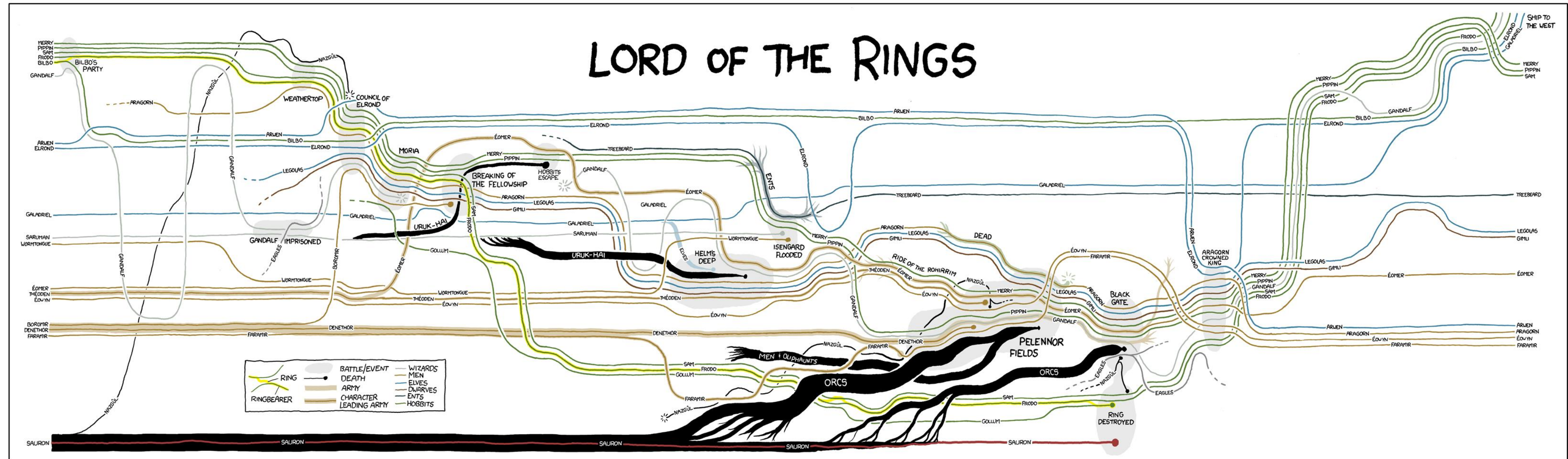


StoryFlow: Tracking the Evolution of Stories

Visual interpretation of a story line.



THESE CHARTS SHOW MOVIE CHARACTER INTERACTIONS.
 THE HORIZONTAL AXIS IS TIME. THE VERTICAL GROUPING OF THE
 LINES INDICATES WHICH CHARACTERS ARE TOGETHER AT A GIVEN TIME.

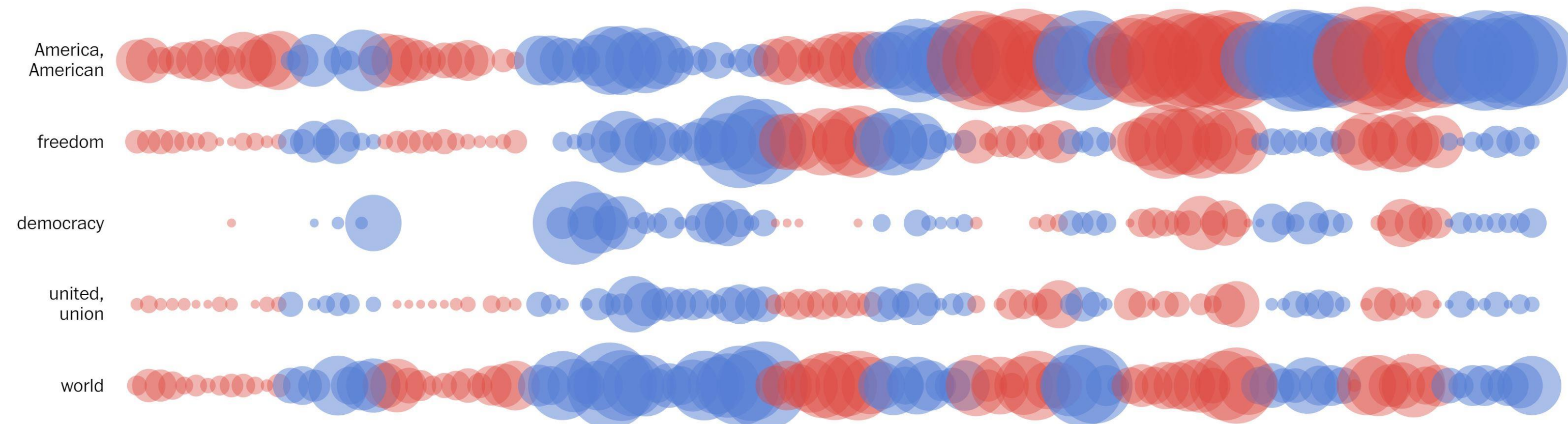


Design Critique: History through the President's words

Nationalism

Liberman shared a colleague's analysis that shows words like "citizens" and "duties" have faded from presidential inaugural addresses, while words like "freedom" and "America" have surged. While it doesn't explain the shift, he suspects that it's likely the trend applies to both types of addresses.

Fields suspected the oscillations in "America" (and variations) shadow the popularity of "God Bless America," which was written by Irving Berlin in 1918 and revised in 1938.



What information is encoded?

What marks and channels are they using?

Is it effective?

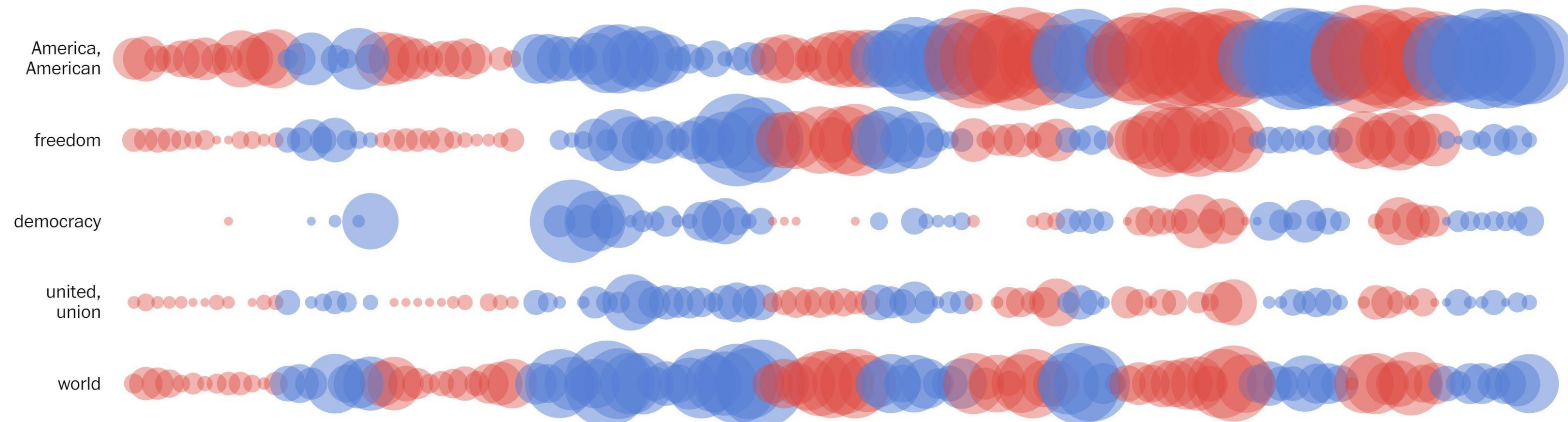
What information do you get in overview vs on hover?

Design Critique: History through the President's words

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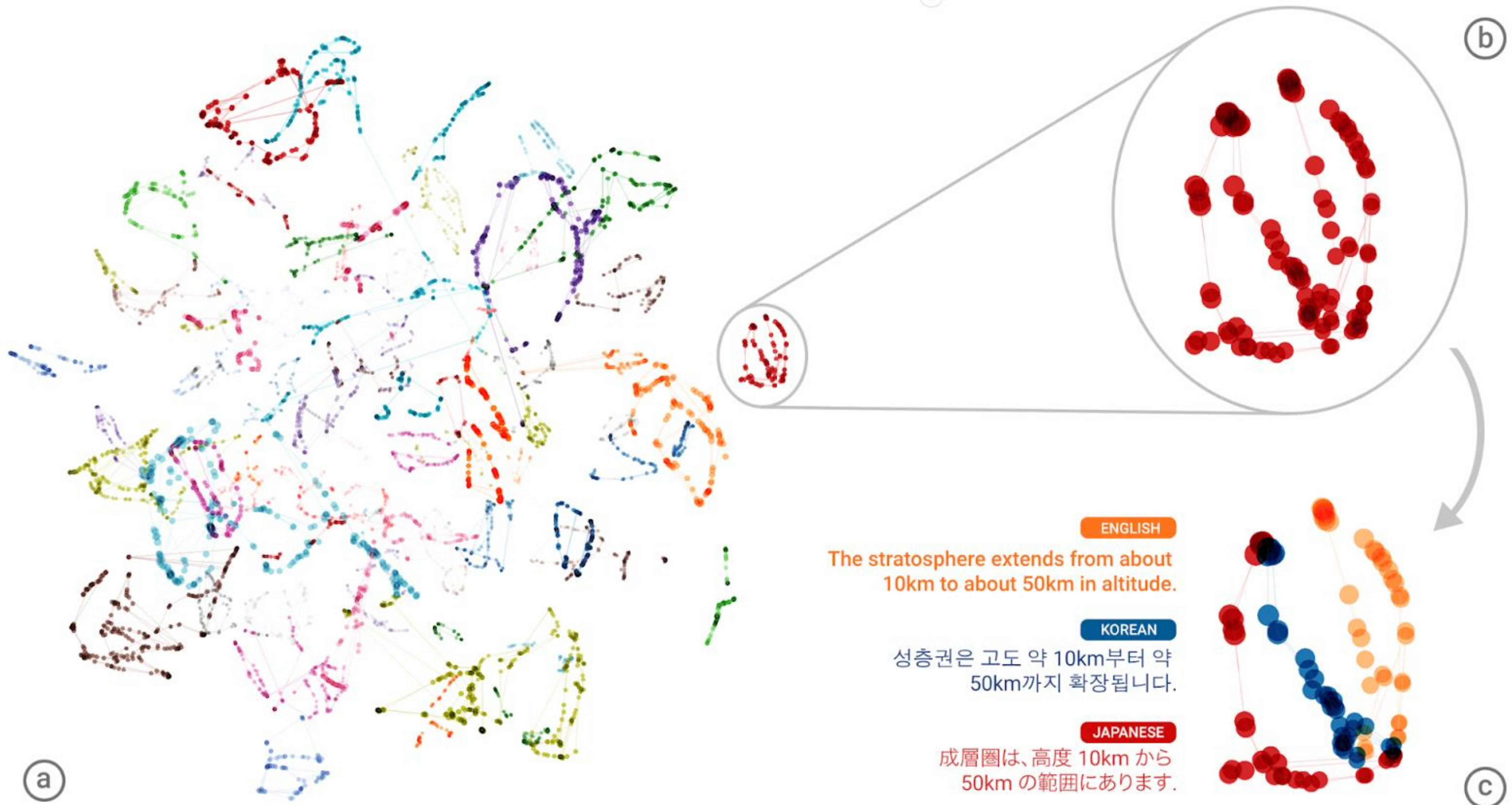
Create a redesign with your group:

Imagine you ran some sentiment analysis on the speech data

Create a redesign encoding polarity of the speech data for listed topics

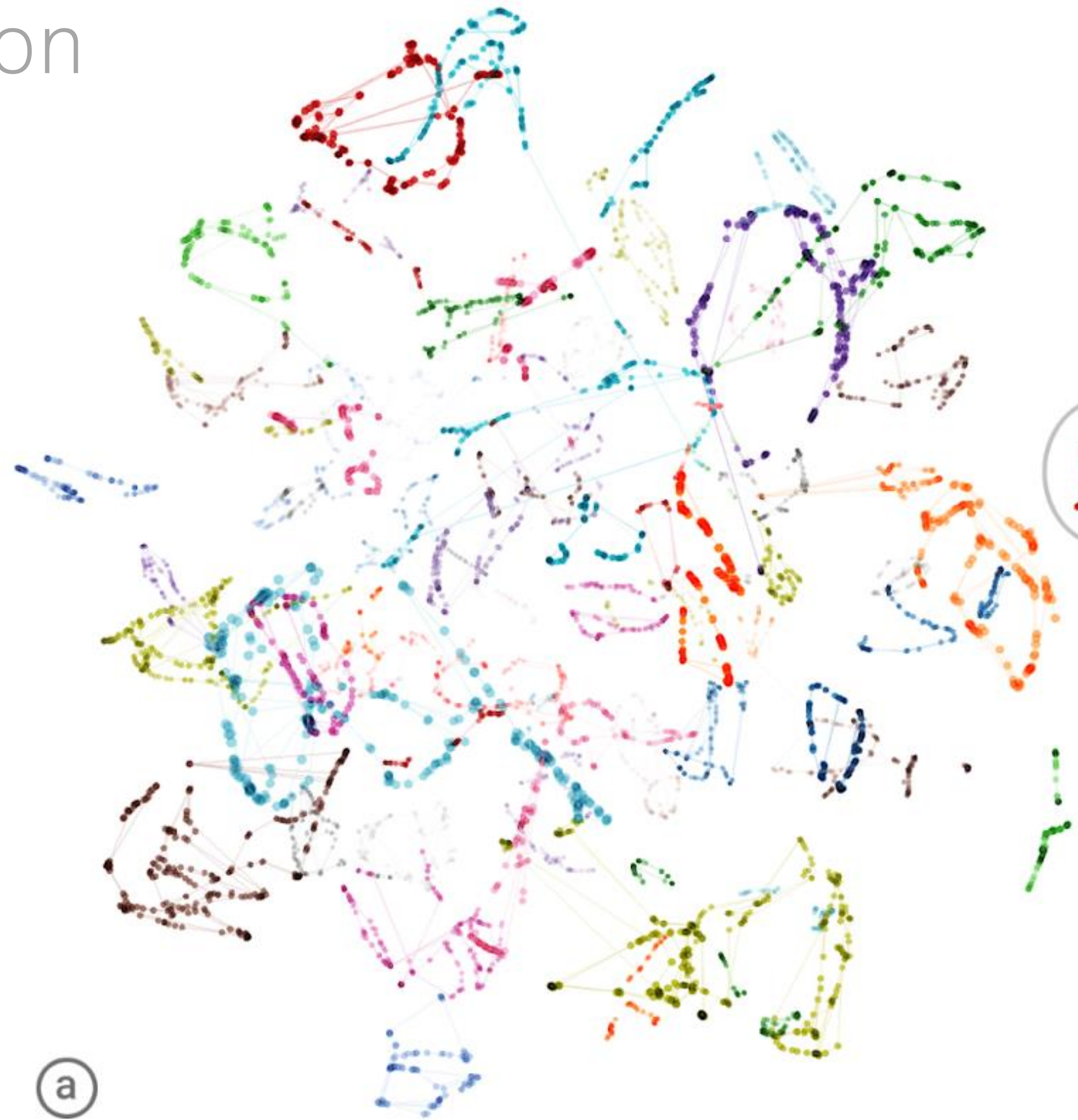
How could you encode sentiment in the visualization

Visualization for Translation



Visualization for Translation

Geometry of translations
Colored by the meaning
A sentence translated from
English → Korean
Japanese → English
share the same color.



② Visualization for Translation

Zoom into one of the groups translated sentence

ENGLISH
The stratosphere extends from about 10km to about 50km in altitude.

KOREAN
성층권은 고도 약 10km부터 약 50km까지 확장됩니다.

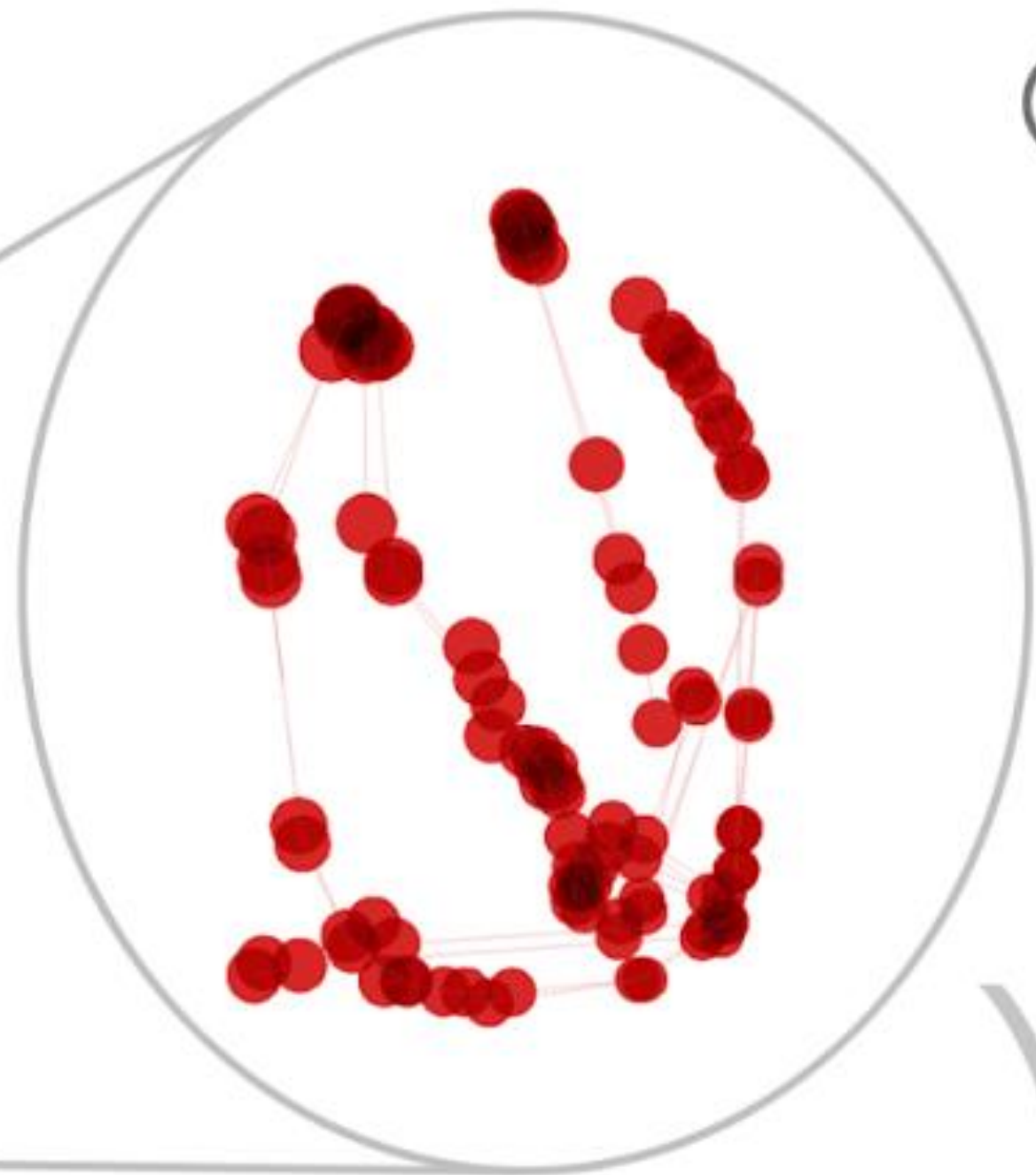
JAPANESE
成層圏は、高度 10km から 50km の範囲にあります。



③

Visualization for Translation

(b)



Color is changed to source language,
Network must be encoding semantics
rather than phrase to phrase
translations
Existence of an interlingua?

ENGLISH
The stratosphere extends from about
10km to about 50km in altitude.

KOREAN
성층권은 고도 약 10km부터 약
50km까지 확장됩니다.

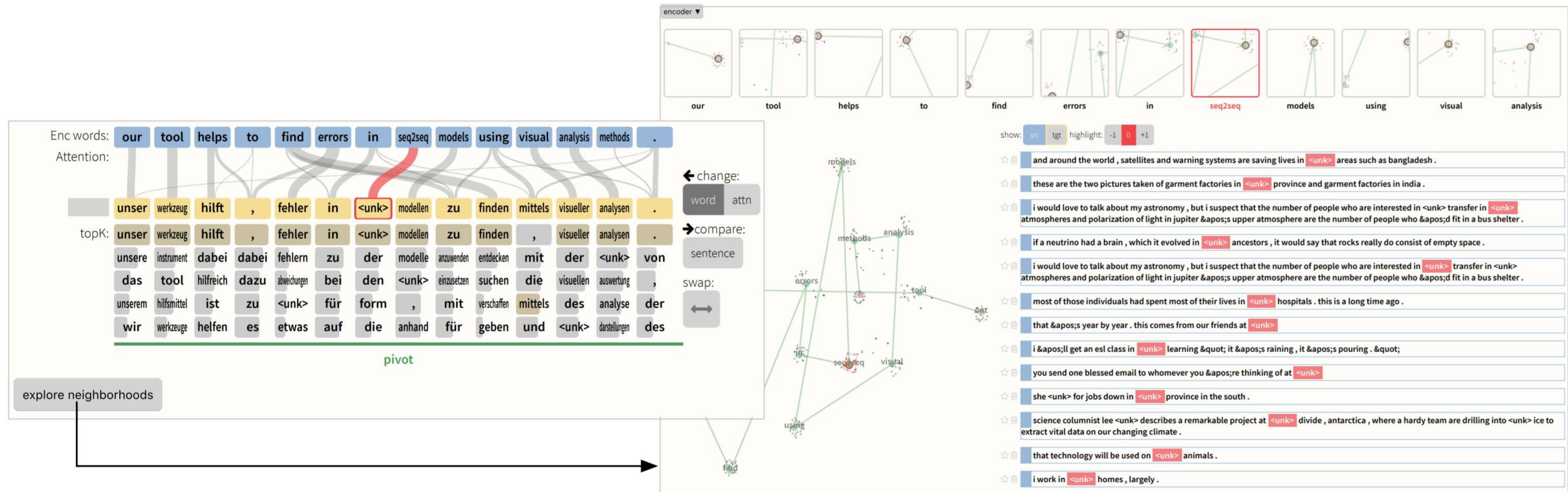
JAPANESE
成層圏は、高度 10km から
50km の範囲にあります。



(c)

Seq2Seq-Vis: A Visual Debugging Tool for Sequence-to-Sequence Models

<http://seq2seq-vis.io/>



<http://textvis.lnu.se/>

Text Visualization Browser

A Visual Survey of Text Visualization Techniques
Provided by ISOVIS group

About Add entry

Techniques displayed: **141**

Search:

Time filter: 1976 2014

Analytic Tasks

- Sum
- Alert
- Like
- Share
- Refresh
- Print
- ...

Visualization Tasks

- Star
- Save
- Sort
- Hide
- Zoom
- ...

Data

Source: File Folder Upload

Properties: Info Refresh ...

The main area of the browser displays a grid of 141 different text visualization techniques. These include various types of word clouds, network graphs, treemaps, and other data visualization methods. The techniques are arranged in a grid that is approximately 10 columns wide and 14 rows high. Each technique is represented by a small thumbnail image. The thumbnails show a wide variety of styles and colors, ranging from simple black and white to vibrant, multi-colored designs. Some techniques use complex geometric shapes, while others are more traditional bar or line charts. The overall layout is clean and organized, allowing users to easily browse through the different visualization methods.