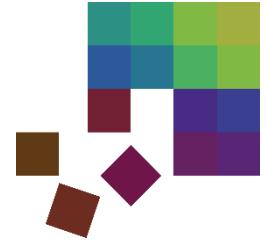
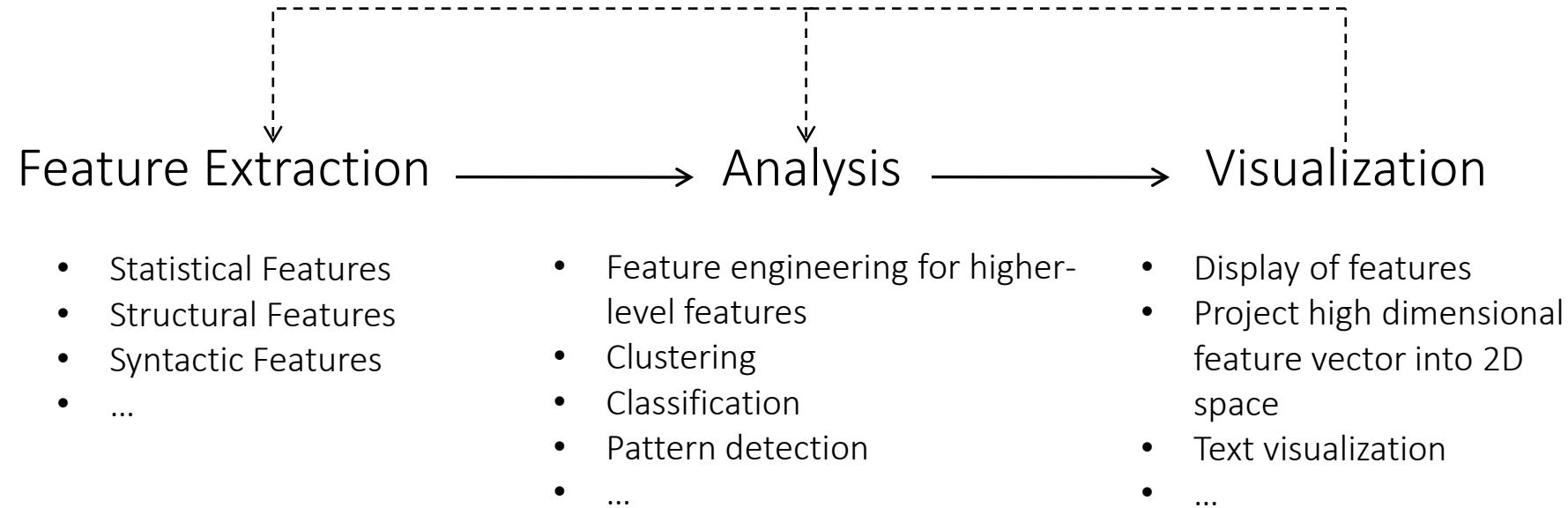


University of Konstanz
Data Analysis and Visualization Group

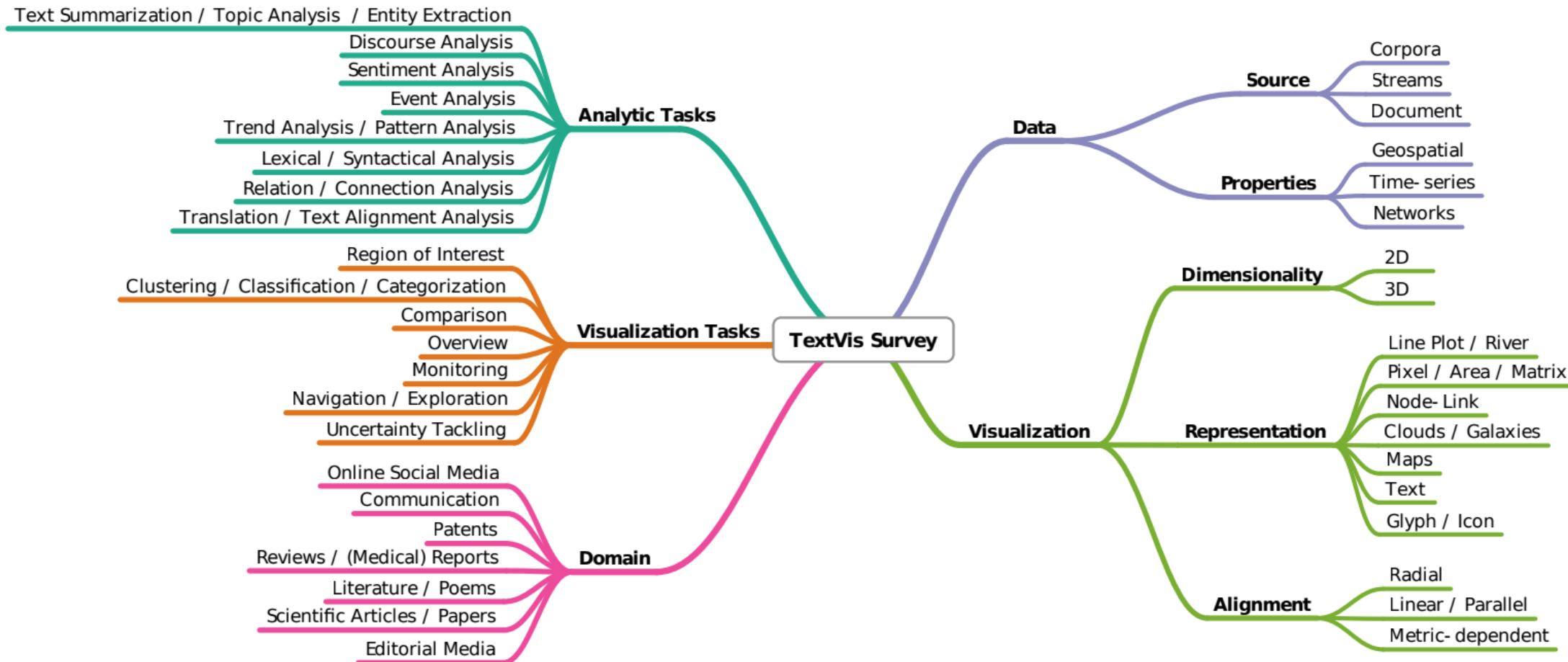


Text Visualization

Stages of Document Visualization

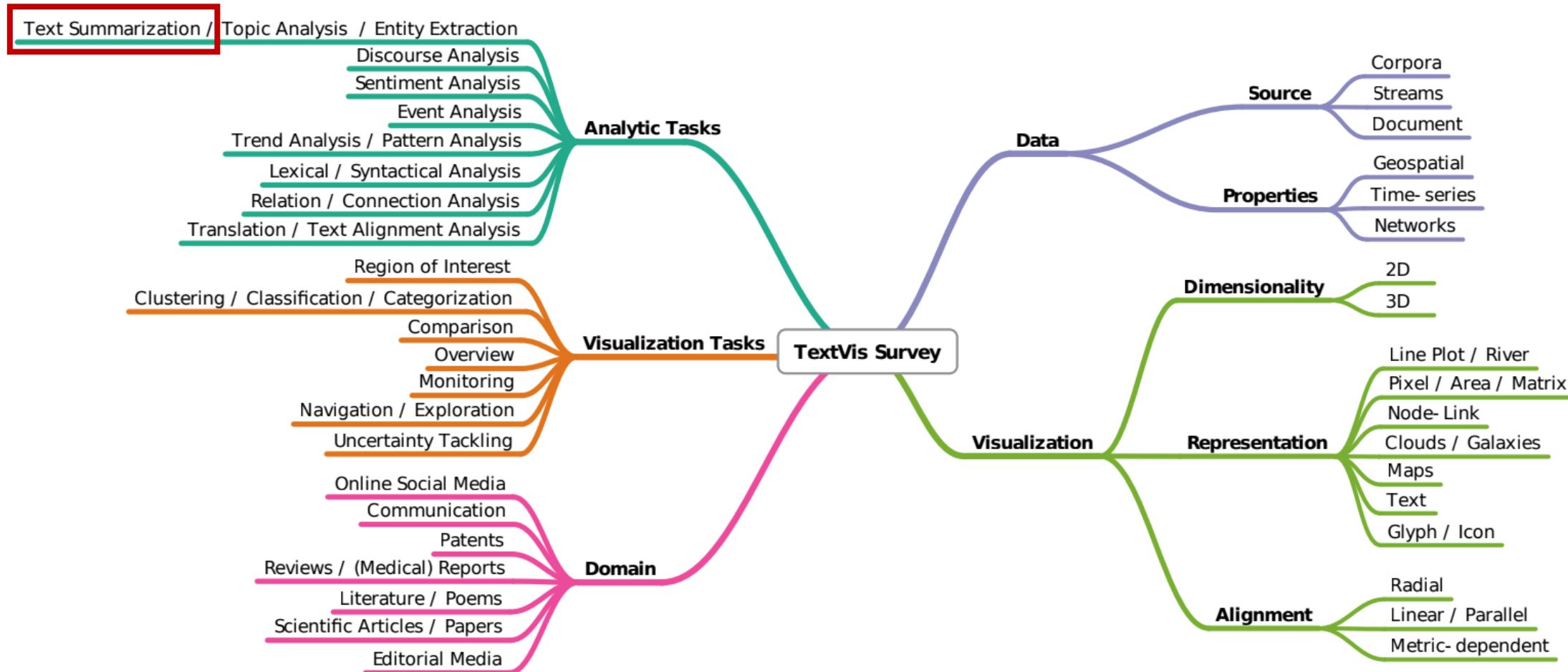


Overview



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

Overview



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

<http://www.wordle.net/>



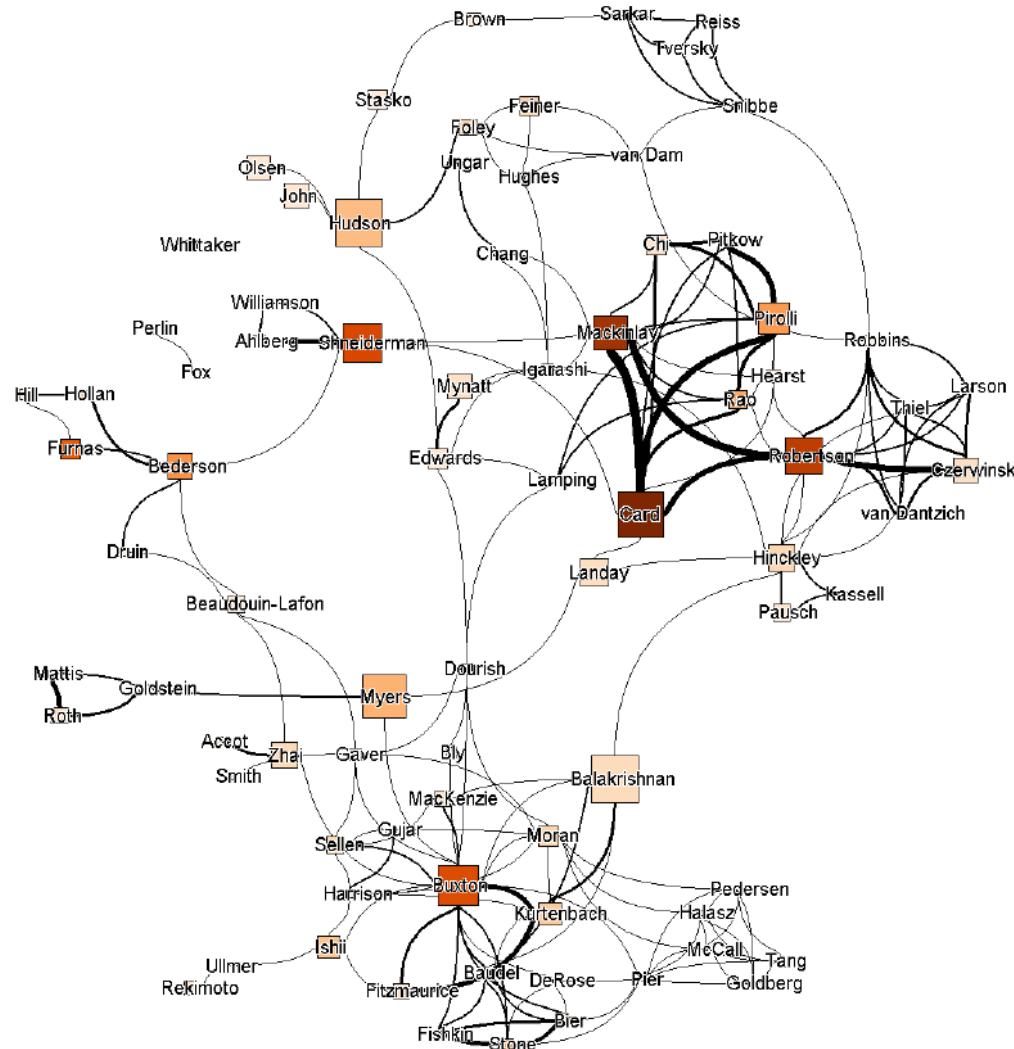
<http://www.edwordle.net/>



EdWordle: Consistency-preserving Word Cloud Editing

Wang, Chu, Bao, Zhu, Deussen, Chen, and Sedlmair - IEEE, 2017

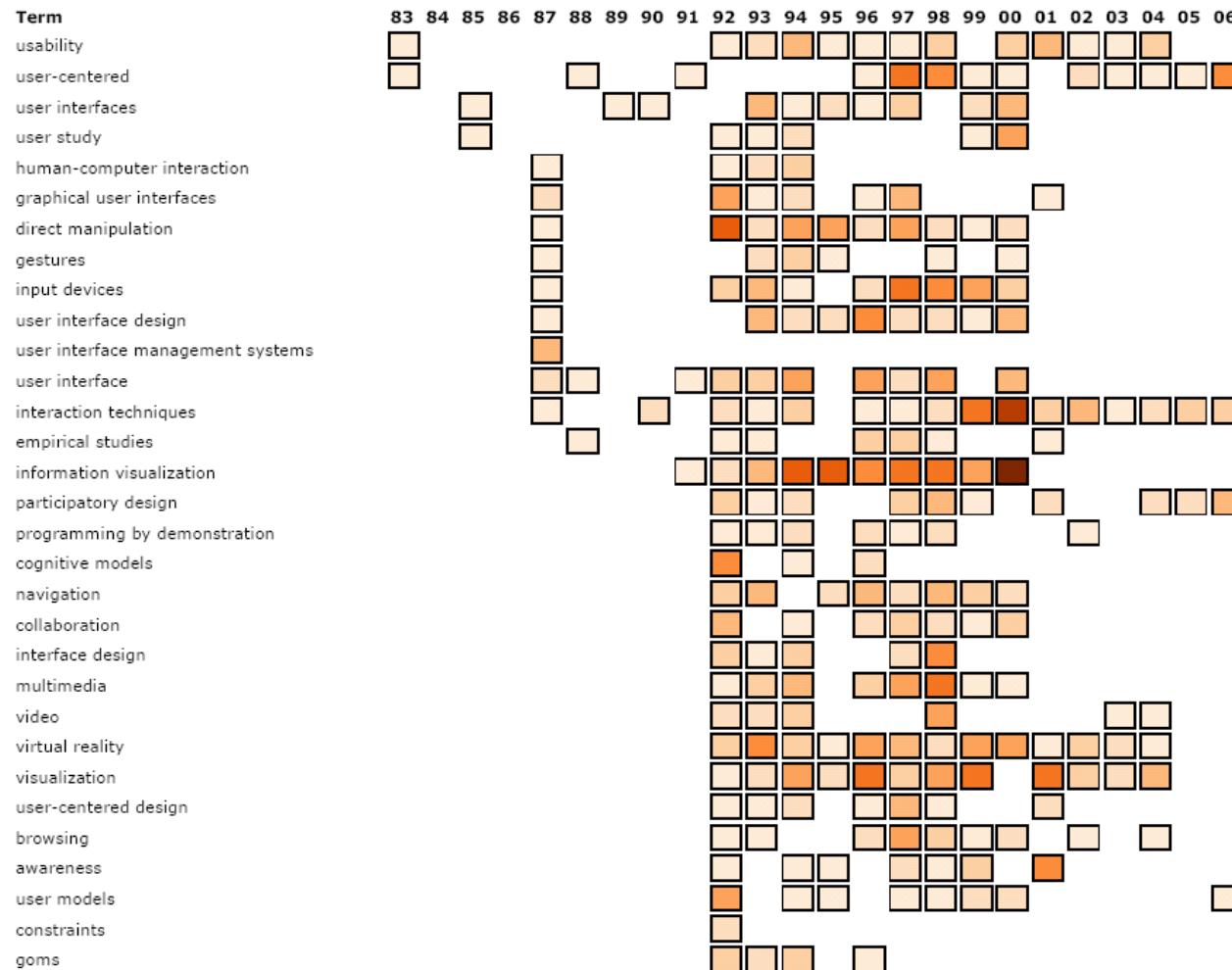
Co-authorship Network



Co-authorship network for HCI-field

- **node:** researcher
- **node size:** number of articles published
- **darkness:** number of citations
- **links:** co-authorship
- **link width:** proportional to number of co-authored papers

Keyword Timeline

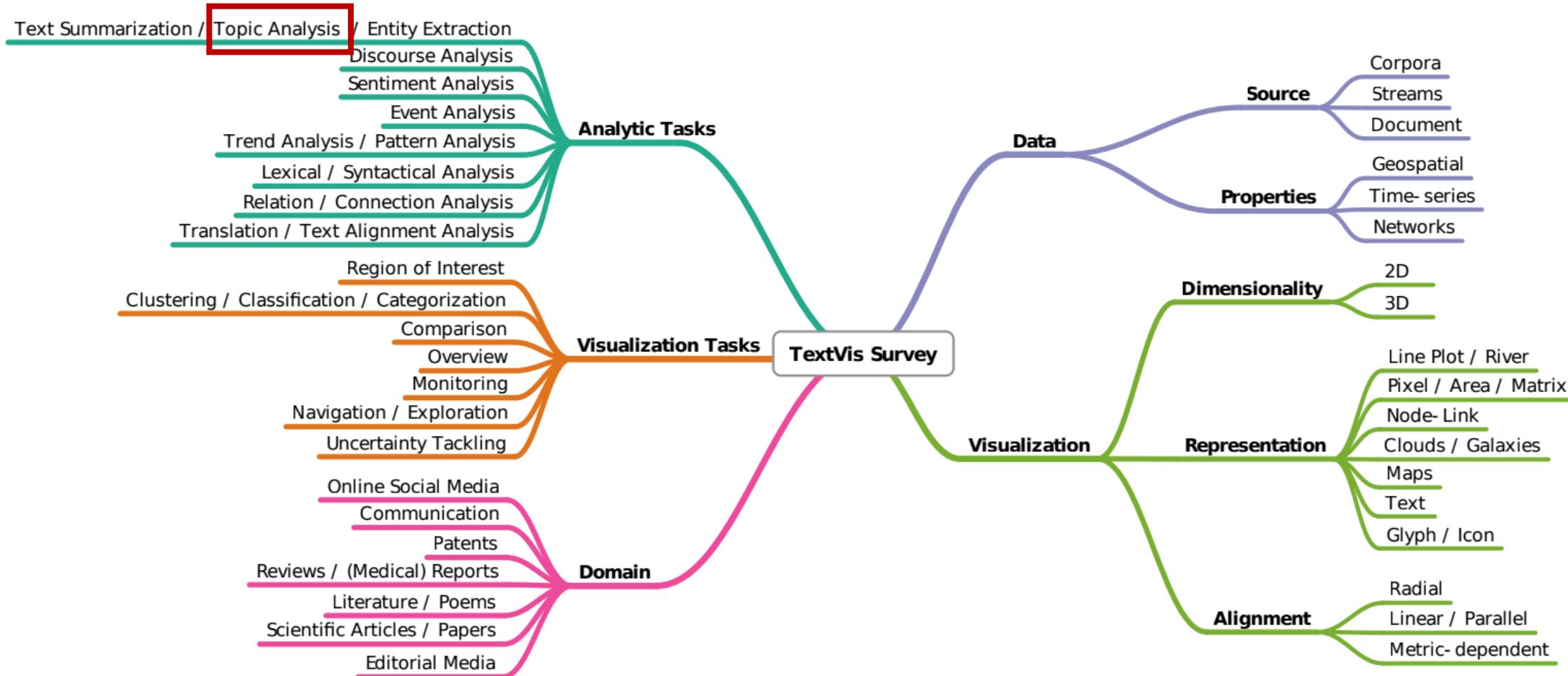


Keyword timeline for four conferences
(CHI, UIST, AVI, InfoVis)

Terms are listed in chronological order of appearance

- darkness: high density

Overview



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

Newsmap

REGISTER LOGIN CUSTOMIZE + SELECT ALL ARGENTINA AUSTRALIA AUSTRIA BRASIL CANADA FRANCE GERMANY INDIA ITALIA MEXICO NETHERLANDS NEW ZEALAND SPAIN UK U.S. search all... ▾

Angela Merkel: Merkel gegen Verdopplung von Euro-Rettungsschirm

"Zum Wachstum verdammt"

Deutscher soll Blackberry retten

TUI: Gekenterter Luxusliner: Zwei weitere Leichen gefunden

Frankreich stellt Völkermord-Leugnung an Armeniern unter Strafe

Ägypten - Die erste Sitzung des Parlamentes nach Mubarak

US-Flugzeugträger kreuzen vor Iran

Gaddafi-Getreue erobern Bani Walid zurück

Keine Spur von Fischern

Außenminister entlassen

Sinkender Gewinn: Siemens spürt kommende Flaute

Euro-Länder öffnen sich für Investoren. Eigentümerfamilie Großkonzern. Schlechte Nachrichten für die Aktionäre am Tag der Hauptversammlung: Der Quartalsgewinn knickt wegen hausgemachter Probleme ein. Aber auch die Zahl der Neuauflagen sinkt. Der Vorzeige-Konzern spürt die Abkühlung der Weltwirtschaft.

Jan 24 16:54 | 29 related articles | Financial Times Deutschland

Waren auf Griechenland-Einigung Sinkender Gewinn Siemens spürt kommende Fläute Schlechte Nachrichten für die Aktionäre am Tag der Hauptversammlung: Der Quartalsgewinn knickt wegen hausgemachter Probleme ein. Aber auch die Zahl der Neuauflagen sinkt. Der Vorzeige-Konzern spürt die Abkühlung der Weltwirtschaft. Seidenberg im Weißen Haus - Obama würdigt Bruins

Trainer Dutt bleibt ein Fremder bei Bayer

Dänen zu stark für B-Team

Guido Westerwelle: EU beschließt «beispiellose» Iran-Sanktionen

Expert: Jeder fünfte Deutsche ist jüdenfeindlich

Ein Bild schreibt die Geschichte weiter

Australian Open : Ein Roger Federer wie zu besten Zeiten

Afrika-Cup: Afrika-Cup: Rohr-Team Gabun siegt zum Auftakt

Eishockey: Seidenberg im Weißen Haus - Obama würdigt Bruins

Extremismus: Politik, Kirche und Verbände gemeinsam gegen Rechts

Wilhelmsburg: Mädchen trinkt Methadon und stirbt

HSV arbeitet Schock in Einzelgesprächen auf

BVB-Star Subotic wird der Vergewaltigung verdächtigt

Werder lässt Wolf in Richtung Monaco ziehen

Gestrandete Grindwale: 39 Wale finden den Weg zurück ins offene Meer

VW Up Fünftürer-Preis

Nach Megupload auch Filesonic aus dem Hessen - der Anfang vom Ende für...

"Gottschalk Live"-Premiere Gleich geht's weiter!

H5N1: Grippeforschung: Wissenschaftler stoppen Experimente mit Supervirus

Rüpel Pepe kommt nach Messi-Tritt glimpflich davon

Kaiserslauterns Dorge Kouemaha erleidet Adduktoren-Verletzung

Breite Unterstützung für Kämpfer Neuer

Lionel Messi: Brutal-Tritt: Pepe kommt mit Verwarnung davon

Handball EM Mazedonien feiert Sieg gegen Polen

Kim Clijsters schlägt Caroline Wozniacki

Dschungelcamp XI: Die Welt ist zwei Kugeln

Tic, Tac, weg - Jazzy ist raus aus dem Dschungelcamp

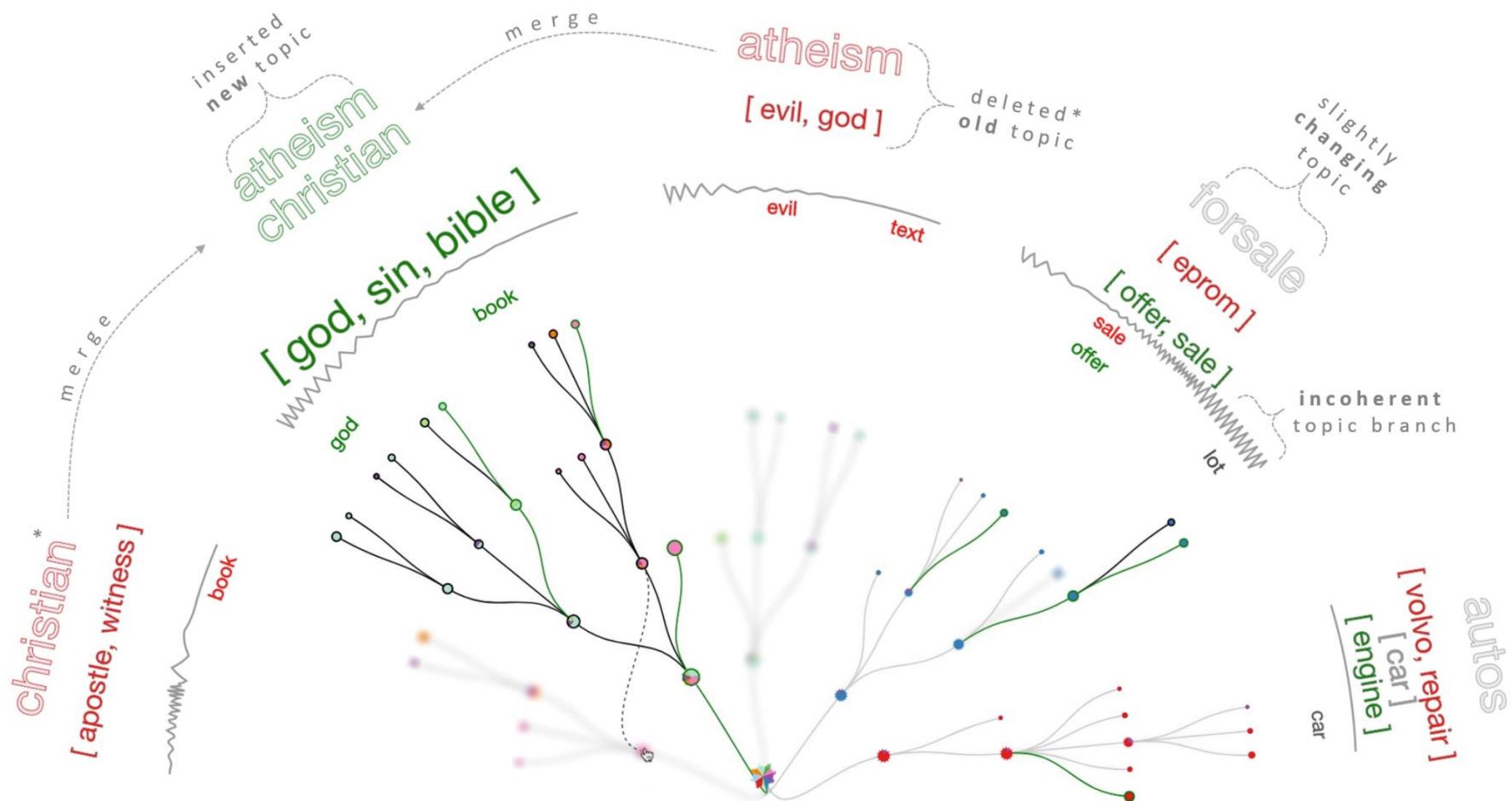
300 Schutzzüge: Dschungelcamp feiert Friedrich den Großen

SELECT ALL WORLD NATIONAL BUSINESS TECHNOLOGY SPORTS ENTERTAINMENT HEALTH

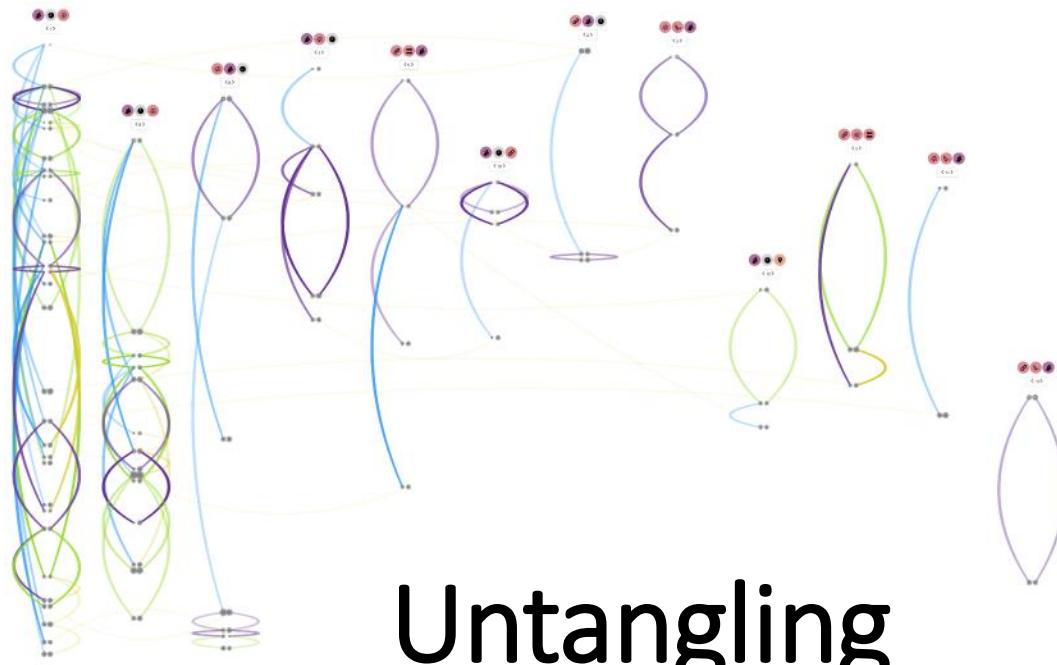
LESS THAN 10 MIN. AGO MORE THAN 10 MIN. AGO MORE THAN 1 HOUR AGO

newsmap
Tue January 24, 2012 9:25:26
powered by Google™ hosting by heimli

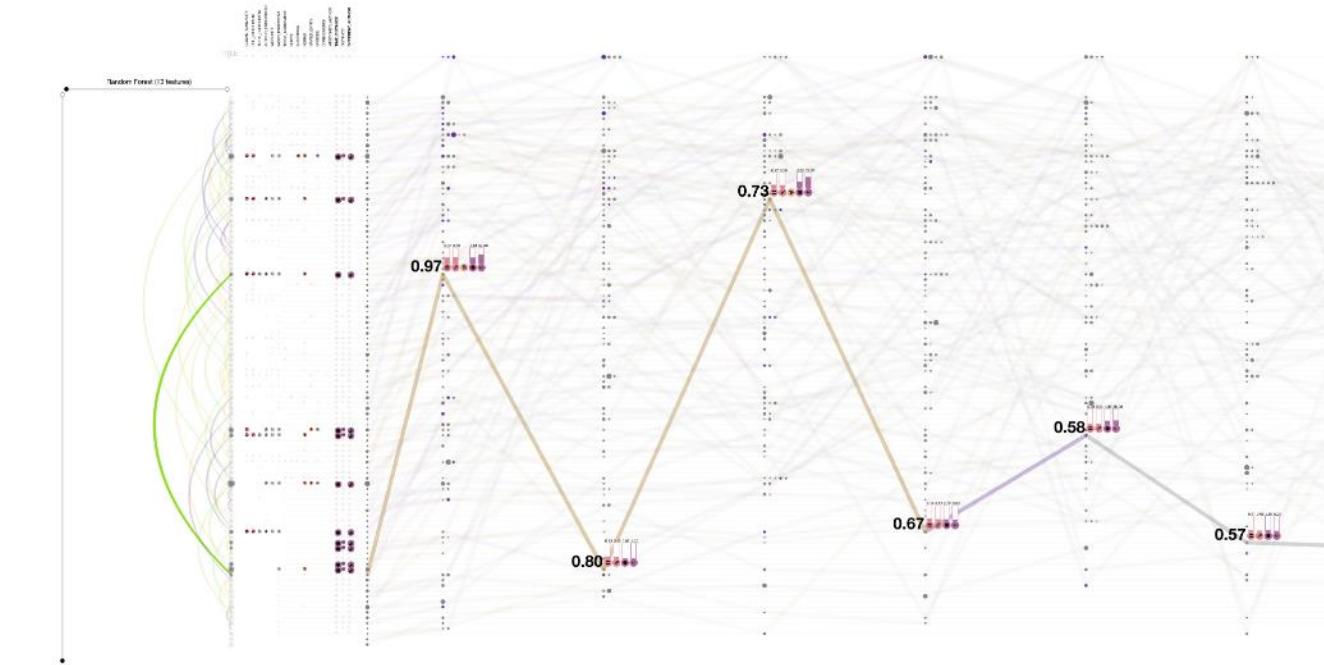
Speculative Execution

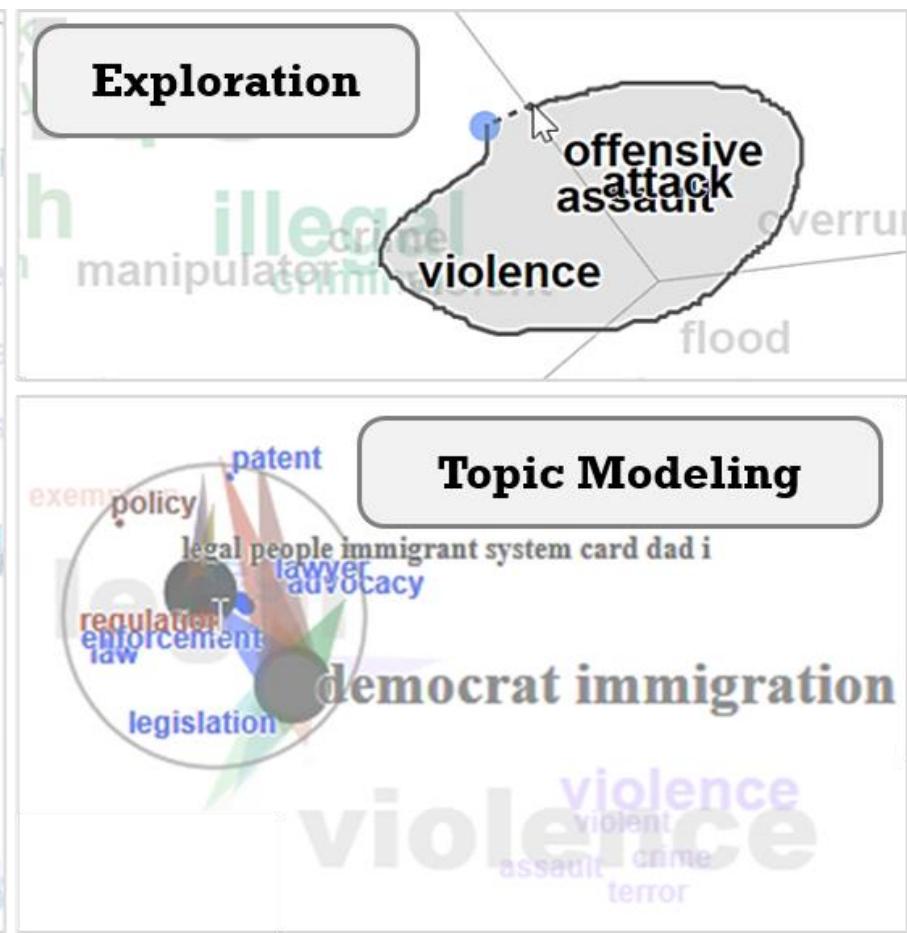
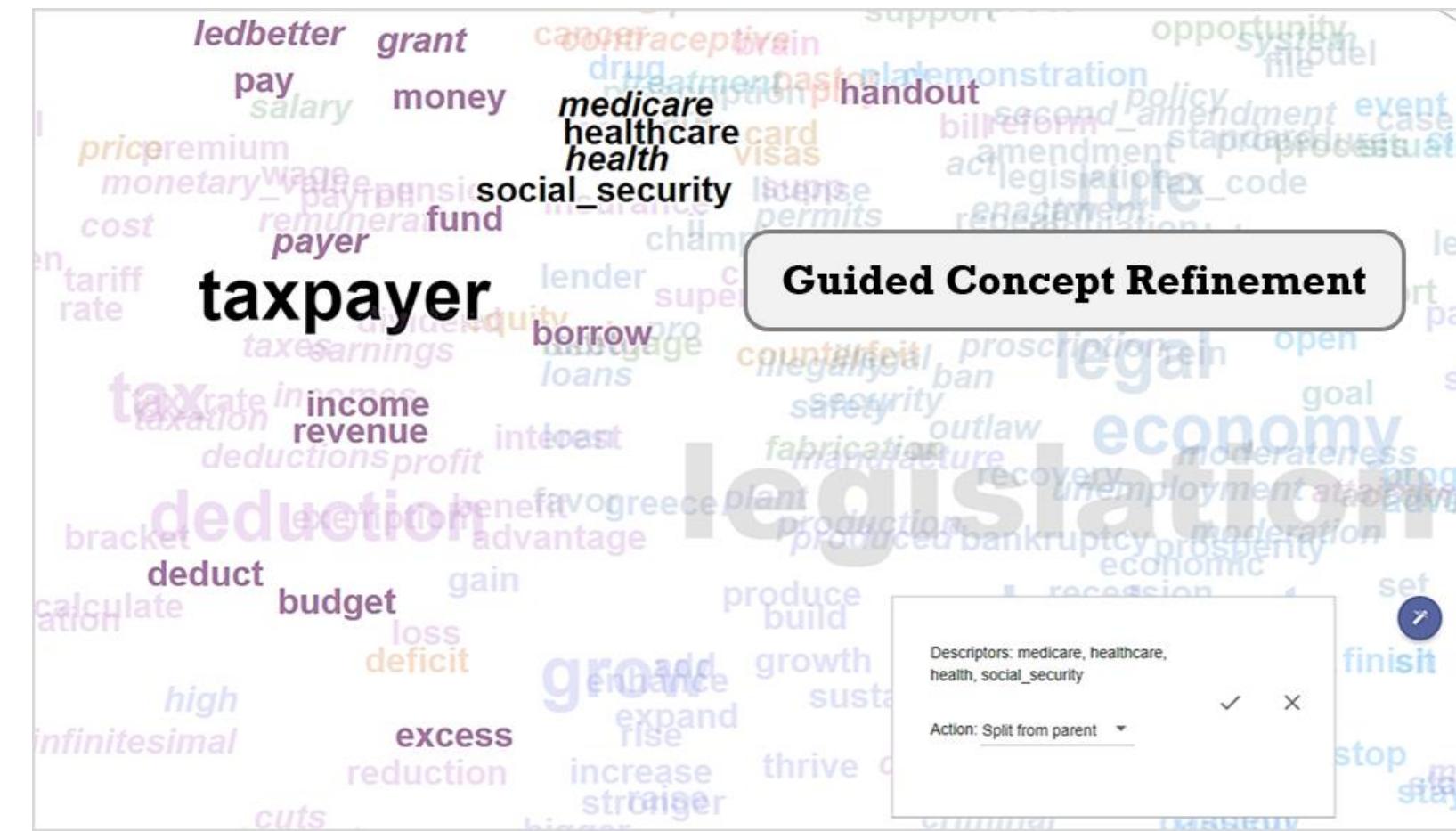


Machine Decision Making



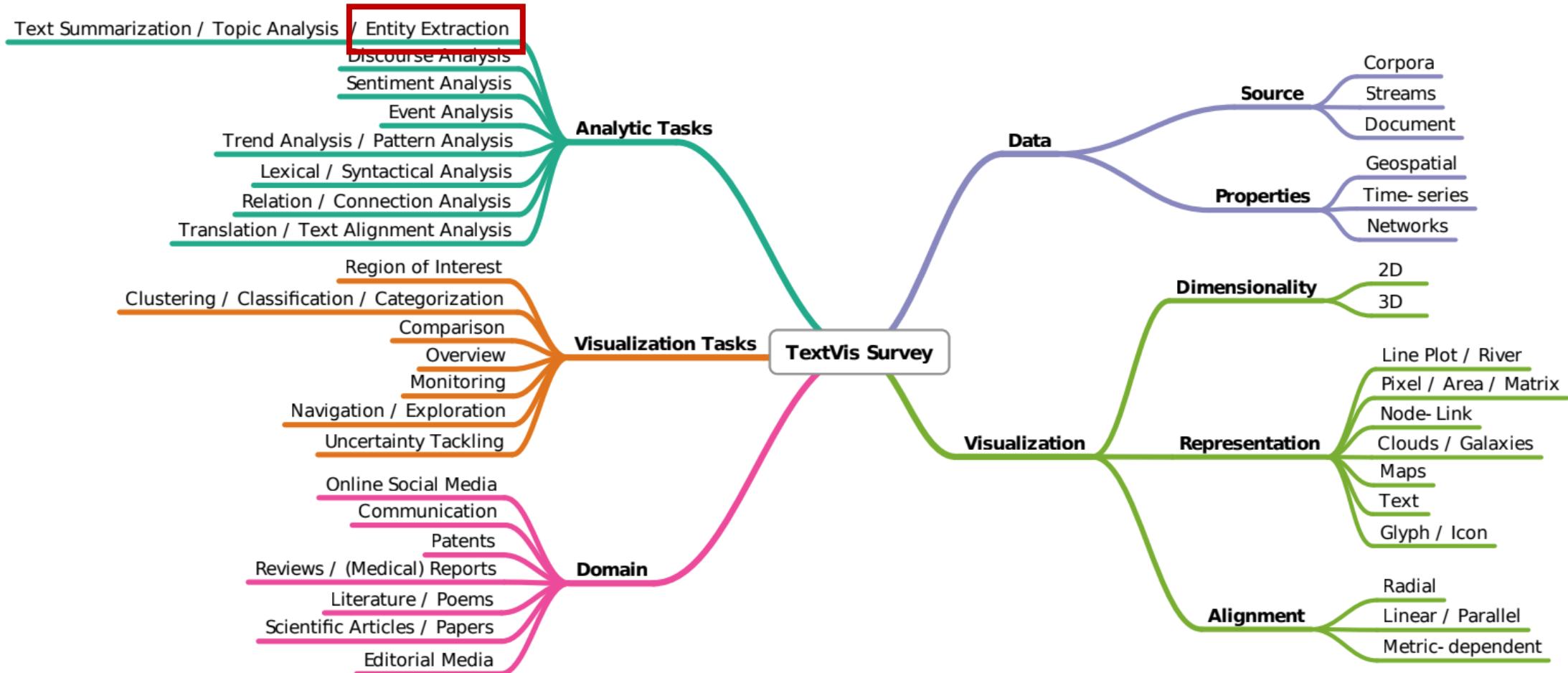
Untangling Threaded Conversations





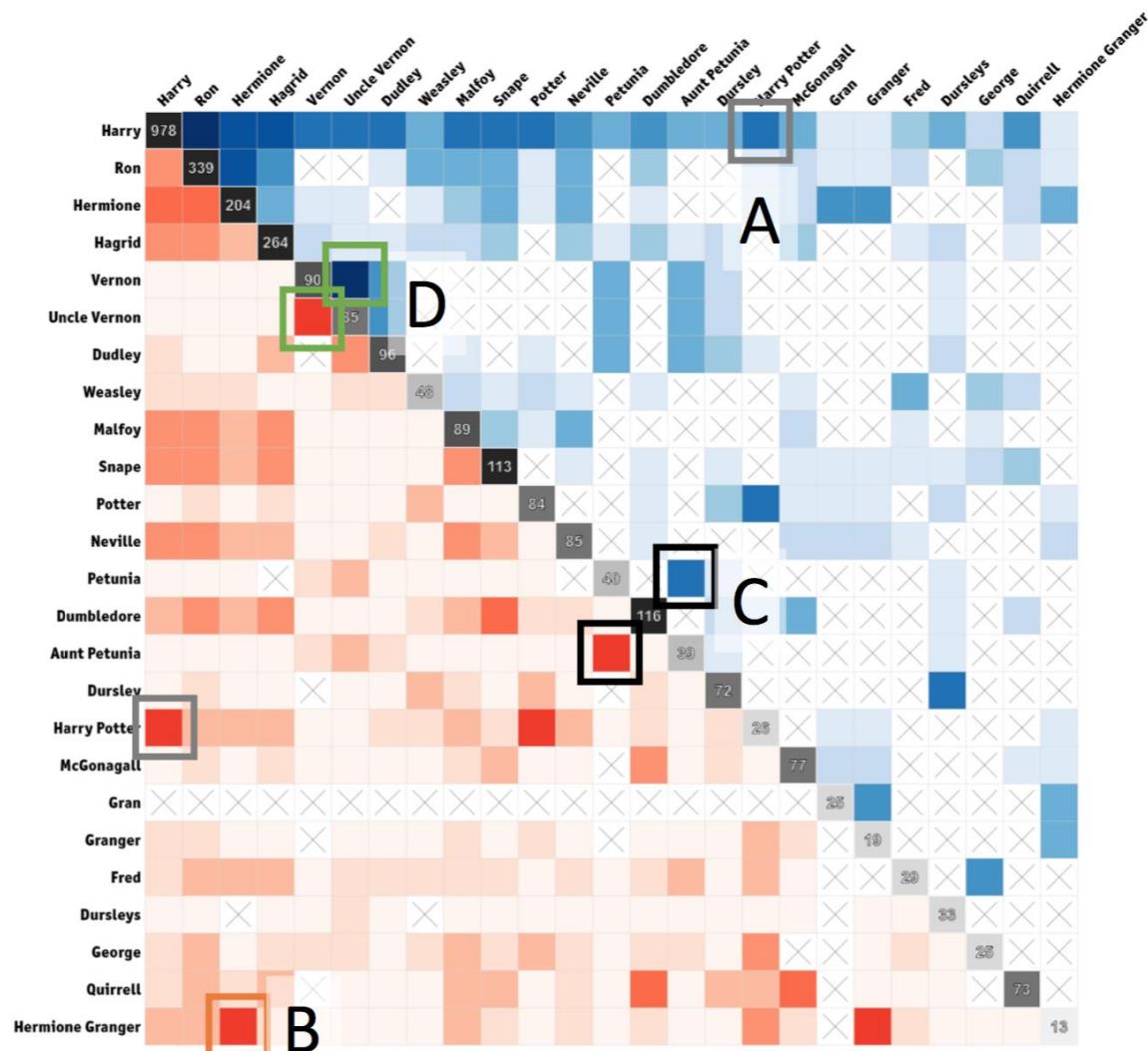
Machine Teaching

Overview



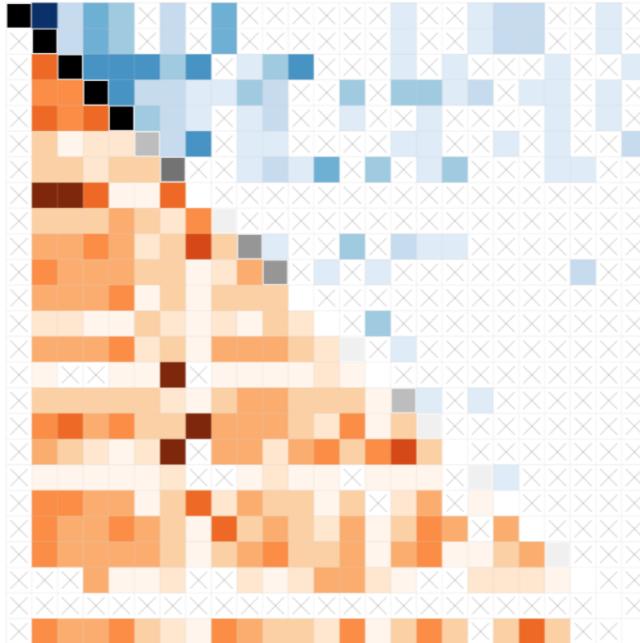
<http://textvis.lnu.se/>

Interactive Ambiguity Resolution of Named Entities in Fictional Literature

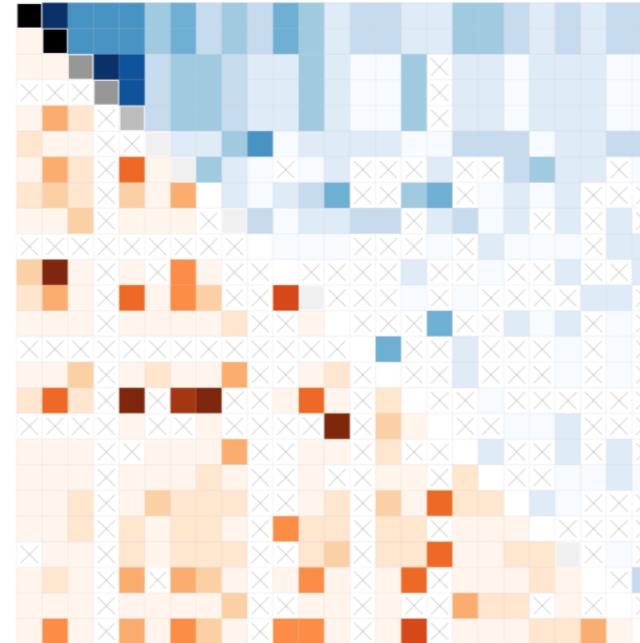


<https://dl.acm.org/citation.cfm?id=3128397.3128415>

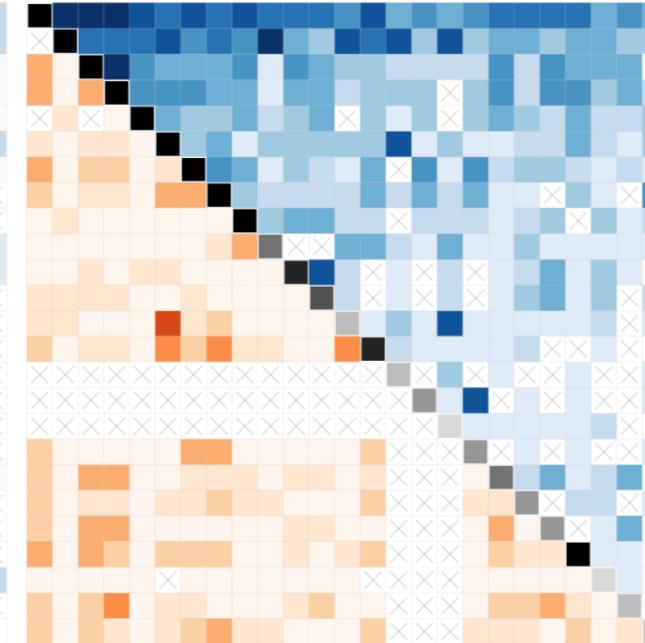
Entity Visualization



(d) Stephen King: The
Shining

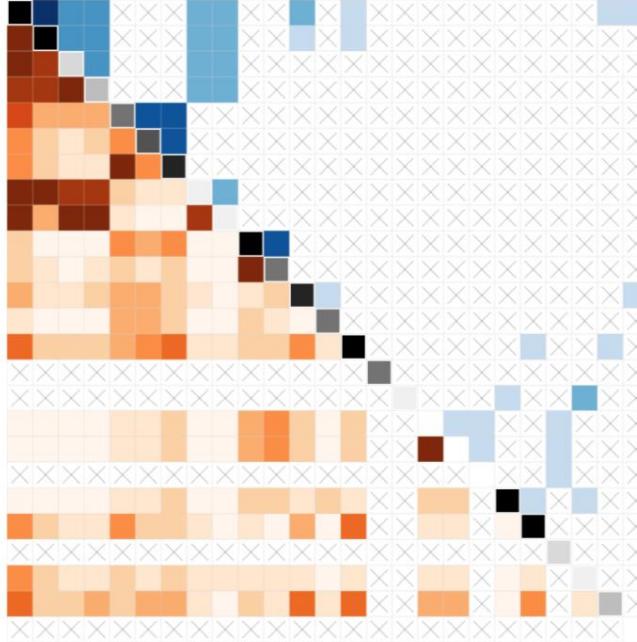


(e) Dan Brown: Angels
and Daemons

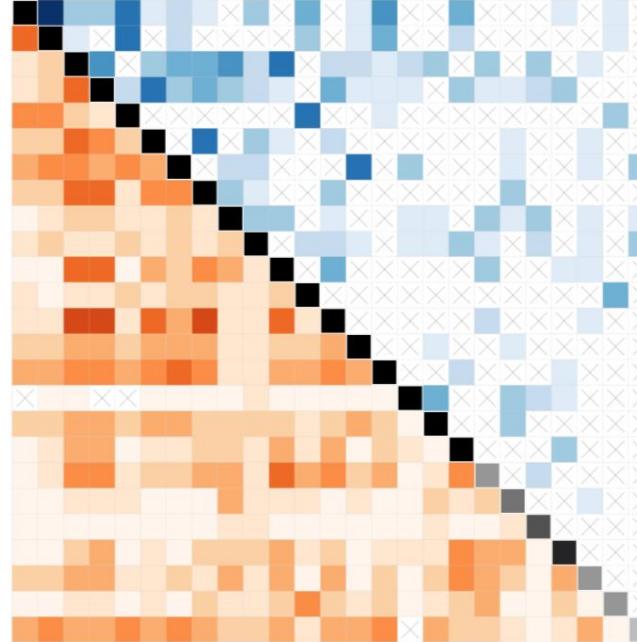


(f) J. K. Rowling: Harry
Potter and the Order of
the Phoenix

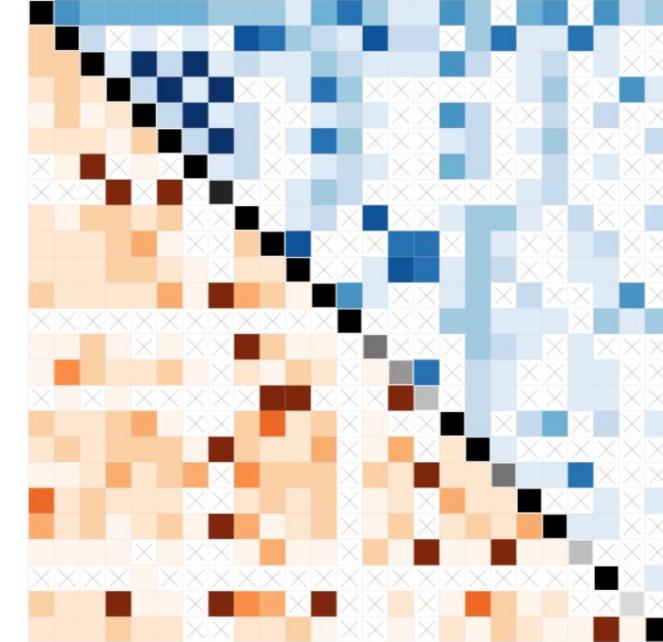
Entity Visualization



(a) Edgar Allan Poe: Tales of the Grotesque and Arabesque

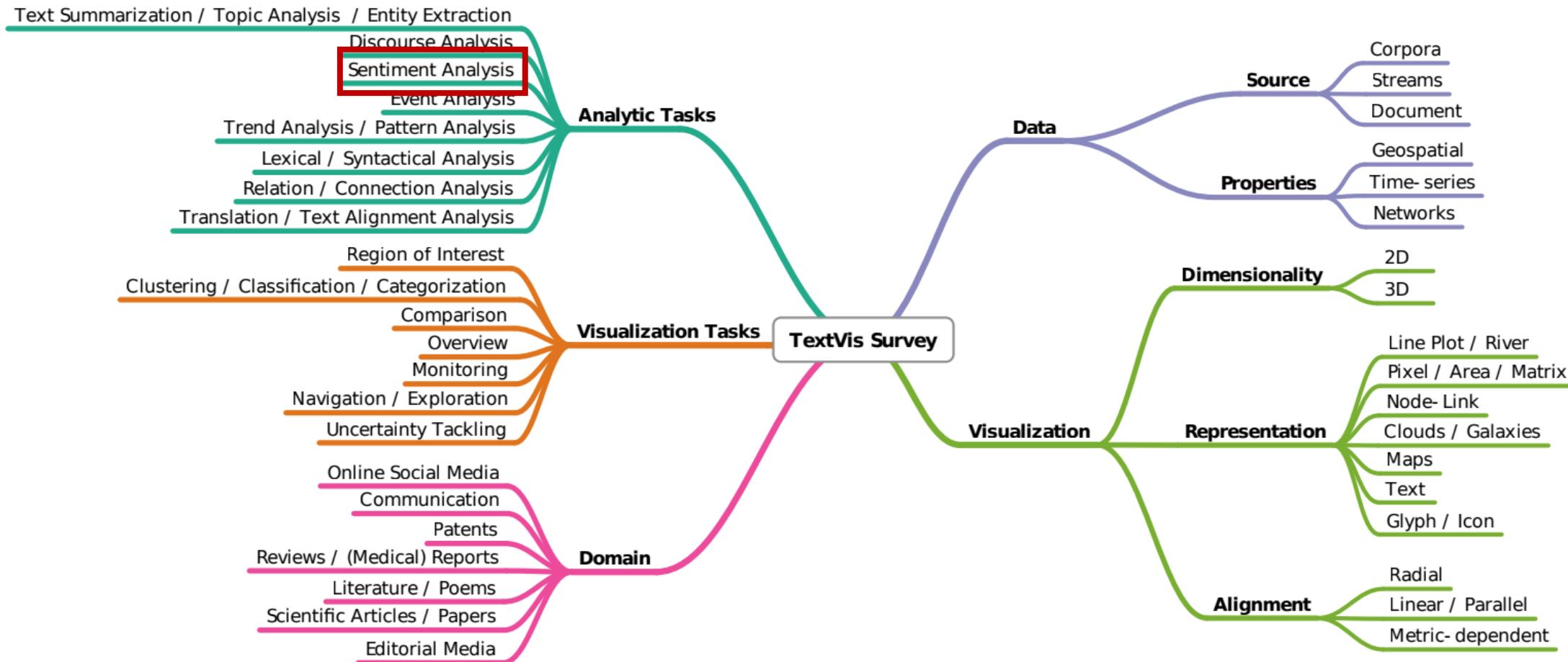


(b) J. R. R. Tolkien: The Two Towers



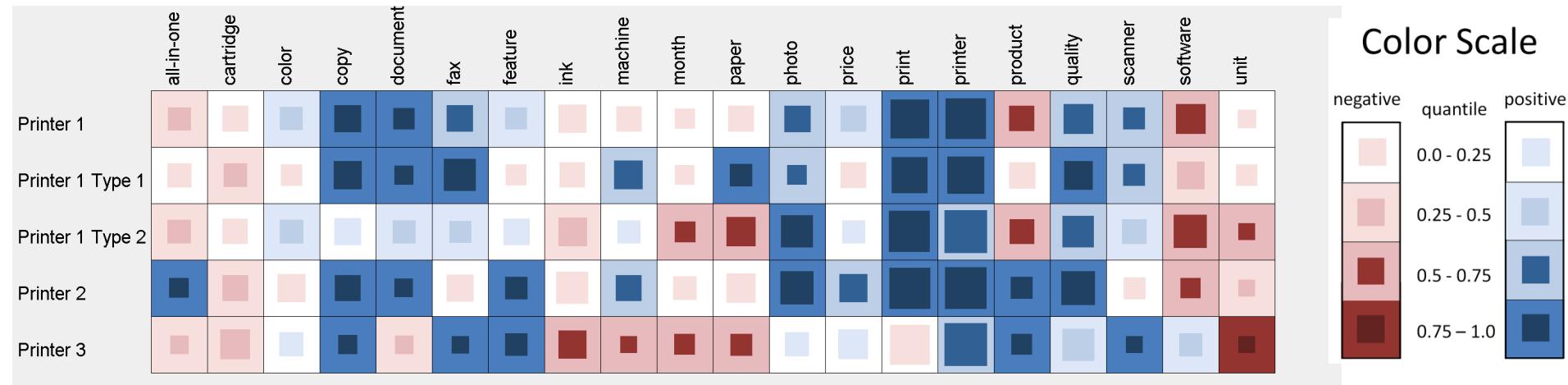
(c) Agatha Christie: A Caribbean Mystery

Overview



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

Review Analysis



Summary Report of printers

- **size inner rectangle:** amount of customers that commented on the attribute
- **blue color:** positive opinions
- **red color:** negative opinions
- **brightness of color:** degree of positiveness / negativeness of comments

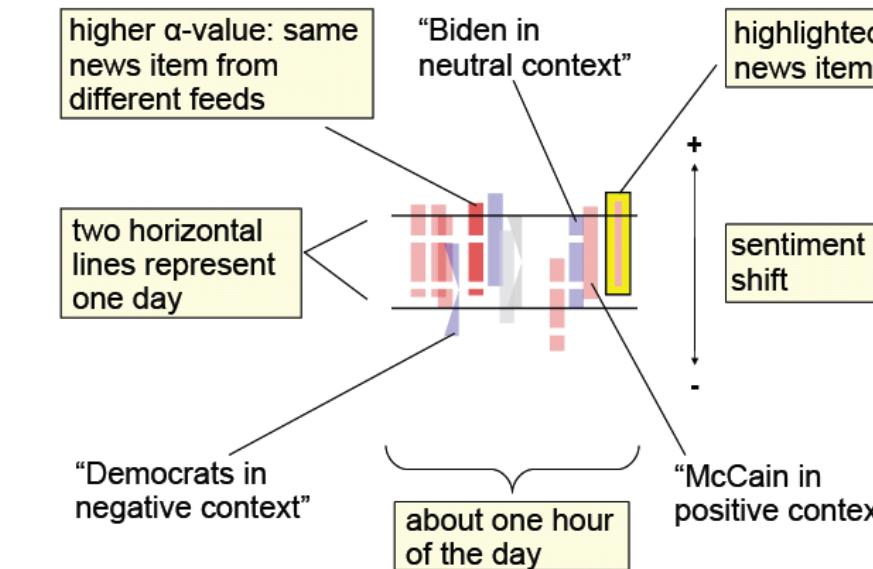
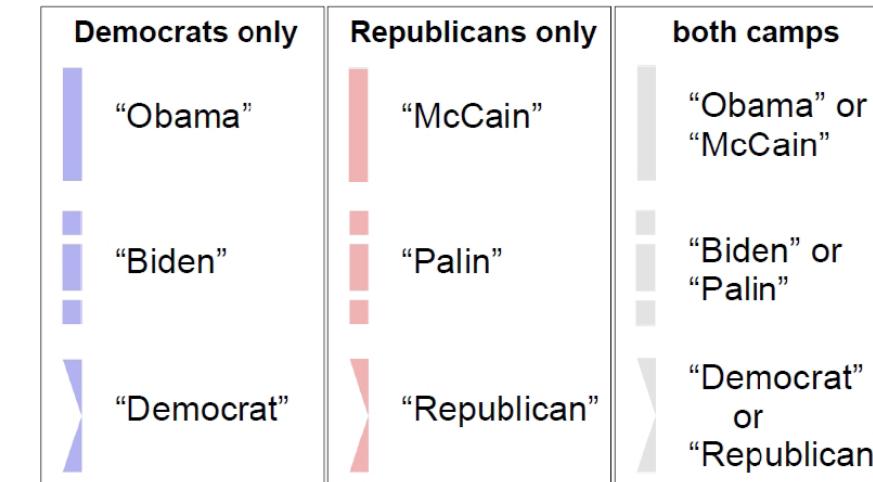
Visual Opinion Analysis of Customer Feedback Data

Oelke, Hao, Rohrdantz, Keim, Dayal, Haug, Janetzko – IEEE Xplore, 2009

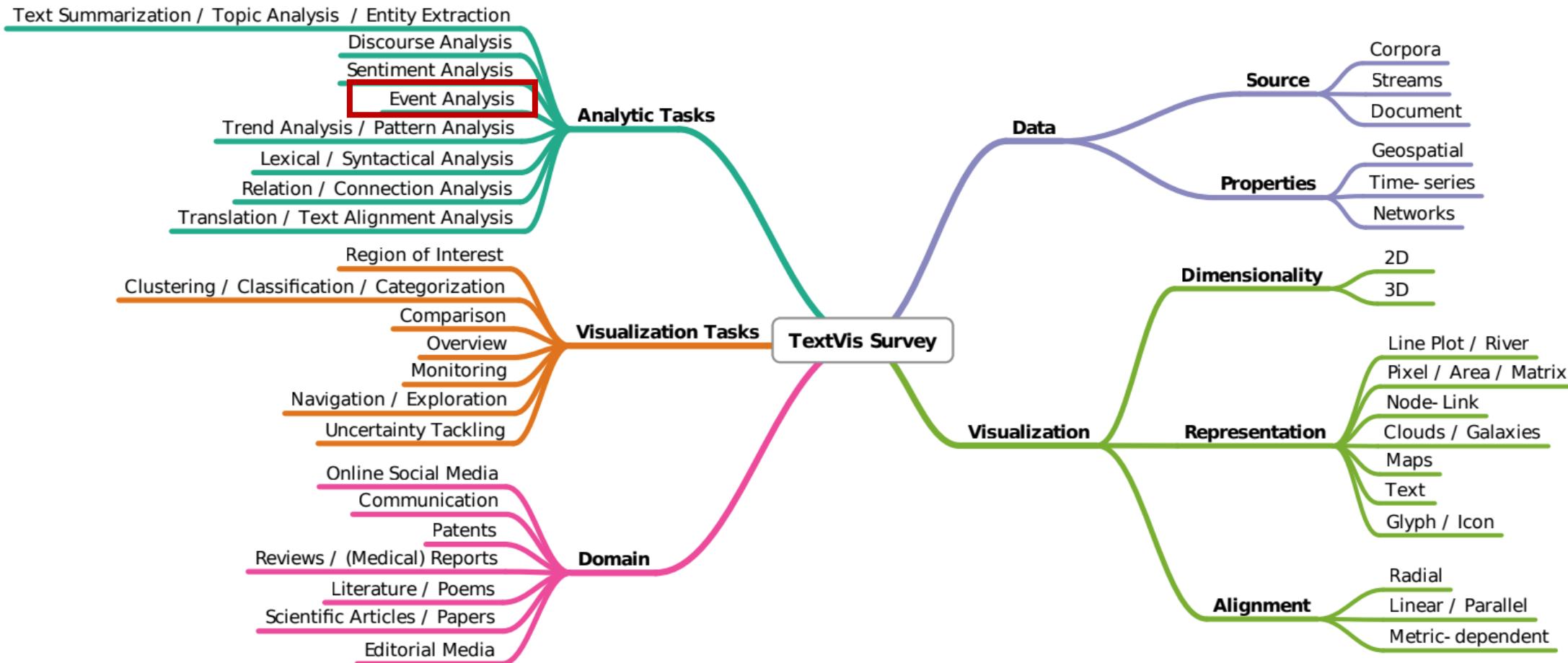
Temporal Variation



31 days of the 2008 US presidential election showing a scandal of power abuse by Palin (A), the TV debate McCain vs. Obama (B), assassination plans against Obama (C), the election day (D), and a debate about Palin's election wardrobe (E)



Overview



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

Event Detection

BETWEEN STATED TIMES PERSONS UNKNOWN
DISABLED ROLLER SHUTTERS TO PREMISES
OPENING SAME THEN SMASHED GLASS PANEL
IN DOOR BY KICKING PREMISES ENTERED AND
ENTRY TO SECURE TOBACCO/LIQUOR KIOSK
GAINED BY FORCING STEEL SHUTTERS ENTRY
TO INSECURE OFFICE ALSO GAINED PROPERTY
LISTED STOLEN EXIT AS ENTRY

Concepts

ACTION* ACTION*
BUILDING_PART
ACTION MATERIAL
METHOD_OF_ENTRY
MATERIAL

Sequential Pattern Mining

Concept Patterns

SMASH GLASS

ENTRY INSERT

EXIT ENTRY

DOOR

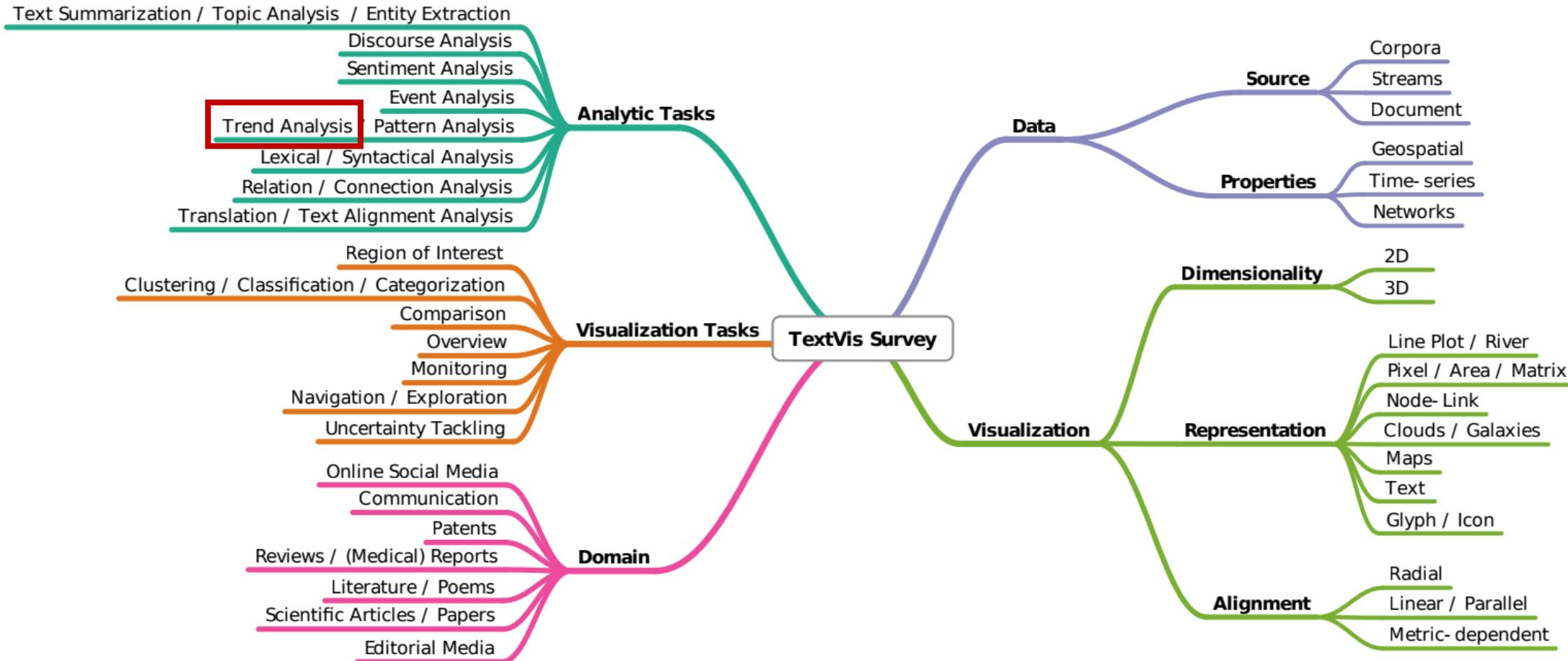
SMASH GLASS
ENTRY INSECURE OFFICE
EXIT ENTRY
DOOR

Comparative Case Analysis

CCA table
crime reports

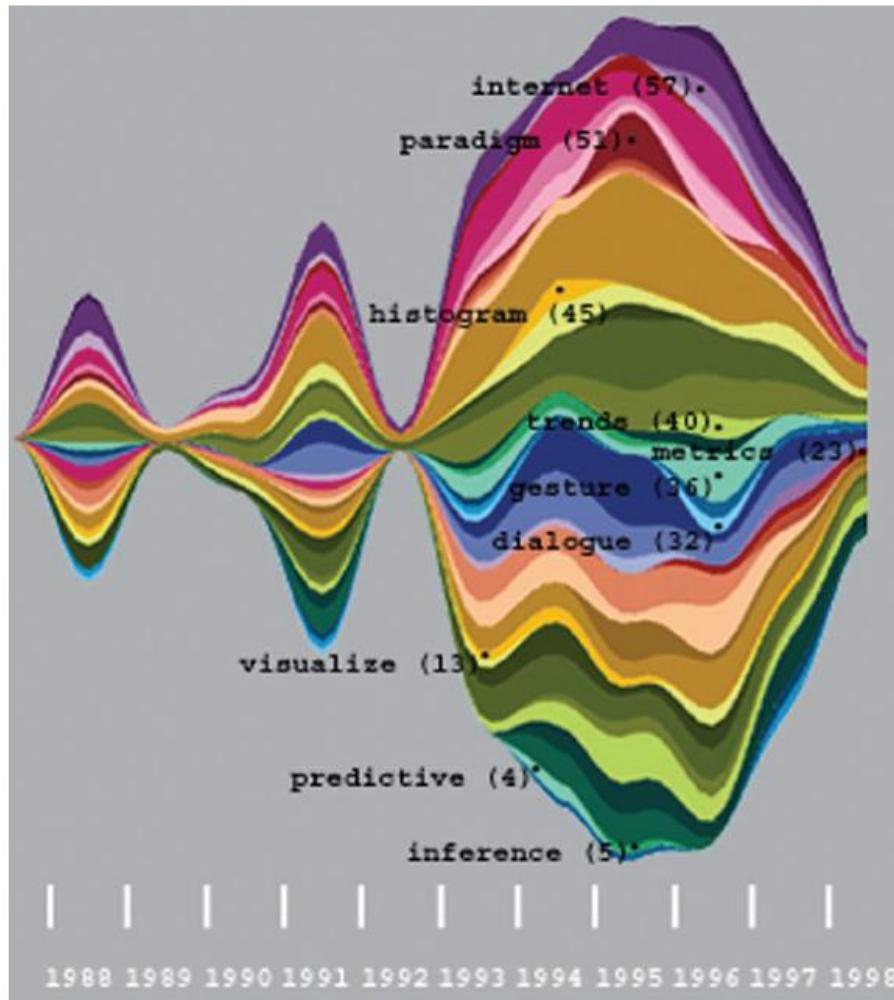
A 10x10 grid with colored cells. The first column is light blue. The second column has a pattern of light blue, dark purple, white, and dark purple. The remaining columns are white.

Overview



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

ThemeRiver

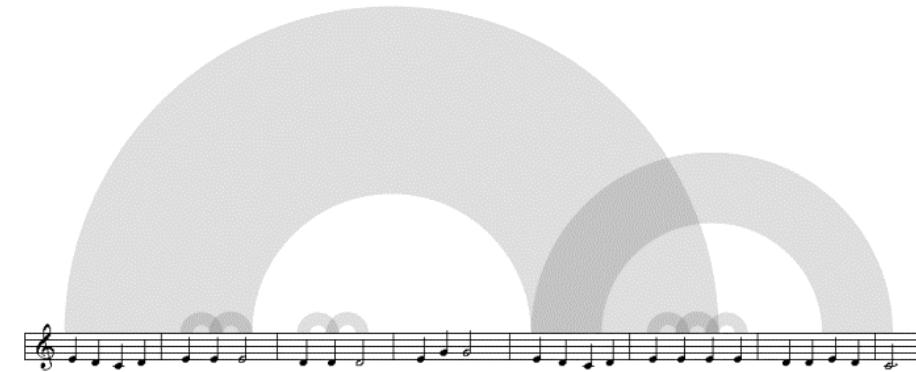


Data: Collection of patents from one company

ThemeRiver depicts **thematic variations over time** within a large collection of documents

- directed flow from left to right: movement through time
- horizontal distance between two points: time interval
- total vertical distance: collective strength of the selected themes
- colored currents: individual themes

Arc Diagrams



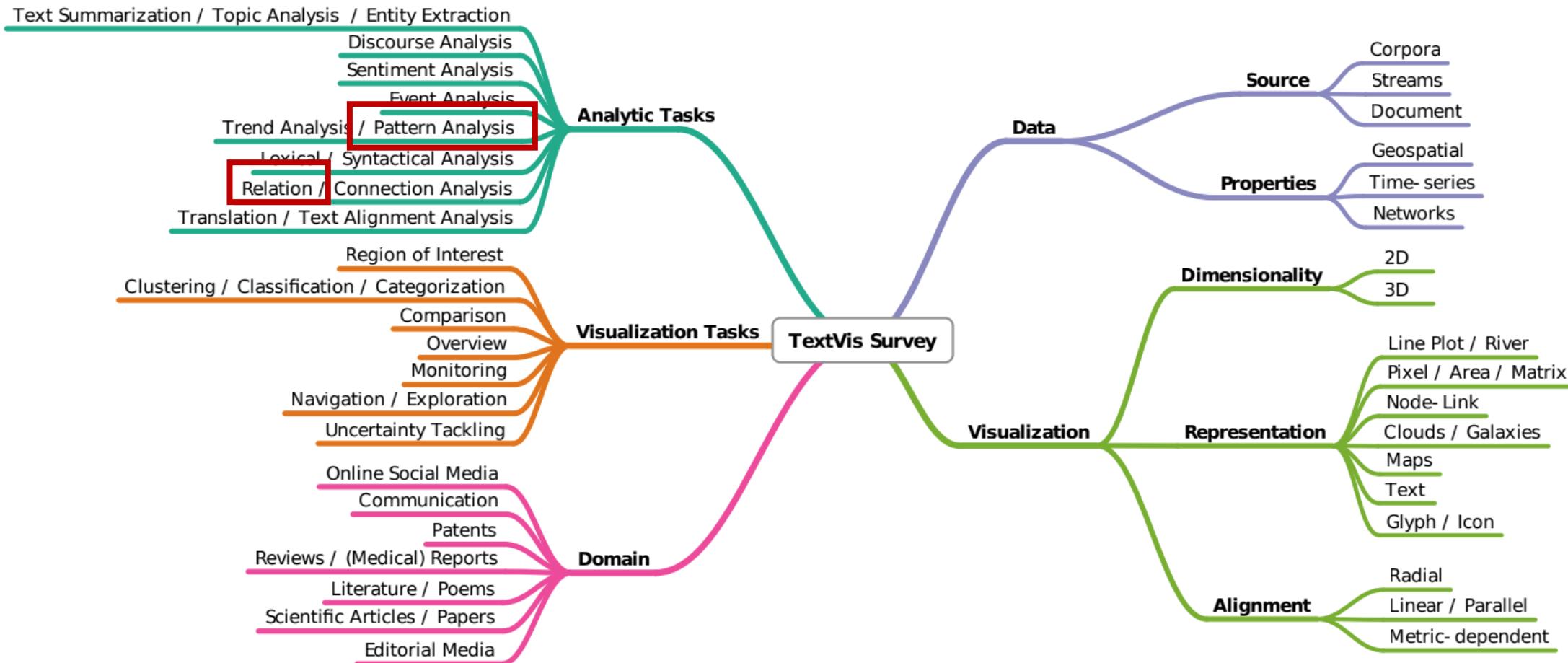
Focus on displaying **repetition** in a document

- **thickness of line:** length of subsequence
- **height:** distance between phrases

Also used for music visualization

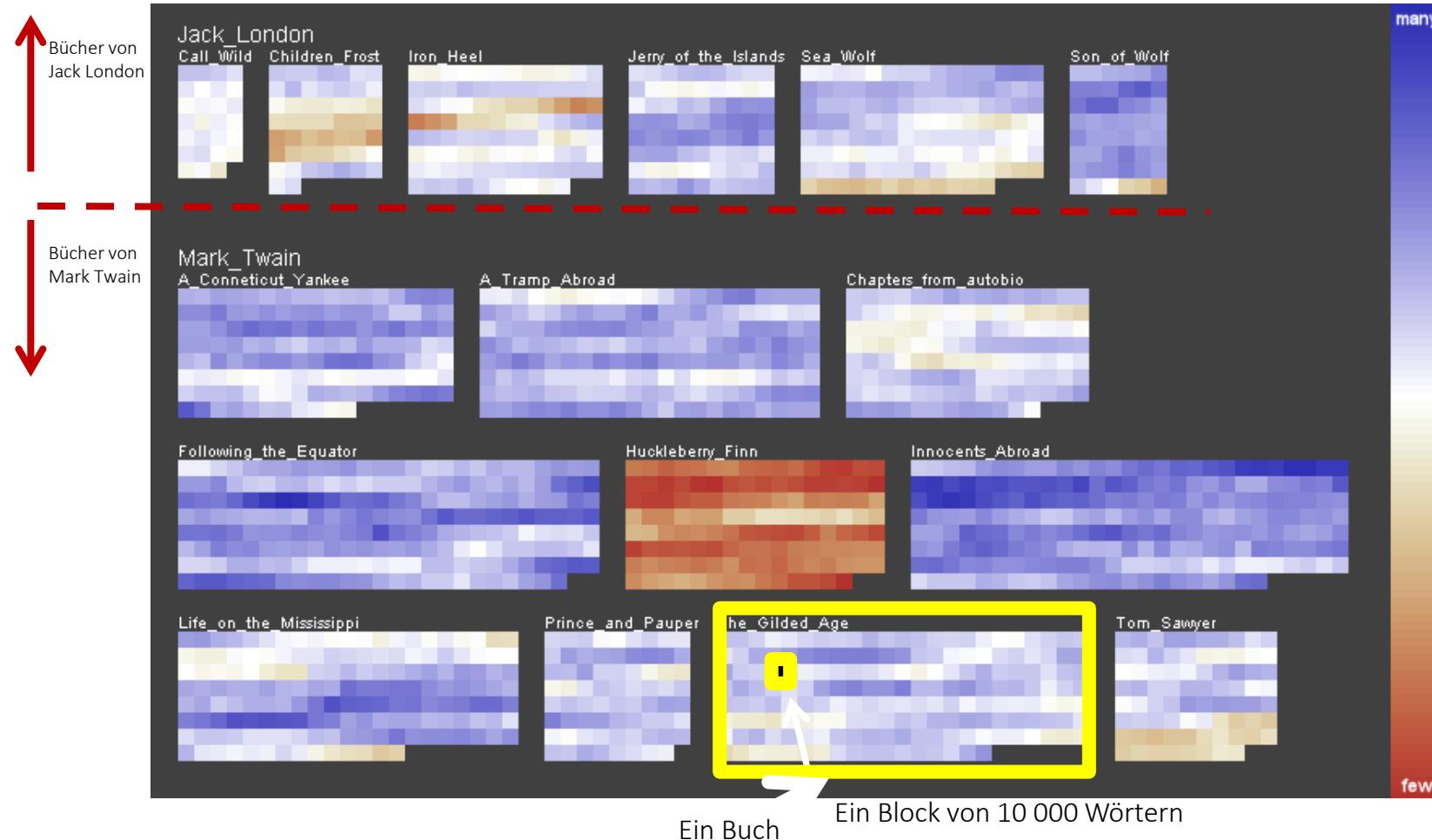


Overview

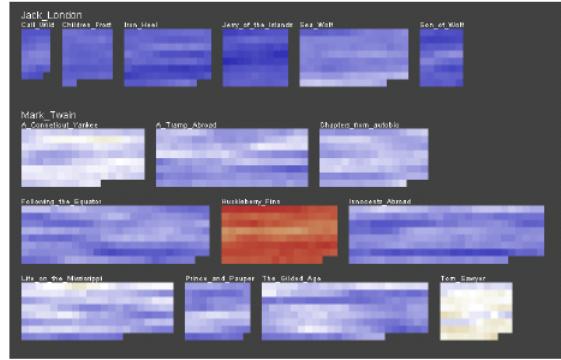


<http://textvis.lnu.se/>

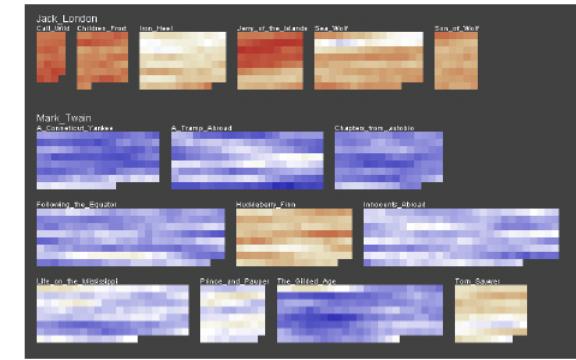
Literature Fingerprints



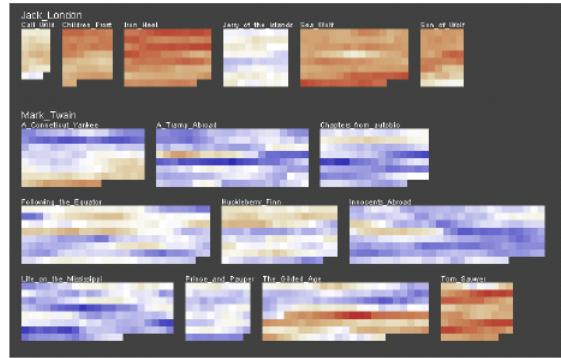
Literature Fingerprints



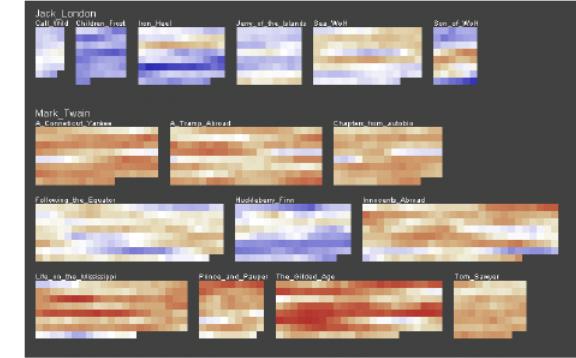
(a) Function words (First Dimension after PCA)



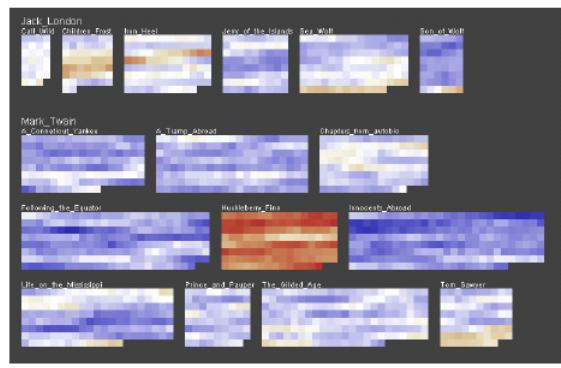
(b) Function words (Second Dimension after PCA)



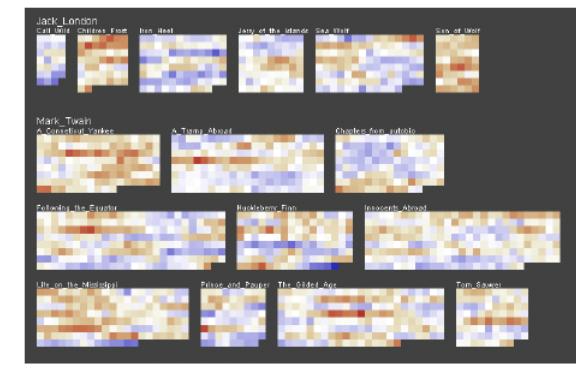
(c) Average sentence length



(d) Simpson's Index



(e) Hapax Legomena

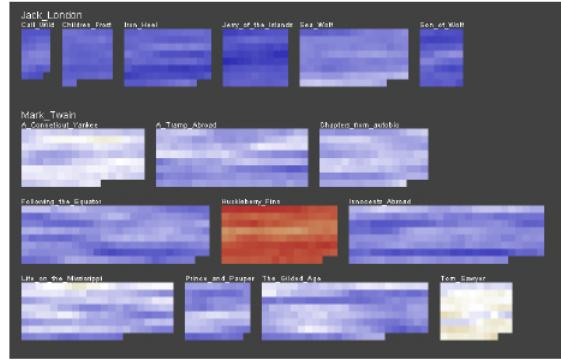


(f) Hapax Dislegomena

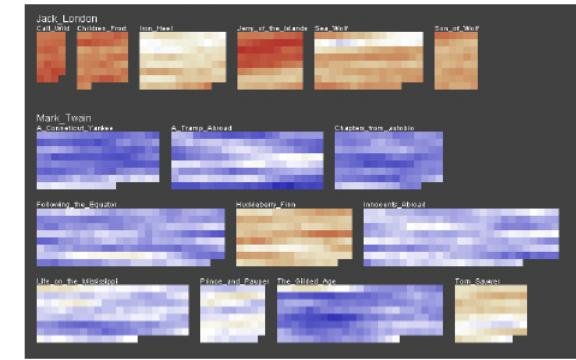
Different measures for authorship attribution are tested on books of Mark Twain (last three rows) and Jack London (first row).

If a feature is able to discriminate between the two authors the books in the first row visually set apart from the rest of the books.

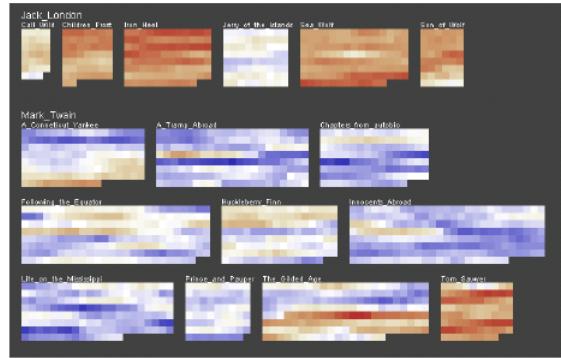
Literature Fingerprints



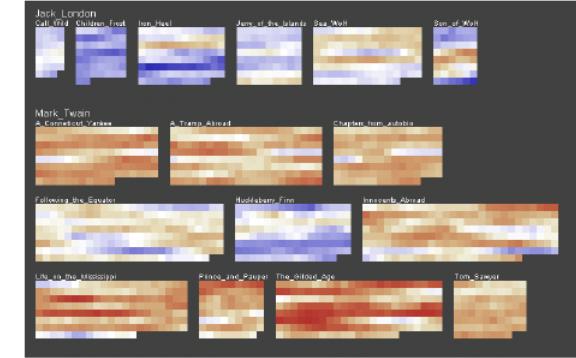
(a) Function words (First Dimension after PCA)



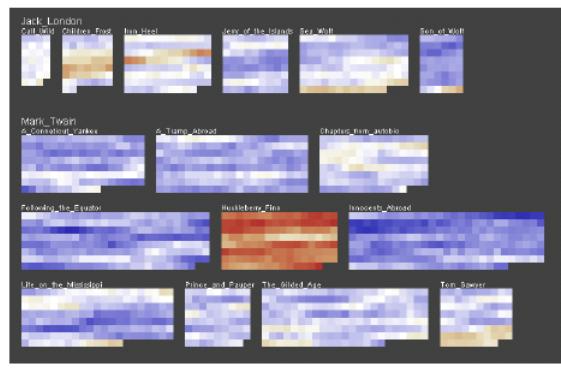
(b) Function words (Second Dimension after PCA)



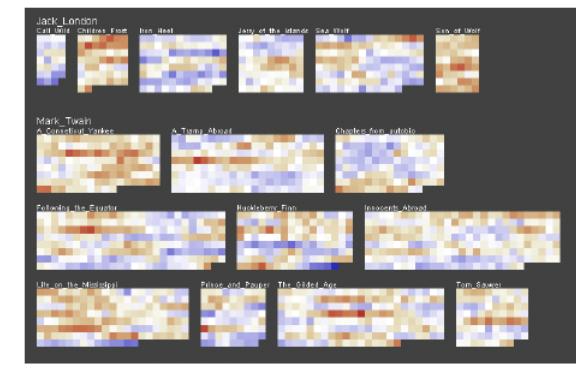
(c) Average sentence length



(d) Simpson's Index



(e) Hapax Legomena



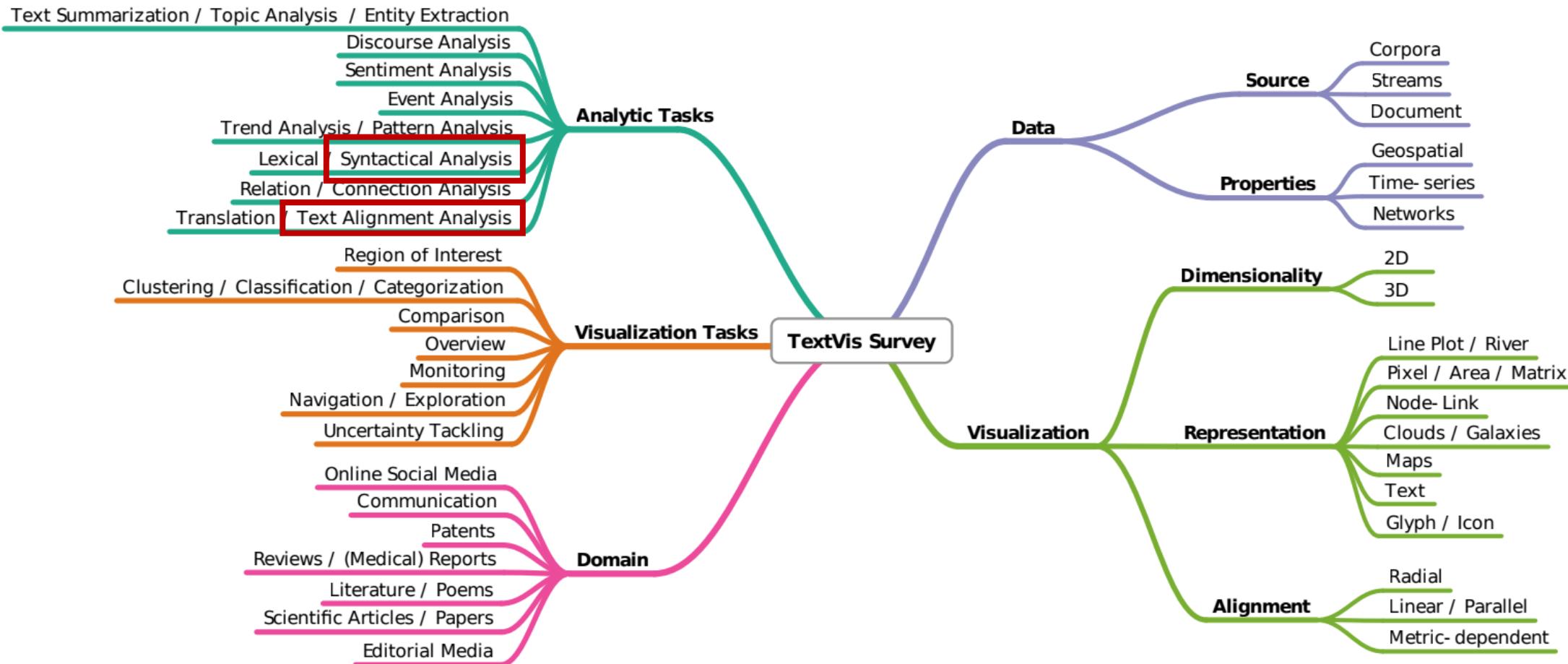
(f) Hapax Dislegomena

Different measures for authorship attribution are tested on books of Mark Twain (last three rows) and Jack London (first row).

If a feature is able to discriminate between the two authors the books in the first row visually set apart from the rest of the books.

Overview

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



```
if (skip)
{
    fprintf(prn_stream, "\033J%c, skip);

/* Copy the scan lines */
lcnt = gdev_rpn_copy_scan_lines(pdev, in,
if (lcnt < 8 * in_y_mult)
{ /* Pad with lines of zeros */
    memset(in + lcnt*line_size, 0,
           in_size - lcnt * line_size);
}

if (y_9pin_high)
{ /* Shuffle the scan lines */
byte *p;
int i;
static const char index[] =
{ 0, 8, 16, 1, 9, 17,
  2, 10, 18, 3, 11, 19,
  4, 12, 20, 5, 13, 31,
  6, 14, 22, 7, 15, 23
};

for(i = 0; i < 24; i++)

```

```
    if (p[0] >= 0x40)
        p[0] = 0x40;

    if (p[1] >= 0x40)
        p[1] = 0x40;

    if (p[2] >= 0x40)
        p[2] = 0x40;

    if (p[3] >= 0x40)
        p[3] = 0x40;

    if (p[4] >= 0x40)
        p[4] = 0x40;

    if (p[5] >= 0x40)
        p[5] = 0x40;

    if (p[6] >= 0x40)
        p[6] = 0x40;

    if (p[7] >= 0x40)
        p[7] = 0x40;

    if (p[8] >= 0x40)
        p[8] = 0x40;

    if (p[9] >= 0x40)
        p[9] = 0x40;

    if (p[10] >= 0x40)
        p[10] = 0x40;

    if (p[11] >= 0x40)
        p[11] = 0x40;

    if (p[12] >= 0x40)
        p[12] = 0x40;

    if (p[13] >= 0x40)
        p[13] = 0x40;

    if (p[14] >= 0x40)
        p[14] = 0x40;

    if (p[15] >= 0x40)
        p[15] = 0x40;

    if (p[16] >= 0x40)
        p[16] = 0x40;

    if (p[17] >= 0x40)
        p[17] = 0x40;

    if (p[18] >= 0x40)
        p[18] = 0x40;

    if (p[19] >= 0x40)
        p[19] = 0x40;

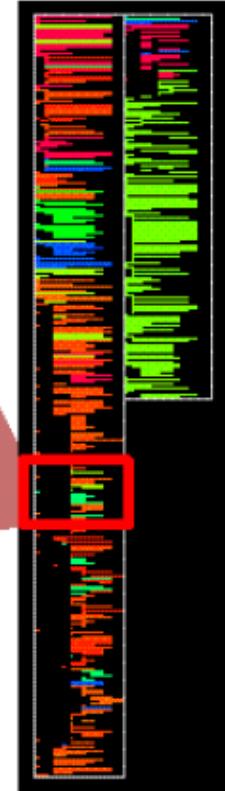
    if (p[20] >= 0x40)
        p[20] = 0x40;

    if (p[21] >= 0x40)
        p[21] = 0x40;

    if (p[22] >= 0x40)
        p[22] = 0x40;

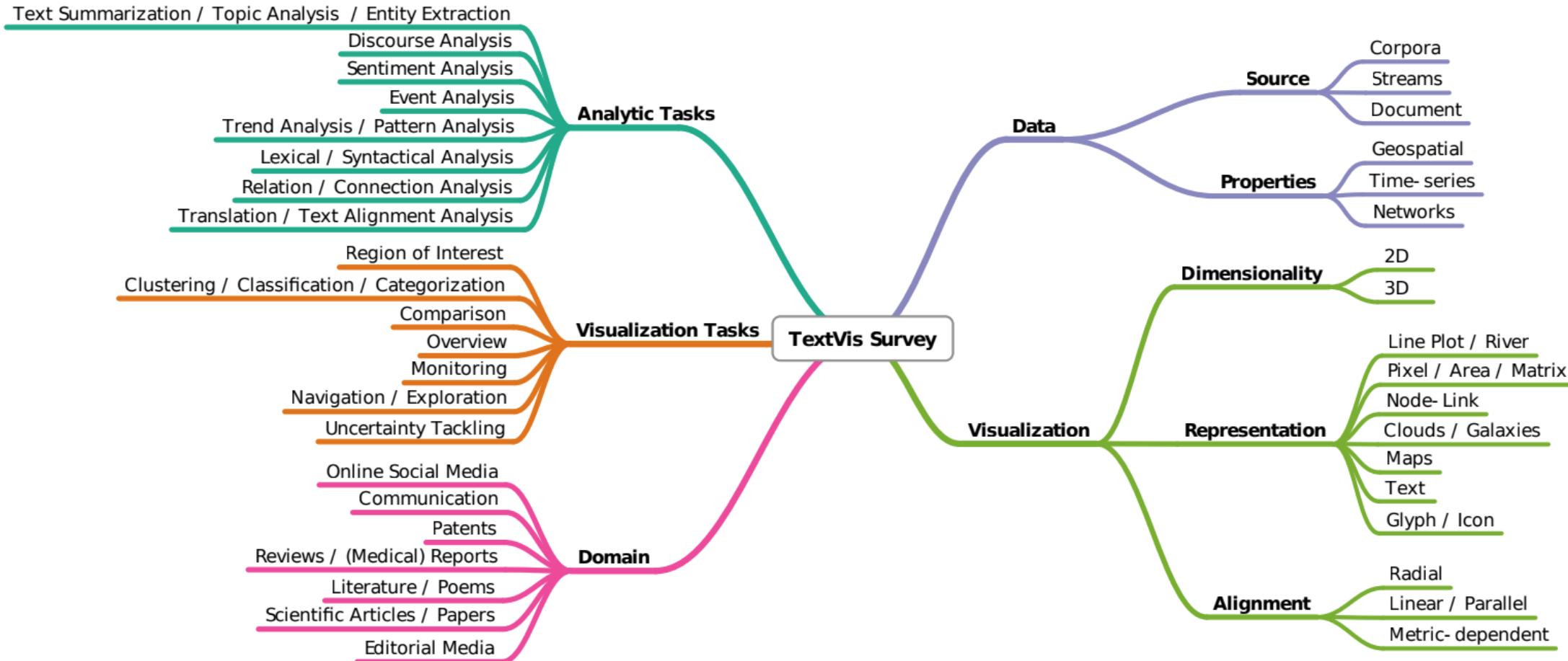
    if (p[23] >= 0x40)
        p[23] = 0x40;
}

```

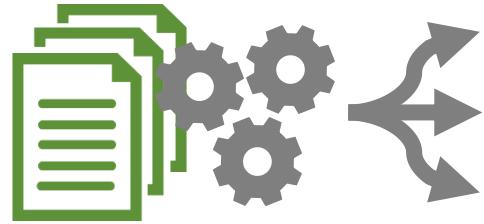


color: statistic of interest, here: code age

Overview



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



<features>
measures
labels

Explainable ML

Discourse Analysis

Prosody

Multi-Corpora Analysis

Language Modeling

Content Analysis

NLP



Challenges

Unify Close and Distant Reading

The figure displays a comparison between a digital edition of a classical text and a physical printed book, illustrating the integration of close and distant reading.

Digital Edition (Left):

- Header:** Chapter, Subchapter, Page (121).
- Table of Contents:** A hierarchical tree view showing sections like "Gleichmut Selbigkeit Achill Besinnung", "Zwerchfell Helle Licht Meer Achauer", "Handlungen Lessing Endzweck", "Nachelander Nebeneinander", etc., with page numbers (e.g., 121, 122, 123, 124, 125) and color-coded sections (green, orange, red).
- Annotations:** Several numbered callouts (a-f) point to specific text segments in the main content area, which are highlighted in red.
- Text Content:** The main area shows a block of Latin text with annotations. Annotations include:
 - a:** "im Freien vogelau will und den Weg zum Hägel oder in das nächste Dorf nachschlägt."
 - b:** "Unter den **Teilen** haben wir der Anfang, die Mitte, das Ende, Gestalt und einzelne Verse des Epos verstanden. Ihre Selbständigkeit ist aber nur möglich auf einer, wenn auch die Teile des dargestellten Lebens unterschiedlich sind. Gerade darin zeigt sich nun die einzigartige Kraft Homers."
 - c:** "Homer erzählt in seiner **Aktenkunst**, der Alexandraszug könnte nicht als eigentlich epischen Thema gelten, weil das Heer vor seinem Führen keine Selbständigkeit bewahrt, sondern ihm, als einem Despoten, blind folgen soll. Wie ganz anders ist Agamemnons Stellung in der **Odyssee**. Er führt zwar den Oberbefehl, doch mehr nur im Sinn eines **gemannter patris**. Wehr ihn, wenn er sich entführen läßt, auf seine Führerschaft zu pochen! Dies wird ihm erwidert: er habe nichts zu befürchten, man sei ihm freiwillig gefolgt. Ein **Zeugnis** gebe es nicht. Jeder kämpfe, sobald es **e** wieder von diesen ziehen. In ähnlichen Verhältnissen **f** der Göttervater, zu den Göttern. Am Anfang des achten Gesanges prahlte er zwar in einer gewöhnigen Rede, in sei leidende, das Meer und die Erde samt allen Göttern, die sich daran loszogen wollten, in die Lüfte zu stellen. **Was überzeugt ja ich persönlich Götter und Menschen?**"
 - d:** "In diesem Versen schaut sich jedoch ein älterer Mythos erhalten zu haben, die Spur einer ungeheueren Welt; 124
 - e:** "In diesem Versen schaut sich jedoch ein älterer Mythos erhalten zu haben, die Spur einer ungeheueren Welt; 124
 - f:** "von der Homer sonst nichts mehr weiß. Im übrigen ist es mit der Macht des **Reden** durchaus nicht so gut bestellt. Es wird zwar ständig versichert, daß alle Entscheidung in seinen Händen ruhe. **Homer**, **Aeneas**, **Poseidon** jedoch sind ihrer anderen Meinung, murren, wenn **Reden** erfolkt, und erhöhen sich gar, mit List und Bezug des Willens des Höchsten zu umgehen. Dann auch sich **Reden** gleichfalls mit Schlächtigkeit oder mit Peinen und Drogen befassen — genau wie **Agamemnon** im Kriegsrat. Das Schimpftal ist peinlich für den Herrn. Doch eben dadurch kommt eine tiefe Götter-Helden so herlich hervor. Sie sind nicht auf den **Reden** bezogen. Jeder hat seine besonderen Wünsche und Angelegenheiten. Feder ist eine frei entfaltete Individualität.
 - g:** "Ebenso bewahrt der Mensch gegenüber den Göttern Selbständigkeit. Nur hat **Homer** zwar schon im Altertum nachgefragt, seine Helden seien Marionetten in den Händen der Himmelsleichen. Wer auferkam first, beweist jedoch bald, daß ein solcher Tadel nicht am

Printed Book (Right):

- Text Content:** The right side shows the same text from the printed book, with the same red highlights and annotations as the digital edition.
- Annotations:** Annotations from the digital edition (a-f) are mapped onto the corresponding text in the printed book.

“Prosthetic Reading” vs. “Slow Analysis”

Sonnet 129
William Shakespeare

The expense of spirit in a waste of shame
Is lust in action; and till action, lust
Is perjured, murderous, bloody, full of blame,
Savage, extreme, rude, cruel, not to trust;
Enjoyed no sooner but despised straight
Past reason hunted; and no sooner had,
Past reason hated, as a swallowed bait,
On purpose laid to make the taker mad:
Mad in pursuit, and in possession so;
Had, having, and in quest to have, extreme;
A bliss in proof, and proved, a very woe;
Before, a joy proposed, behind, a dream.
All this the world well knows yet none knows well
To shun the heaven that leads men to this hell.

Alliteration

Sonnet 129
William Shakespeare

Th' expense of spirit in a waste of shame
Is lust in action; and till action, lust
Is perjured, murderous, bloody, full of blame,
Savage, extreme, rude, cruel, not to trust;
Enjoyed no sooner but despised straight
Past reason hunted; and no sooner had,
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On purpose laid to make the taker mad:
Mad in pursuit, and in possession so;
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A bliss in proof, and proved, a very woe;
Before, a joy proposed, behind, a dream.
All this the world well knows yet none knows well
To shun the heaven that leads men to this hell.

Assonance

A person writing in a notebook.

Vibration [Who chose his epitaph? - himself alone
Could thus have dared the grave to agitate,
And claim, among the dead, this awful crown;
Nor doubt that He marked also for his own
Close to these cloistral steps a burial-place,
That every foot might fall with heavier tread, alliteration, internal rhyme]
paradox: 'naturamus' = hubris

A Th' expense of spirit in a waste of shame
Is lust in action; and till action, lust
Is perjured, murderous, bloody, full of blame,
Savage, extreme, rude, cruel, not to trust;
Enjoyed no sooner but despised straight
Past reason hunted; and no sooner had,
Past reason hated, as a swallowed bait,
On purpose laid to make the taker mad:
Mad in pursuit, and in possession so;
Had, having, and in quest to have, extreme;
A bliss in proof, and proved, a very woe;
Before, a joy proposed, behind, a dream.

B not one a fighter; It is like a plane
dusting apple orchards or Arabs or
one of the mighty... one of the hel

C Perhaps you consider yourself an oracle,
Mouthpiece of the dead, or of some god or
Thirty years now I have labored
To dredge the silt from your throat,
I am none the wiser.
Scaling little ladders with gluepots and pa
I crawl like an ant in mourning
Over the weedy acres of your brow
To mend the immense skull plates and cle
The bald, white tumuli of your eyes.
A blue sky out of the Oresteia
Arches above us. O father! all by yourself
You can make us stand.

D On thy withered lips and dry,
Which like barren furrows lie,
Brooding kisses I will pour
Shall thy youthful [heat] restore
Such kind showers in autumn fall,
And a second spring recall?
Nor from thee will ever part,
Ancient person of my heart.

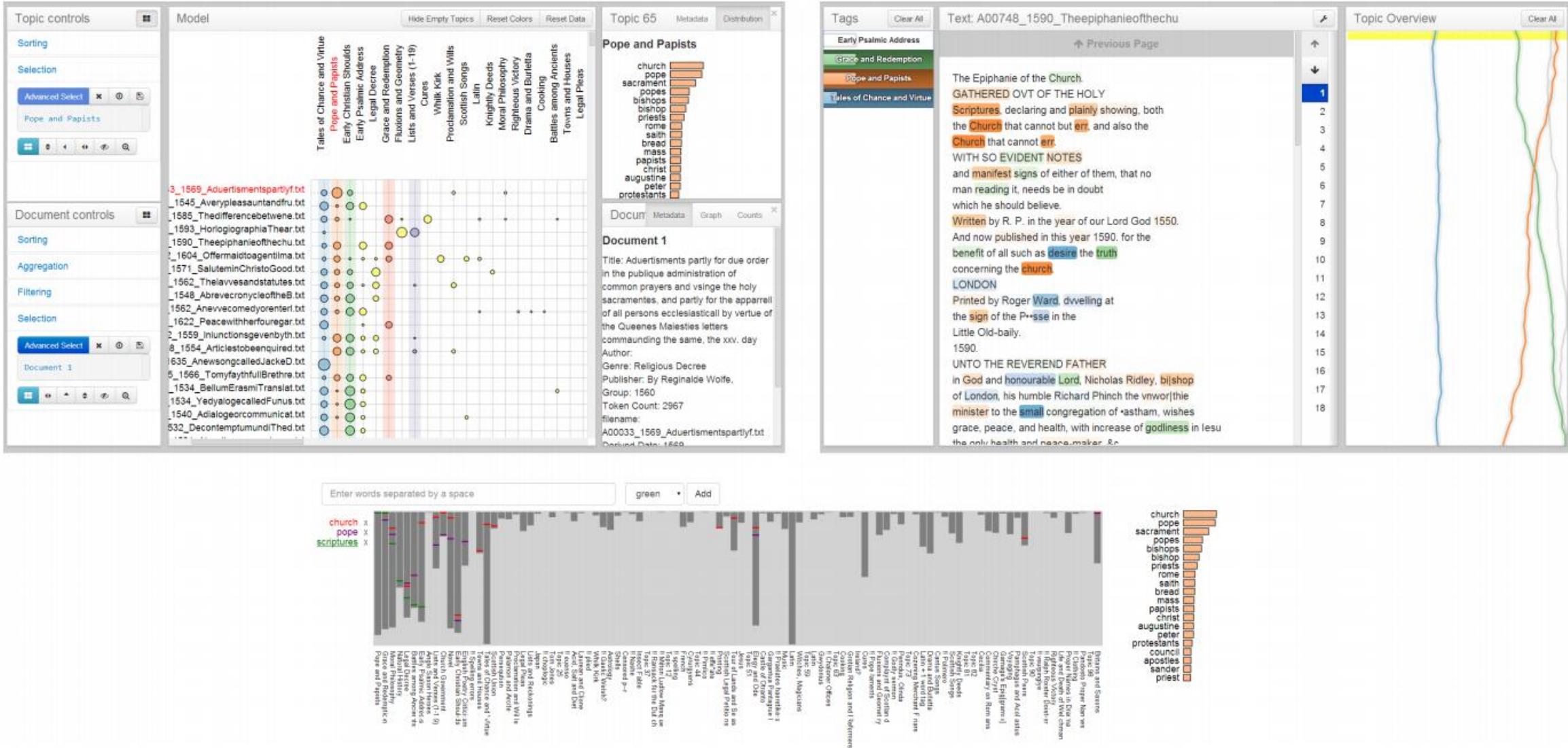
E Thy nobler part, which but to name
In our sex would be counted shame
By age's frozen grasp possessed,
From [his] ice shall be released,
And soothed by my reviving hand
In former warmth and vigor stand.
All a laurel wreath from earth

Guided Discovery

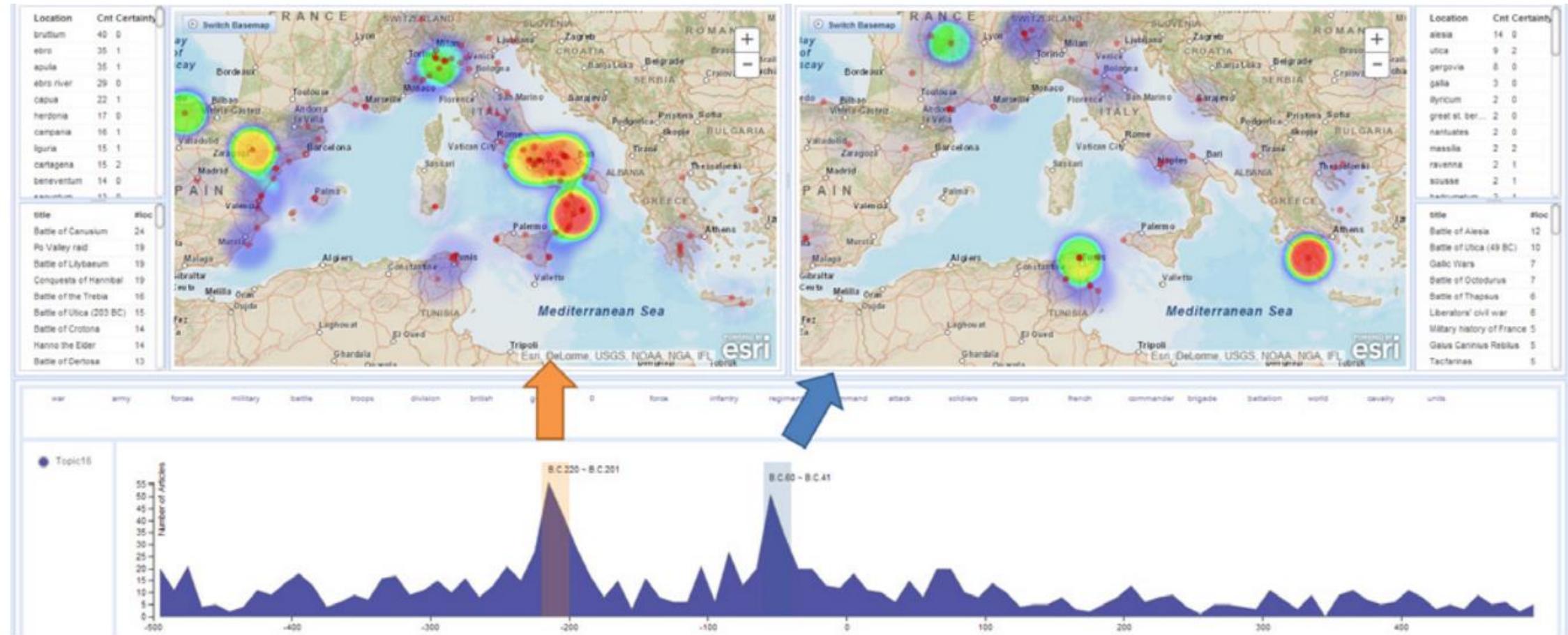


Thudt et al., The Bohemian Bookshelf: Supporting Serendipitous Book Discoveries through Information Visualization

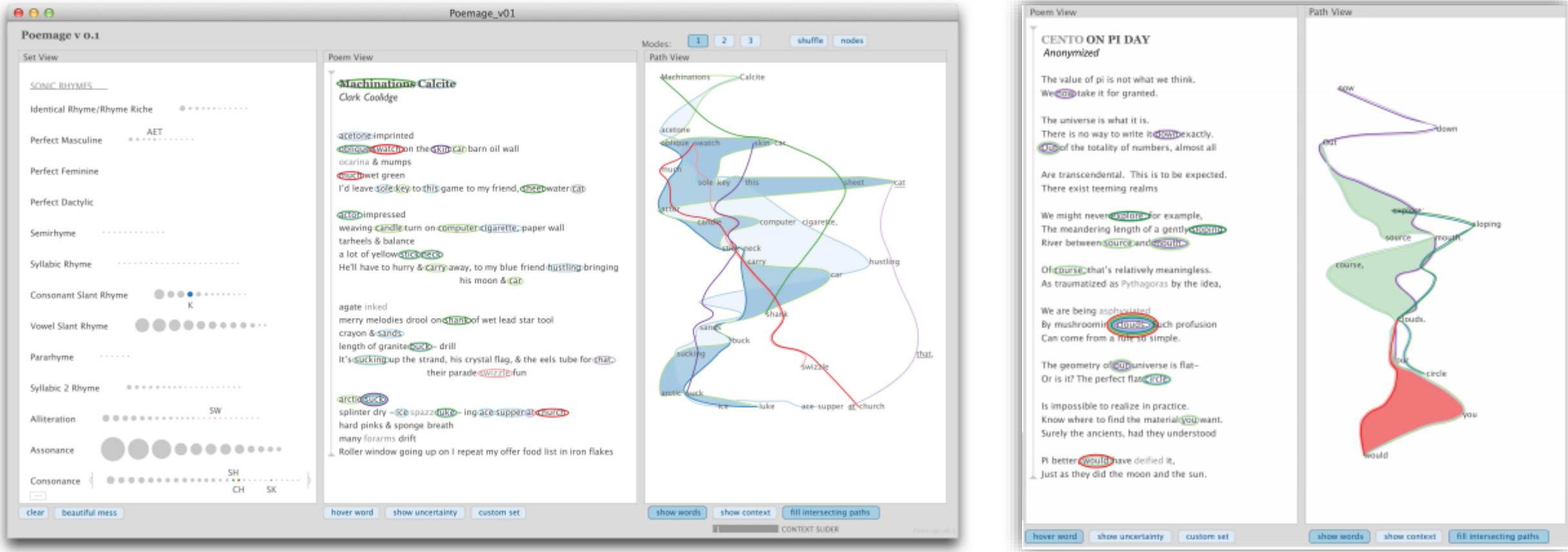
Guided Discovery



Linking Outside Resources into the Analysis



Aesthetic Experiences



McCurdy et al., Poemage: Visualizing the Sonic Topology of a Poem

Annotation of Resources



David seems to remember a lot from his childhood stay at various places

Seems to be thinking about a fantasy from past. May he has fear from animals (dogs, crow etc)?



Pew at church - from book

CHAPTER 2. I OBSERVE

The first objects that assume a distinct presence before me , as I look far back , into the blank of my infancy , are my mother with her pretty hair and youthful shape , and Peggotty with no shape at all , and eyes so dark that they seemed to darken their whole neighbourhood in her face , and cheeks and arms so hard and red that I wondered the birds didn't peck her in preference to apples.

I believe I can remember these two at a little distance apart , dwarfed to my sight by stooping down or kneeling on the floor , and I going unsteadily from the one to the other. I have an impression on my mind which I cannot distinguish from actual remembrance , of the touch of Peggotty's forefinger as she used to hold it out to me , and of its being roughened by needlework , like a pocket nutmeg-grater.

This may be fancy , though I think the **memory** of most of us can go farther back into such times than many of us suppose : just as I believe the power of **observation** in numbers of very young children to be quite wonderful for its closeness and accuracy. Indeed , I think that most grown men who are remarkable in this respect , may with greater propriety be said not to have lost the faculty , than to have acquired it ; the rather , as I generally observe such men to retain a certain freshness , and gentleness , and capacity of being pleased , which are also an inheritance they have preserved from their **childhood**.

I might have a misgiving that I am 'meandering' in stopping to say this , but that it brings me to remark that I build these conclusions , in part upon my own experience of myself ; and if it should appear from anything I may set down in this narrative that I was a child of close observation , or that as a man I have a strong memory of my childhood , I undoubtedly lay claim to both of these characteristics.

Looking back , as I was saying , into the blank of my infancy , the first objects I can **remember** as standing out by themselves from a confusion of things , are my mother and Peggotty. What else do I remember? Let me see.

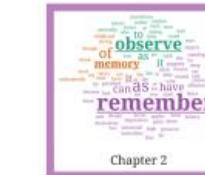
There comes out of the cloud : our house – not new to me , but quite familiar ; in its earliest remembrance. On the ground-floor is Peggotty's kitchen , opening into a back yard ; with a pigeon-house on a pole , in the centre , without any pigeons in it ; a great dog-kennel in a corner , without any dog ; and a quantity of fowls that look terribly tall to me , walking about , in a menacing and ferocious manner. There is one cock who gets upon a post to crow ; and seems to take particular notice of me as I look at him through the kitchen window , who makes me shiver ; he is so fierce. Of the geese outside the side-gate who come waddling after me with their long necks stretched out when I go that way , I dream at night : as a man envenomed by wild beasts might dream of lions.

Here is a long passage – what an enormous perspective I make of it ! – leading from Peggotty's kitchen to the front door. A dark store-room opens out of it , and that is a place to be run past at night ; for I don't know what may be among those tubs and jars and old tea-chests , when there is nobody in there with a dimly-burning light , letting a mouldy air come out of the door , in which there is the smell of soup , pickles , pepper , candles , and coffee , all at once whiff. Then there are the two parlours : the parlour in which we sit on an evening , my mother and I and Peggotty – for Peggotty is quite our companion , when her work is done and we are alone – and the best parlour where we sit on a Sunday : grandly , but not so comfortably. There is something of a doleful air about that room to me , for Peggotty has told me – I don't know when , but apparently ages ago – about my father's funeral , and the company having their black cloaks put on. One Sunday night my mother reads to Peggotty and me in there , how Lazarus was raised up from the dead. And I am so frightened that they are afterwards obliged to take me out of bed , and show me the quiet churchyard out of the bedroom window , with the dead all lying in their graves at rest , below the solemn moon.

There is nothing half so green that I know anywhere , as the grass of that churchyard ; nothing half so shady as trees ; nothing half so quiet as its tombstones. The sheep are feeding there , when I kneel up , early in the morning , in my little bed in a closet within my mother's room , to look out at it ; and I see the red light shining on the sun-dial , and think within myself , 'Is the sun-dial glad , I wonder , that it can tell the time again ?'

Here is our pew in the church. What a high-backed pew ! With a window near it , out of which our house can be seen , and is seen many times during the morning's service , by Peggotty , who likes to make herself as sure as she can that it's not being robbed , or is not in flames. But though Peggotty's eye wanders , she is much offended if mine does , and frowns to me , as I stand upon the seat , that I am to look at the clergyman. But I can't always look at him – I know him without that white thing on , and I am afraid of his wondering why I stare so , and perhaps stopping the service to inquire – and what am I to do ? It's a dreadful thing to gaze , but I must do something. I look at my mother , but she pretends not to see me. I look at a boy in the aisle , and he makes faces at me. I look at the sunlight coming in at the open door through the porch , and there I see a stray sheep – I don't mean a sinner , but mutation – half making up his mind to come into the church. I feel that if I looked at him any longer , I might be tempted to say something out loud ; and what would become of me then ! I look up at the monumental tablets on the wall , and try to think of Mr. Bodgers late of this parish , and what the feelings of Mrs. Bodgers must have been , when affliction sore , long time Mr. Bodgers bore , and physicians were in vain. I wonder whether they called him Mr. Chilip , and he was in vain ; and if so , how he likes to be reminded of it once a week. I look from Mr. Chilip , in his Sunday neckcloth , to the pulpit , and think what a good place it would be to play in , and what a castle it would make , with another boy coming up the stairs to attack it , and having the velvet cushion with the tassels thrown down on his head. In my time my eyes gradually shut up ; and , from seeming to hear the clergyman singing a drowsy song in the heat , I hear nothing , until I fall off the seat with a crash , and am taken out , more dead than alive , by Peggotty.

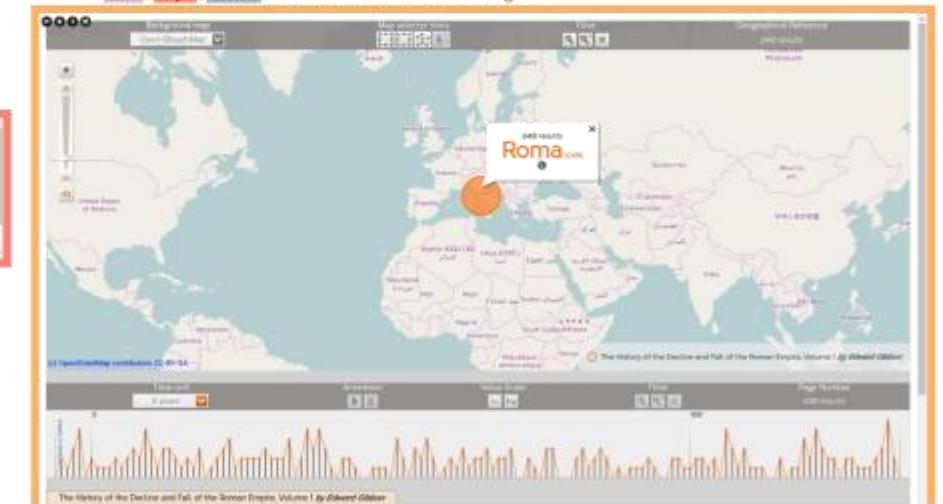
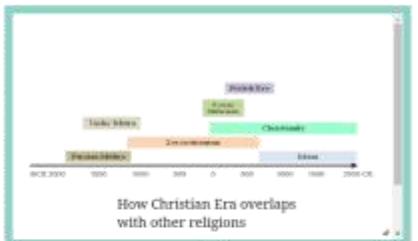
Are memory, observe and remember used in same context by the author? Let's analyze with TagPies!



Peggotty seems to be gentle and caring, opening herself and her family to David whenever he is in need

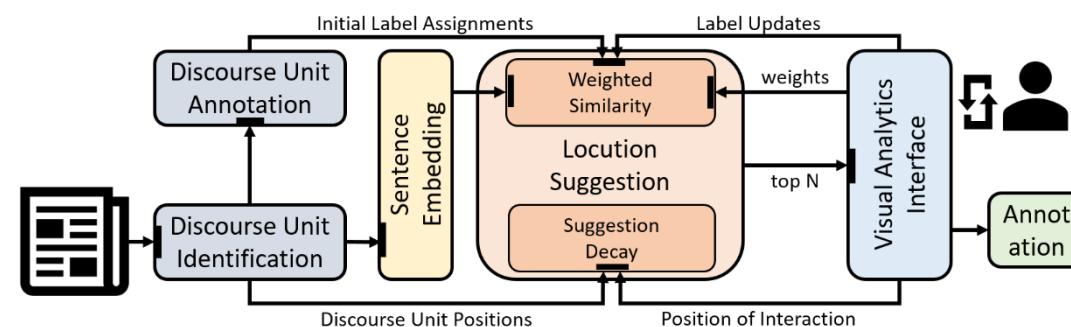
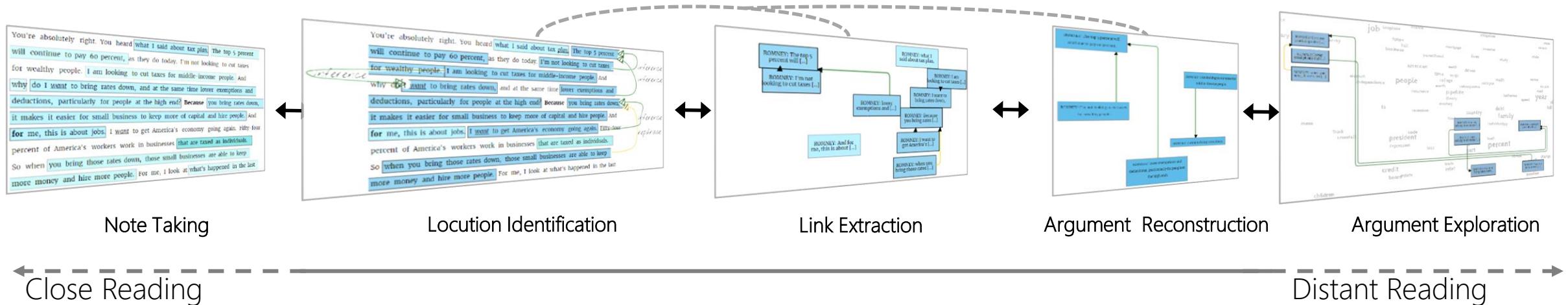


In the second century of the **Christian Era** , the **empire of Rome** comprehended the fairest part of the earth , and the most civilized portion of mankind. The frontiers of that extensive monarchy were guarded by ancient renown and disciplined valor. The gentle but powerful influence of laws and manners had gradually cemented the union of the provinces. Their peaceful inhabitants enjoyed and abused the advantages of wealth and luxury. The image of a free constitution was preserved with decent reverence : the Roman senate appeared to possess the sovereign authority , and devoted on the emperors all the executive powers of government. During a happy period of more than fourscore years , the public administration was conducted by the virtue and abilities of **Nerva** , **Trajan** , **Hadrian** , and the two Antonines. It is the design



Faisal Cheema et al., AnnotateVis: Combining Traditional Close Reading with Visual Text Analysis

Semi-Automatic Annotation



F. Sperrle et al., VIANA: Visual Interactive
Annotation of Argumentation

Semi-Automatic Annotation

Context Before	Question	Context After
 Verify		
 Annotate CARL AZUZ Ten-second trivia : Scientists say that the total solar eclipse on August 21st will last how long ?	 CARL AZUZ More than five minutes , four minutes and 20 seconds , exactly four minutes , or less than three minutes ?	 CARL AZUZ Though enthusiasts have waited on this for months , the upcoming total eclipse will last only two minutes and 43 seconds
 Resolve Conflict		

ISQ
NONE
NISQ

ISQ
NONE
NISQ

ISQ
NONE
NISQ

Submit!

Annotations:

- what * VERB
- PROPER_NOUN ORGANIZATION* CONJUNCTION PROPER_NOUN ORGANIZATION
- where ADVERB * PRONOUN
- VERB QuestionMark *
- how ADVERB ADVERB QuestionMark *
- NOUN * NOUN QuestionMark *
- CONJUNCTION why ADVERB
- why ADVERB VERB
- VERB PRONOUN
- which DETERMINER PREPOSITION DETERMINER
- PROPER_NOUN LOCATION* LOCATION CONJUNCTION PROPER_NOUN Question
- CARDINAL_NUMBER QuestionMark *
- PROPER_NOUN CONJUNCTION NOUN QuestionMark *
- ADJECTIVE CONJUNCTION ADJECTIVE
- which DETERMINER PREPOSITION DETERMINER
- * which DETERMINER PREPOSITION DETERMINER
- NOUN CONJUNCTION PROPER_NOUN NOUN QuestionMark *
- which DETERMINER PREPOSITION DETERMINER
- PROPER_NOUN NOUN VERB * CONJUNCTION NOUN VERB QuestionMark

Art and Text



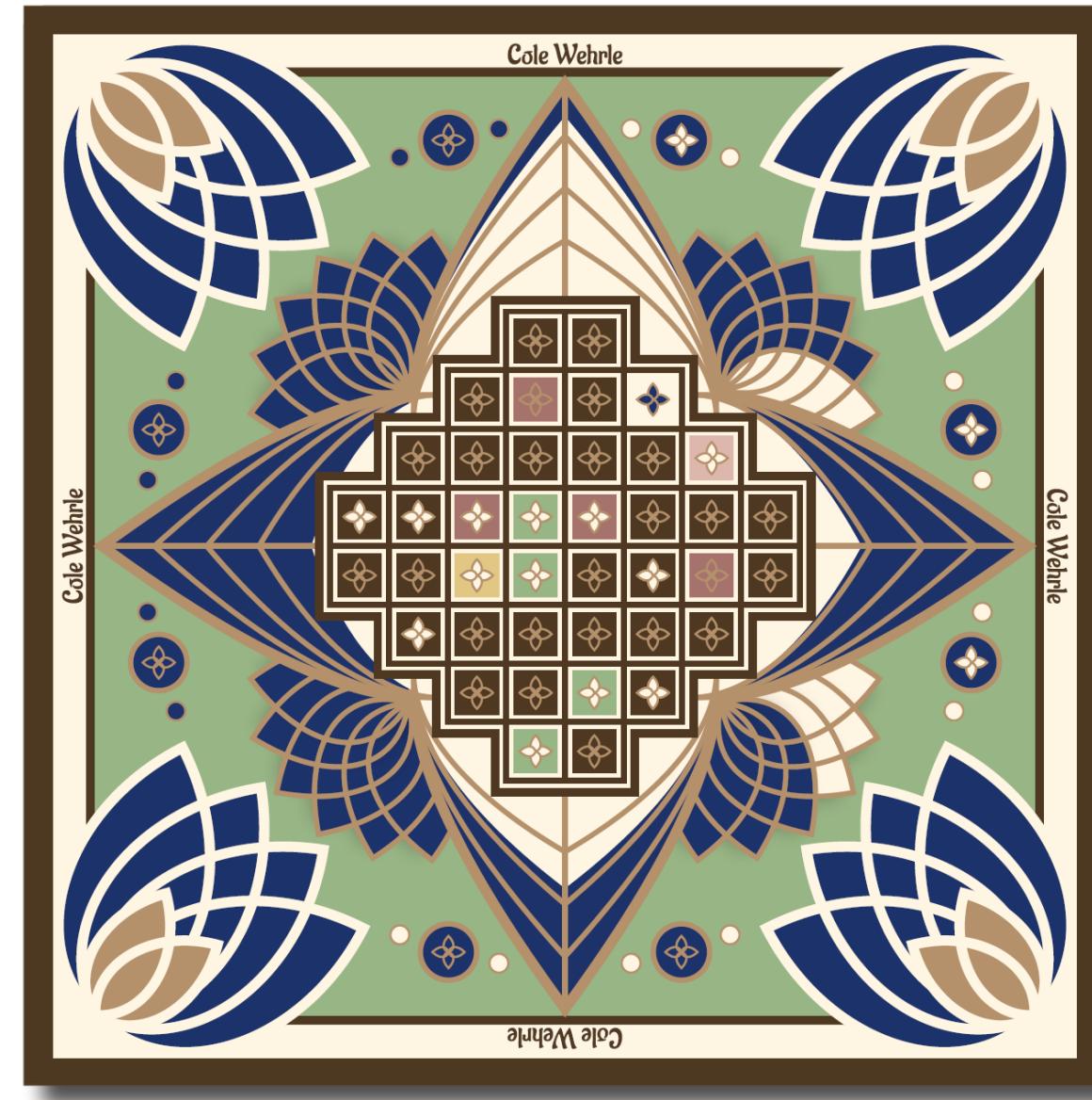
<http://www.esono.com/boris/projects/poetry05/>



Art and Text

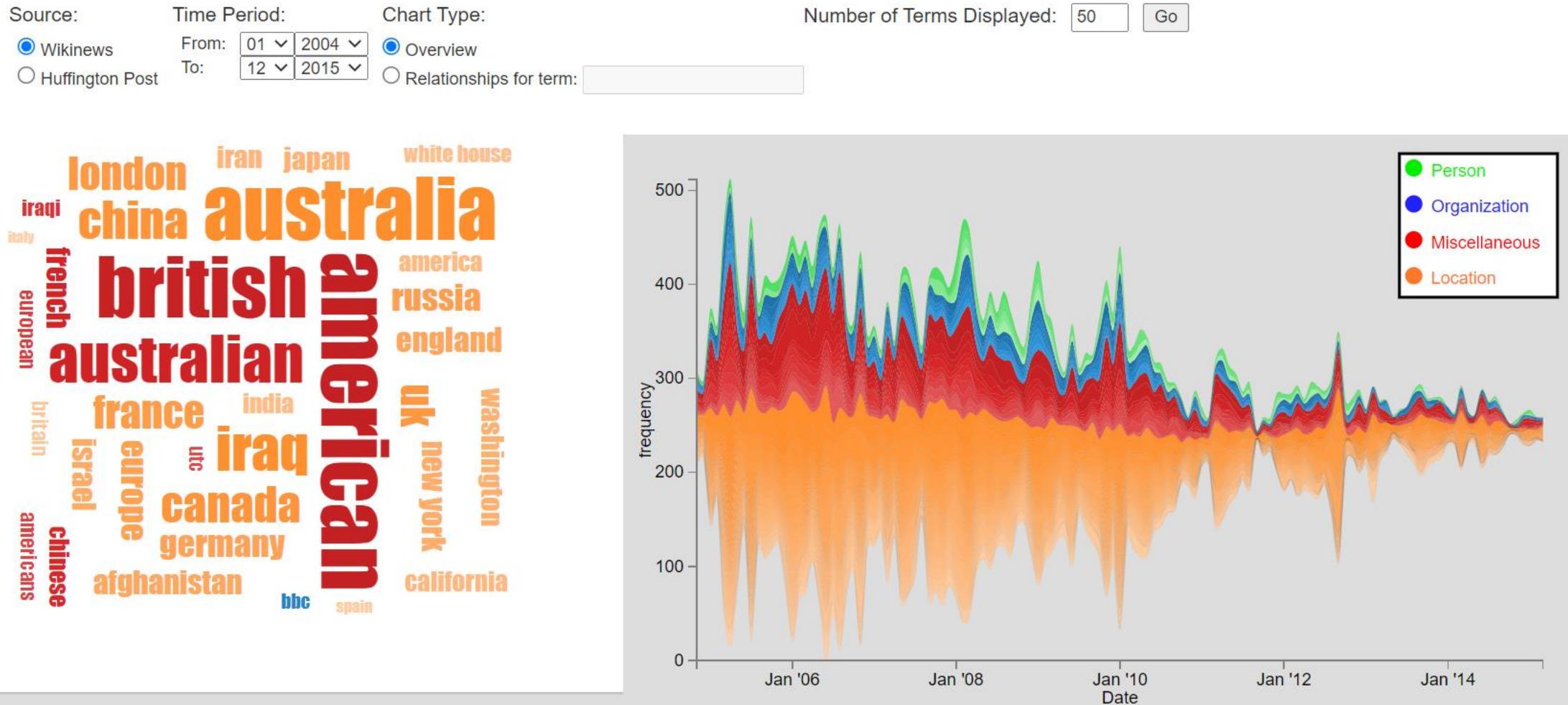
Live example
on texts of board games

Root



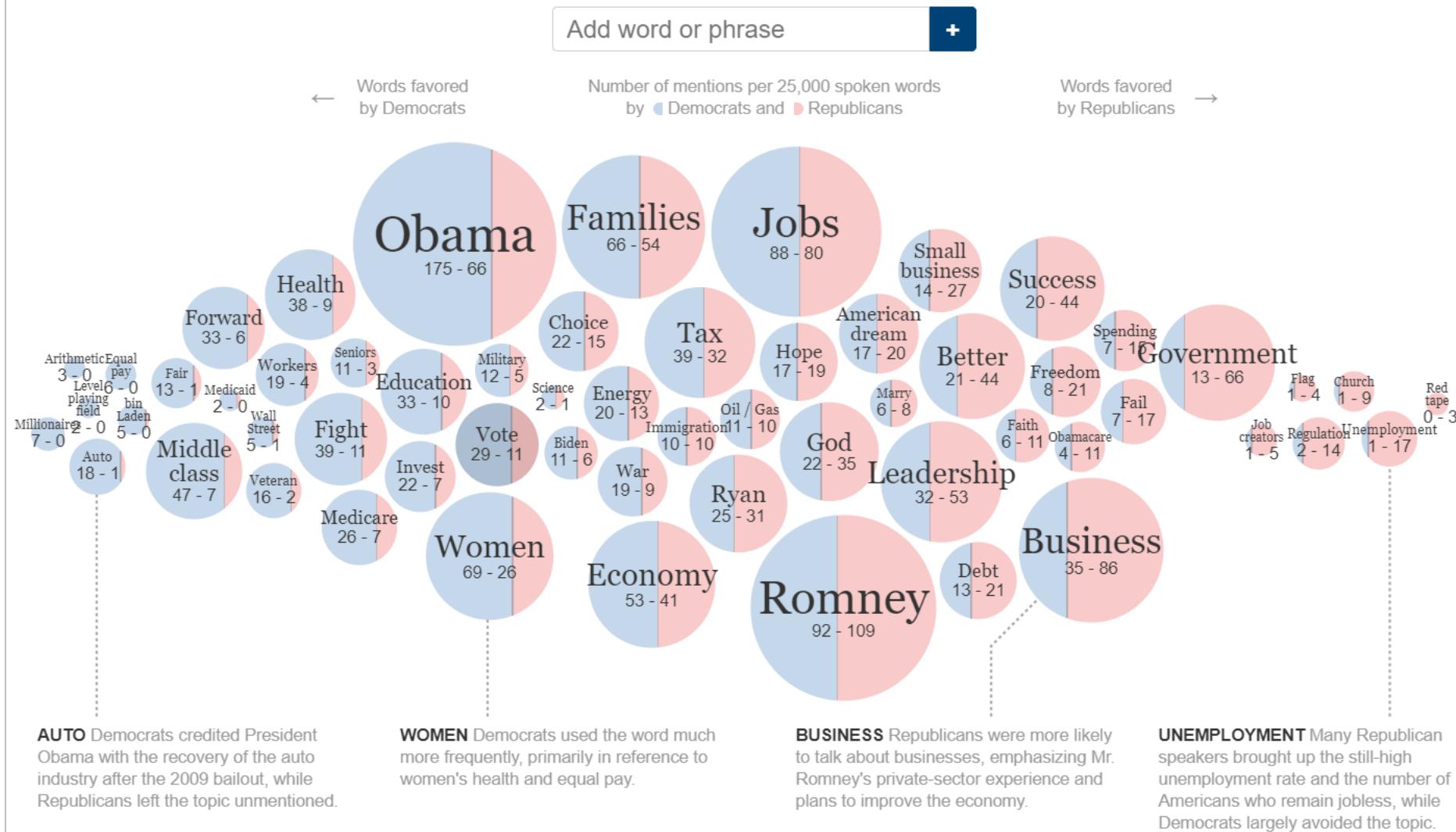
Interactive Examples

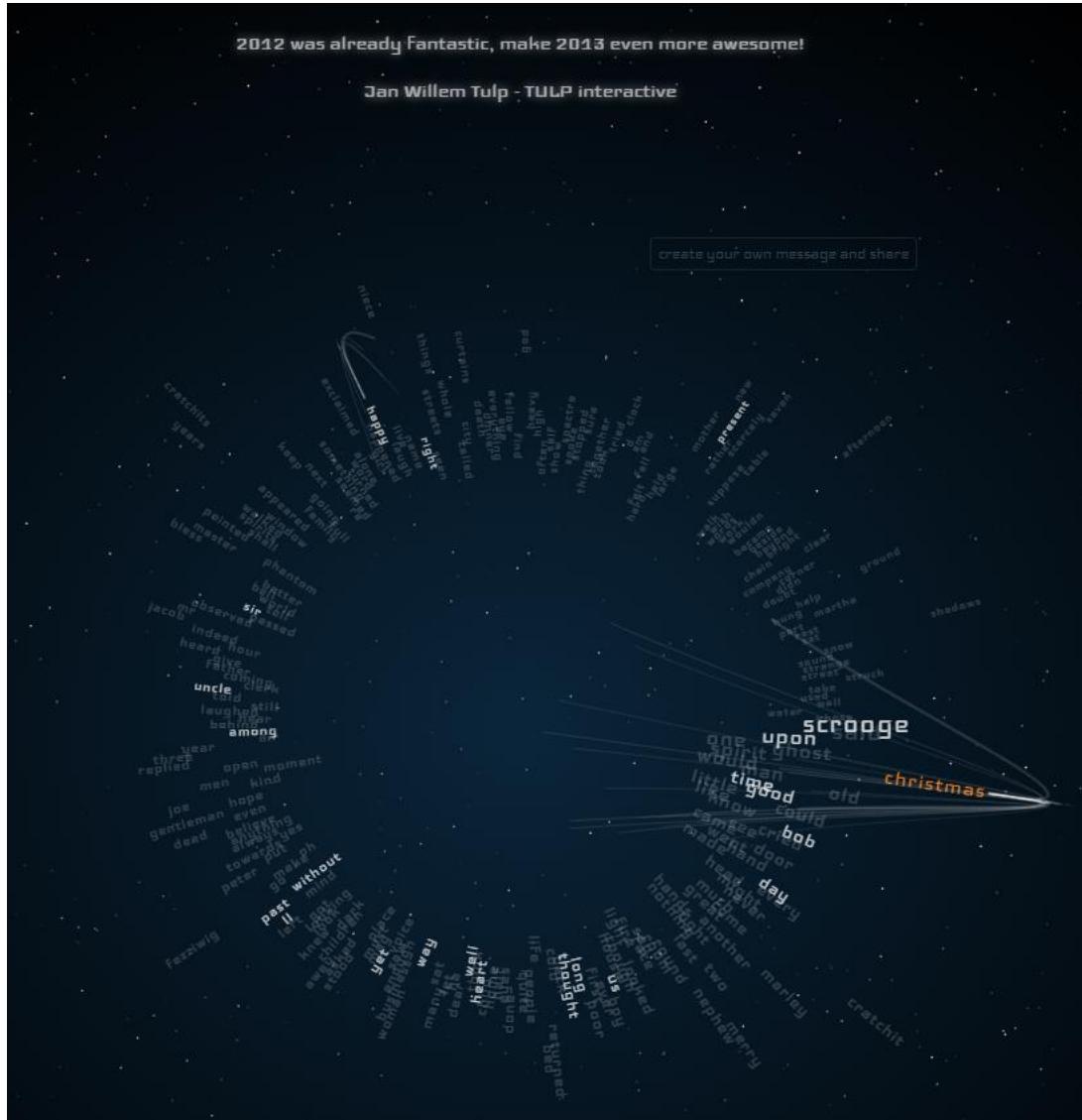
Text Visualization



<https://manorepo.github.io/Text-Visualization/>

A comparison of how often speakers at the two presidential nominating conventions used different words and phrases, based on an analysis of transcripts from the Federal News Service.





<http://tulpinteractive.com/achristmascarol/>

Seq2Seq Vis

wir leben alle auf einem gelben u-boot .

Enc words: wir leben alle auf einem gelben u-boot .

Attention:

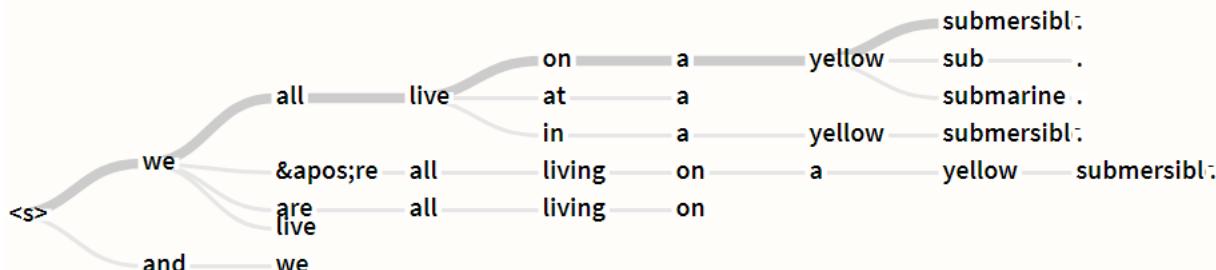
topK:	we	all	live	on	a	yellow	submersible	.
	and	're	lived	at	one	blank	sub	,
	all	are	are	in	the	very	submarine	?
	so	live	lives	for	top	red	dive	all
	you	've	life	up	that	<unk>	cord	for

← change:
word attn

→ compare:
sentence

swap:
↔

pivot



decoder ▼

<http://ganter.ailab.res.ibm.com/s2s/client/index.html>

DATA

5 tensors found

Word2Vec 10K

Label by
wordColor by
No color mapEdit by
word

Tag selection as

Load Publish Download Label

UMAP T-SNE PCA CUSTOM

X Component #1 Component #2

Z Component #3 PCA is approximate. [?](#)

Total variance described: 8.5%.



Show All Data

Isolate 8 points

Clear selection

Search

stud

by

word

8 matches.

study

studies

students

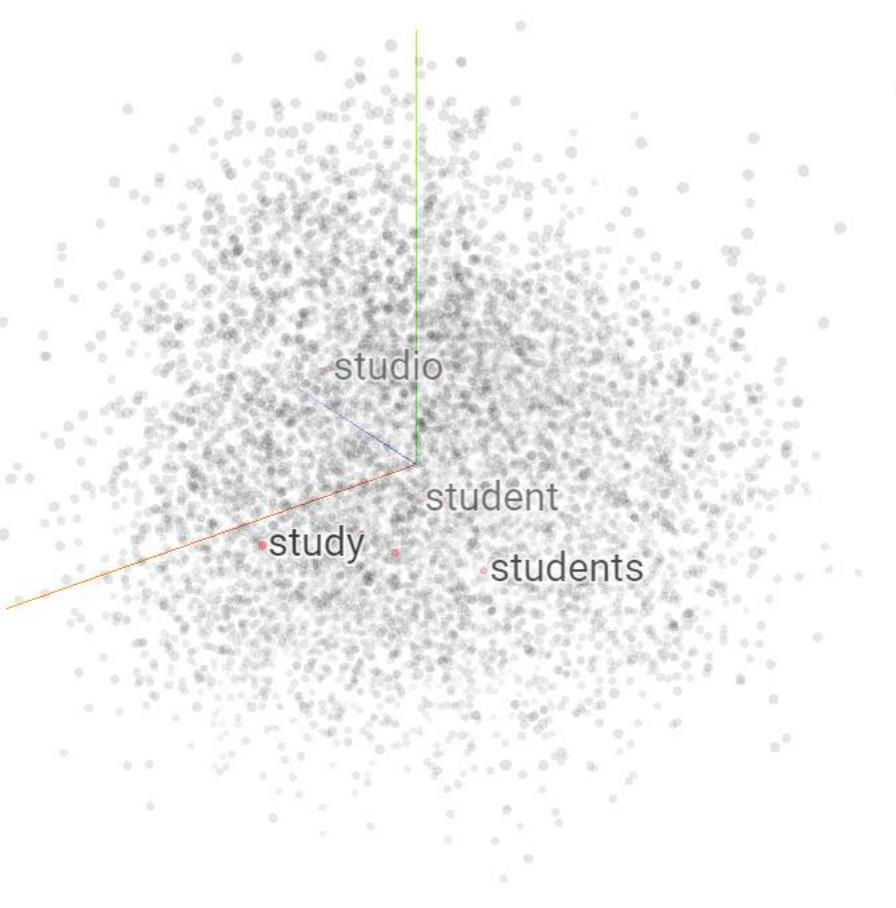
student

studied

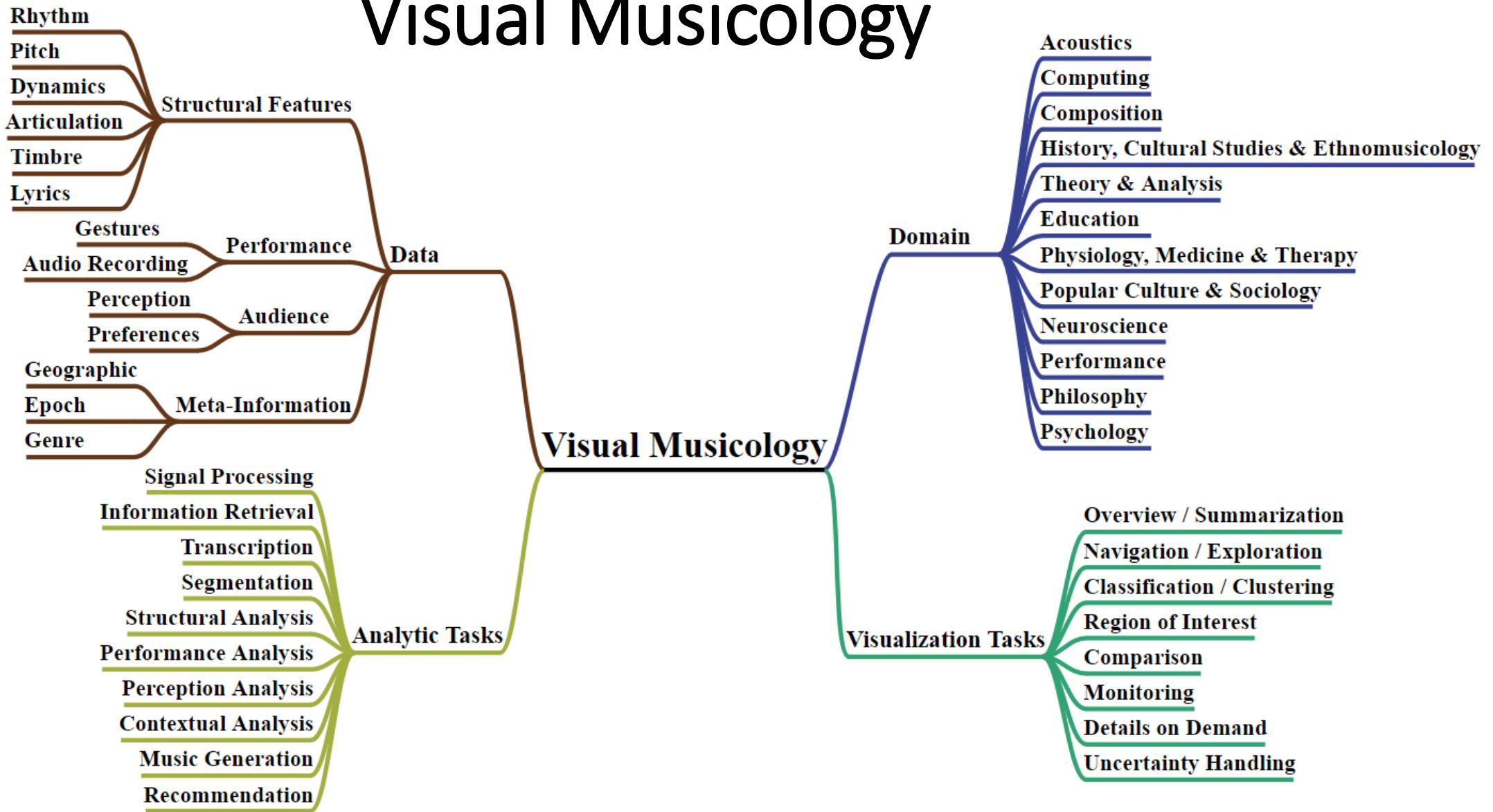
studio

studios

studying

BOOKMARKS (0) [?](#)<http://projector.tensorflow.org/>

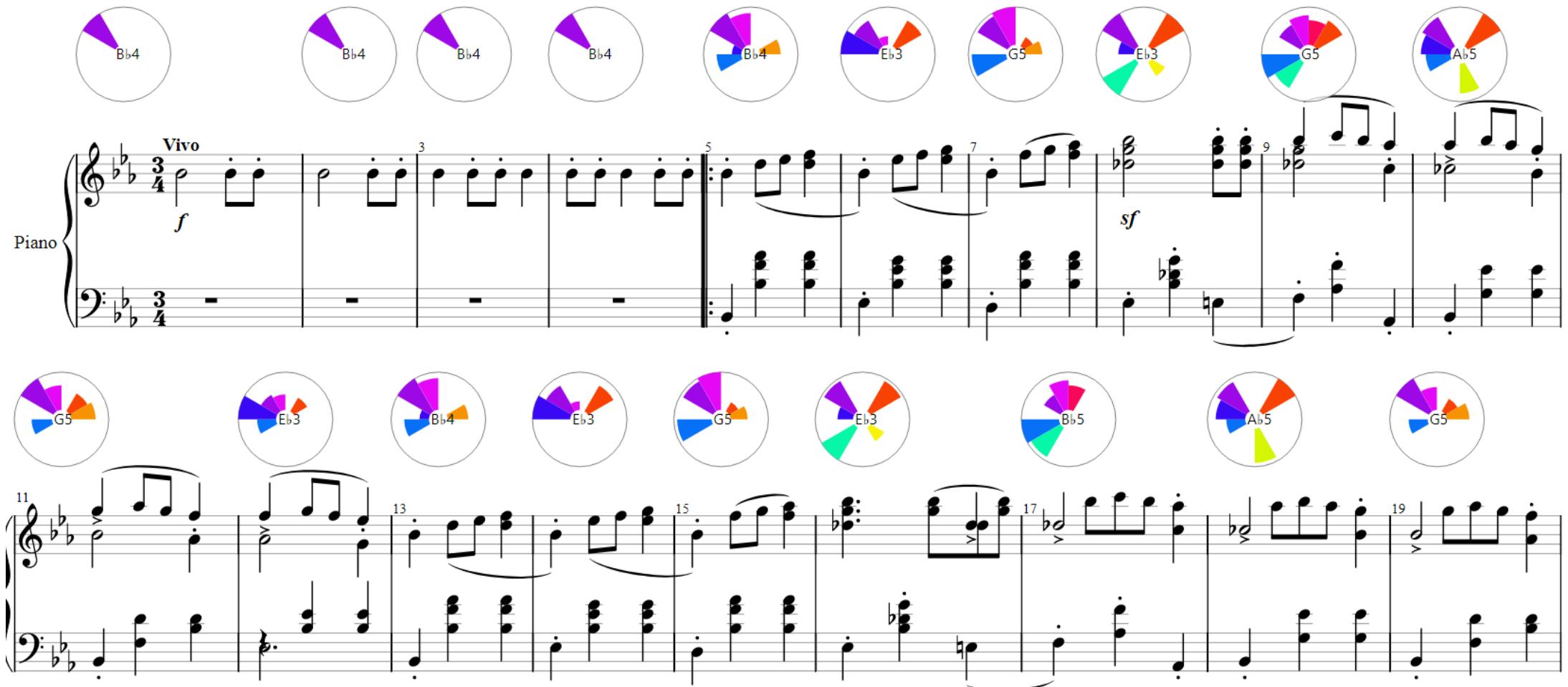
Visual Musicology



Waltz in E♭ Major

Fryderyk Franciszek Chopin

Frédéric François Chopin (1810 - 1849)

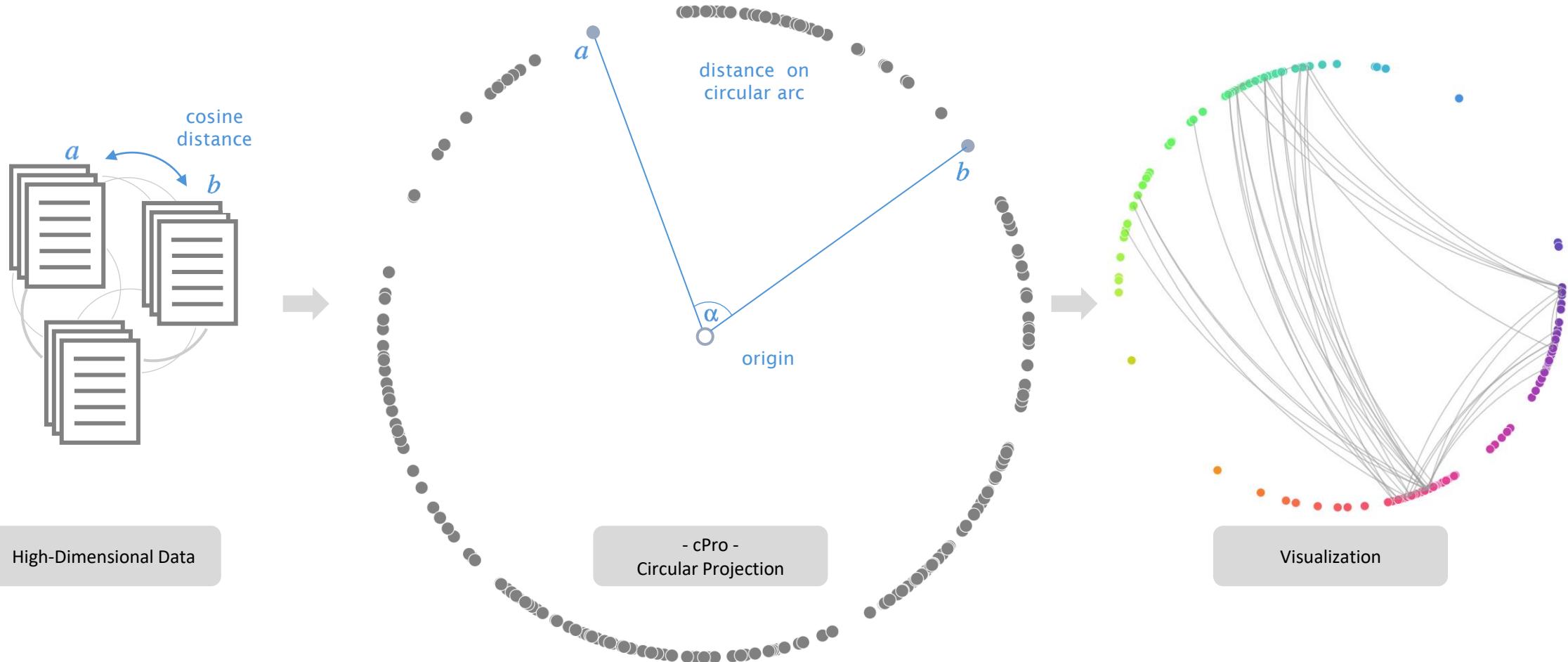


Visual Musicology

M. Miller et al., Augmenting Music Sheets with Harmonic Fingerprints

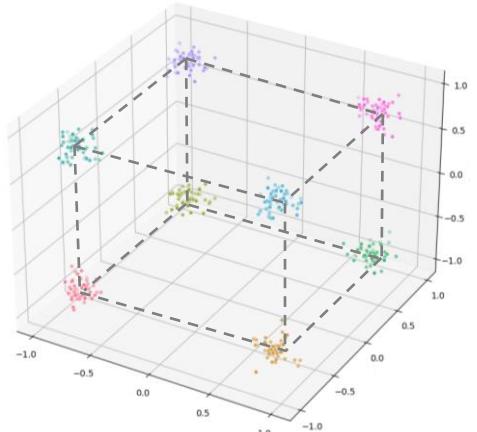
<https://visual-musicology.com/>

cPro – Circular Projection



σ_D

cube dataset



0.5

1

4

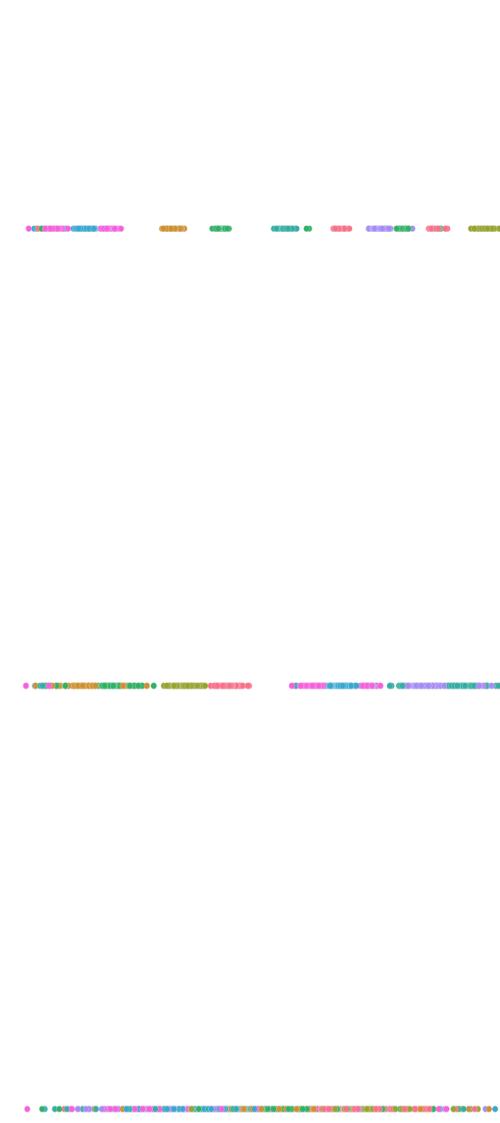
cPro

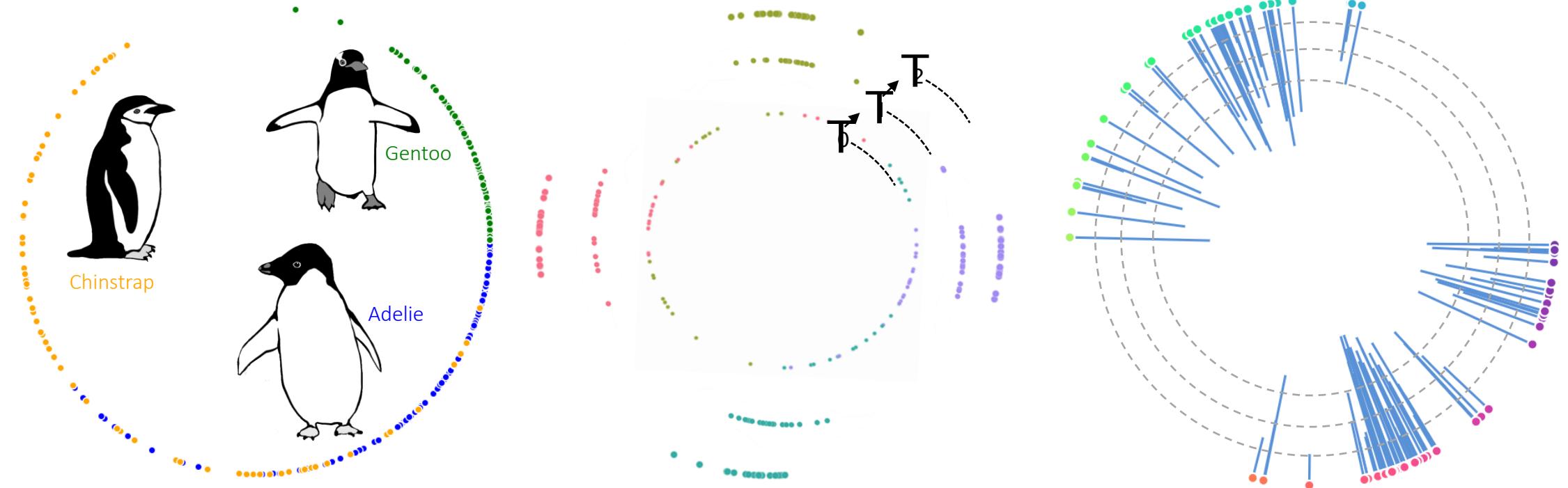


2d MDS



1d MDS

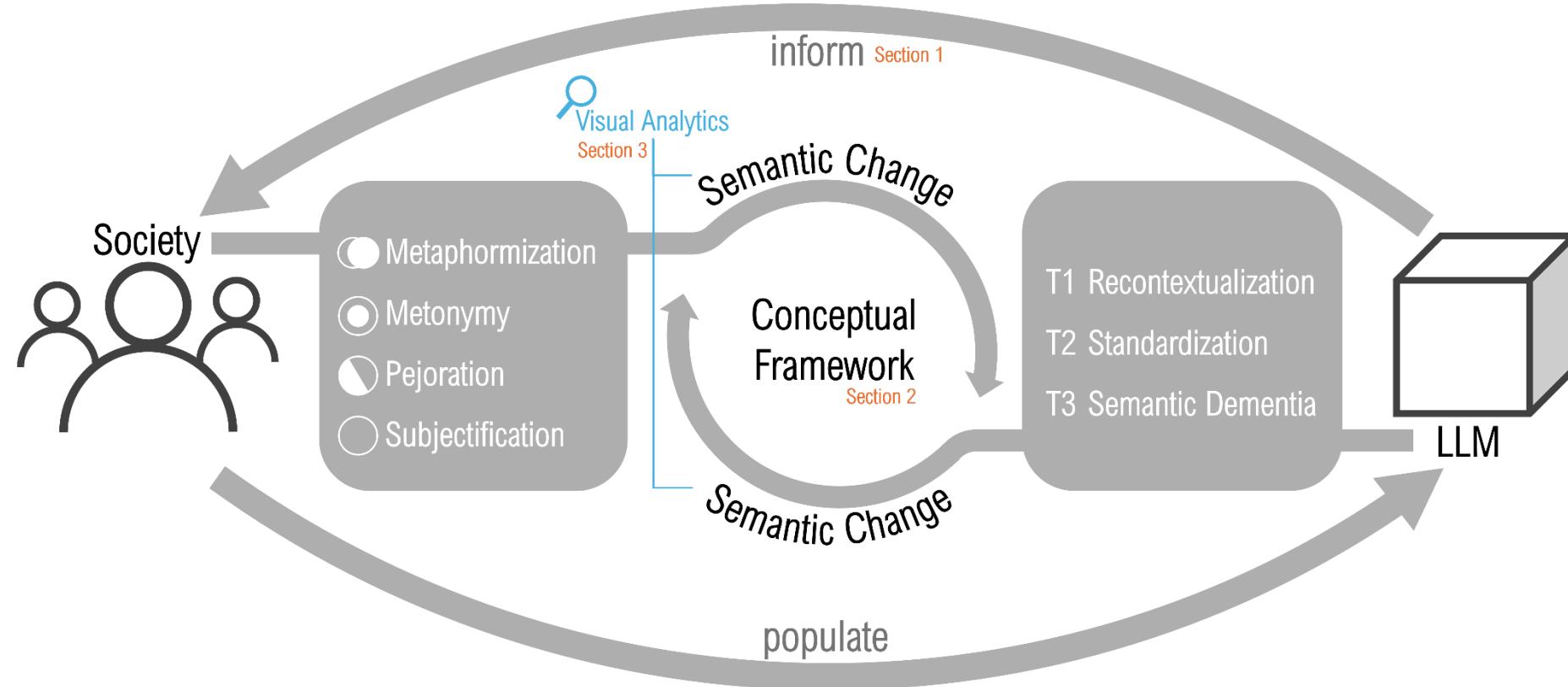




Seeing the Shift:

Keep an Eye on Semantic Changes in Times of LLMs

Raphael Buchmüller, Friedericke Körte, Daniel A. Keim



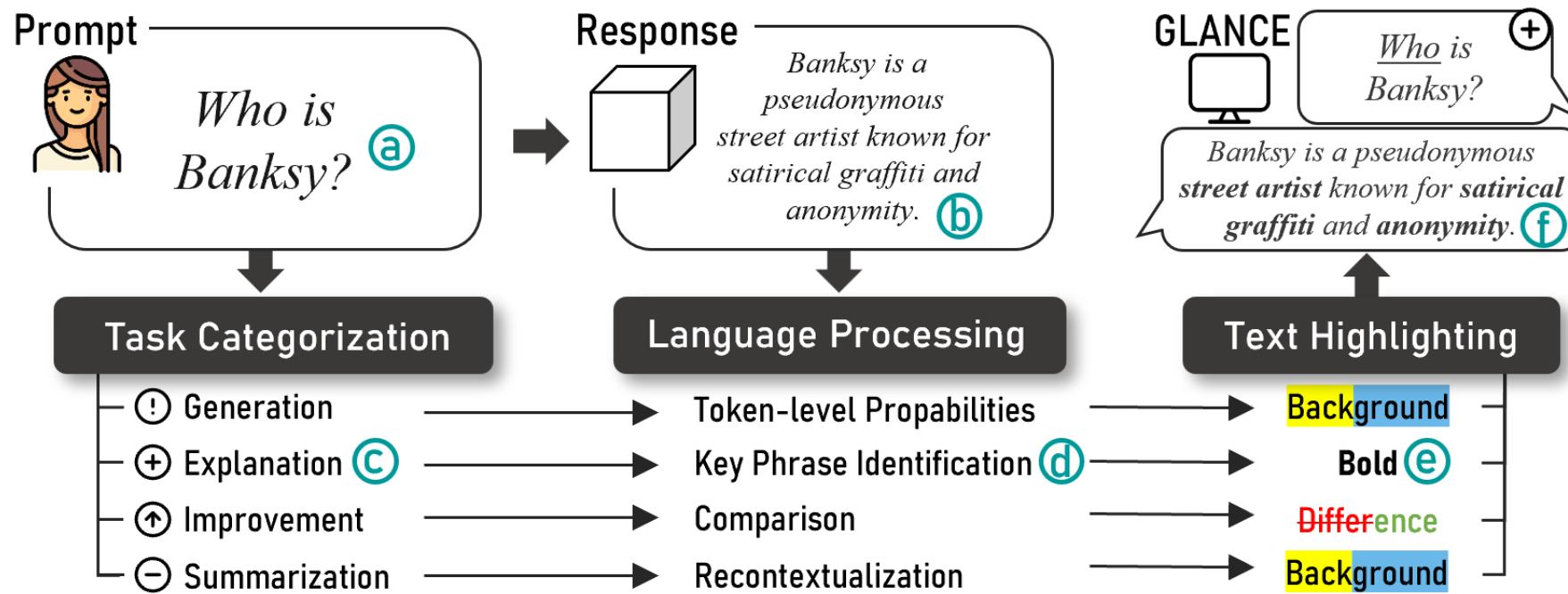
How can LLMs provoke Semantic Shifts?

How can LLMs provoke Semantic Shifts?

Author	Citation	Year	Corpus	Language	Detection Method		Visual Approach	Semantic Shift	Visualization Techniques						Visualization Focus				
					Word-Based	Sense-Based			Topic Modelling			Frequency			Top Similarity Words				
					Co-Occurrence	Static Embeddings	Dynamic Embedding	Contextualized Embed.	Word Sense	Embedding	Context	Word Re-Occurrence	Similarity Degree	Continuity	Evolution	Change Visible			
			Decades	English	German	Dutch	French	Spanish	Chinese	Others					Motion Component	Interactive			
Hilpert and Gries	2009		Google Ngram	●							●	●	●	●	●	●	Scatterplot	●	Dendrogram, Screen Plot
Rohrdantz et al.	2011		COHA	●	●														
Wijaya and Yeniterzi	2011	●	TIME	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
Heylen et al.	2012		Other	●	●	●	●	●	●	●	●	●	●	●	●	●	●		Motion Chart
Odijk and Santucci	2012			1980-2000	●	●	●	●	●	●	●	●	●	●	●	●	●	●	RadViz
Kim et al.	2014	●		1800-1994	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Jatowt and Duh	2014	●	●	1850-2009	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Hilpert and Perek	2015	●	●	1810-2009	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Motion Chart
Xu and Kemp	2015	●		1890-1999	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Theron and Fontanillo	2015			1732-2001	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Parallel Coordinate Plot
Kulkarni et al.	2015	●	●	-	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Hamilton et al.	2016	●	●	1800-1999	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Frerman and Lapata	2016			1700-2010	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Stacked Bar Chart
Martinez-Ortiz et al.	2016			1950-1990	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Stream Graph, Network Graph
Benito et al.	2016			-	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Mahmood et al.	2016			-	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Story Lines
Xu and Crestani	2017			1900-200	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Bamler and Mandt	2017	●		1850-2008	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Rudolph and Blei	2018			1858-2015	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Rosenfeld and Erk	2018	●		1900-2009	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Yao et al.	2018			1990-2016	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Jatowt et al.	2018	●	●	1600-2010	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Tree
Hellrich et al.	2018	●	●	-	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Stacked Bar Chart
Giulianelli et al.	2020			1910-2009	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Martinc et al.	2020			2011-2019	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Hofmann et al.	2021			2000-2020	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Li et al.	2021			1800 -1950	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Gruppi et al.	2022			-	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Kazi et al.	2022			1970-2020	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Spiral Line Chart, Radial Bar Chart

GLANCE: Enhancing LLM Communication through Text Visualization

Raphael Buchmüller, Daniel A. Keim



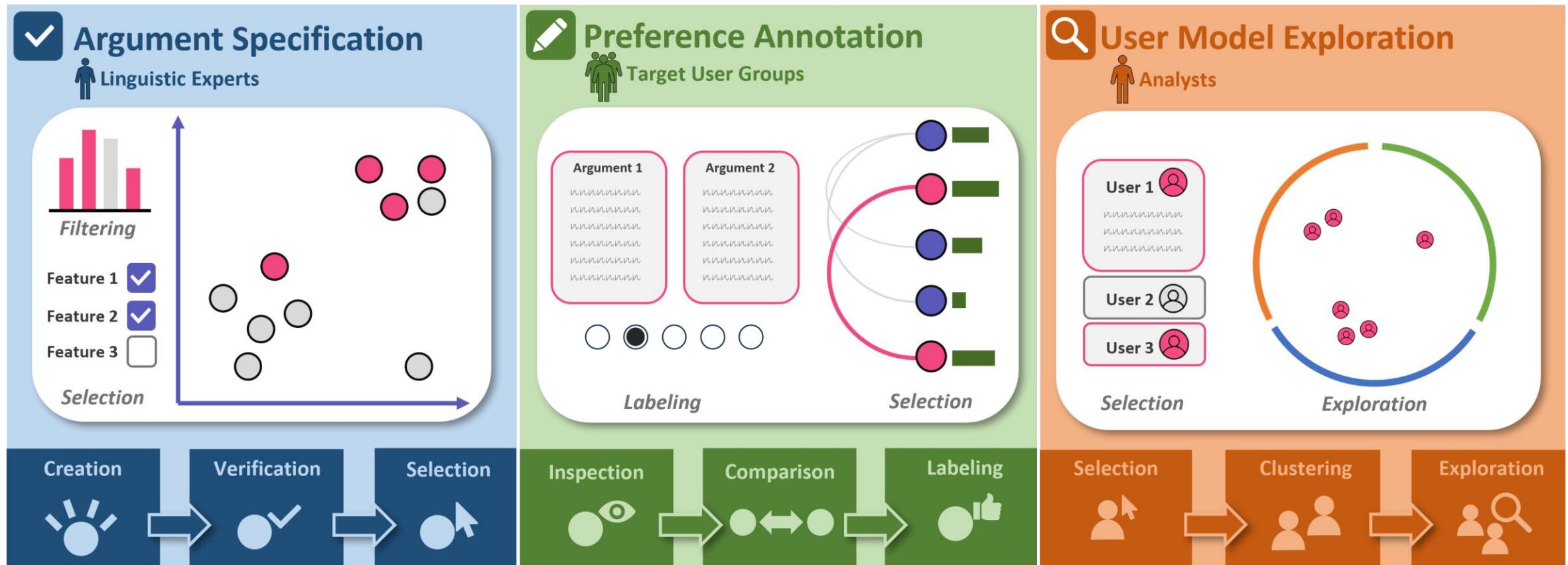
Prompt Enhancement

Prompt Enhancement

<p>! Explain the concept of machine learning, focusing on supervised learning techniques.</p> <p>Machine learning is a core area of AI where systems learn patterns from data to make predictions or decisions. In supervised learning, models are trained on datasets with known inputs and outputs. The process involves providing the system with labeled data, allowing it to map inputs to corresponding outputs accurately. Supervised learning techniques are used for tasks like classification, where the goal is to assign items to categories, and regression, which predicts numerical values. With enough labeled examples, the system can generalize and predict outputs for new, unseen inputs.</p> <p>Type your message here... </p>	<p>+ Generate a short story about the fjords of Norway and its beauty when wandering through.</p> <p>The fjords of Norway shimmered in the early morning light as Ingrid hiked along the narrow path. towering cliffs, dusted with snow, reflected on the deep blue waters below. sunlight filtered through the clouds, casting golden rays on emerald green valleys. The air was crisp, filled with the sounds of nature—the gentle lap of water, distant bird calls, and rustling leaves. Pausing at an outcrop, Ingrid marveled at waterfalls their silver streams glistening in the sun. the way felt timeless, their beauty pure, leaving her with a deep sense of peace and wonder.</p> <p></p>	<p>↑ Improve the following letter making it more formal and concise.</p> <p><i>Dear Sir, I am writing this email to let you know that I really liked your cool idea. It was awesome, and I hope everything is going fine. Please get back to me ASAP.</i></p> <p>Dear Sir Mr. Johnson, I am writing this email I write to you I write to you to let you know that I really liked appreciated appreciated your cool idea innovative concept. It was awesome remarkable, and I hope everything is going fine I trust this message finds you well. Please get back to me ASAP respond at your earliest convenience respond at your earliest convenience.</p> <p></p>	<p>- Summarize key strategies in adapting agriculture to climate change.</p> <p><i>Adapting agriculture to climate change requires a multi-dimensional approach. Key strategies include drought-resistant crops, sustainable farming techniques, and efficient irrigation systems. Incentives like subsidies and policies for water and soil management are essential.</i></p> <p>Climate change adaptation in agriculture involves using drought-resistant crops, sustainable farming practices, and efficient irrigation. Policy measures, like subsidies and resource management, support this transition.</p> <p></p>
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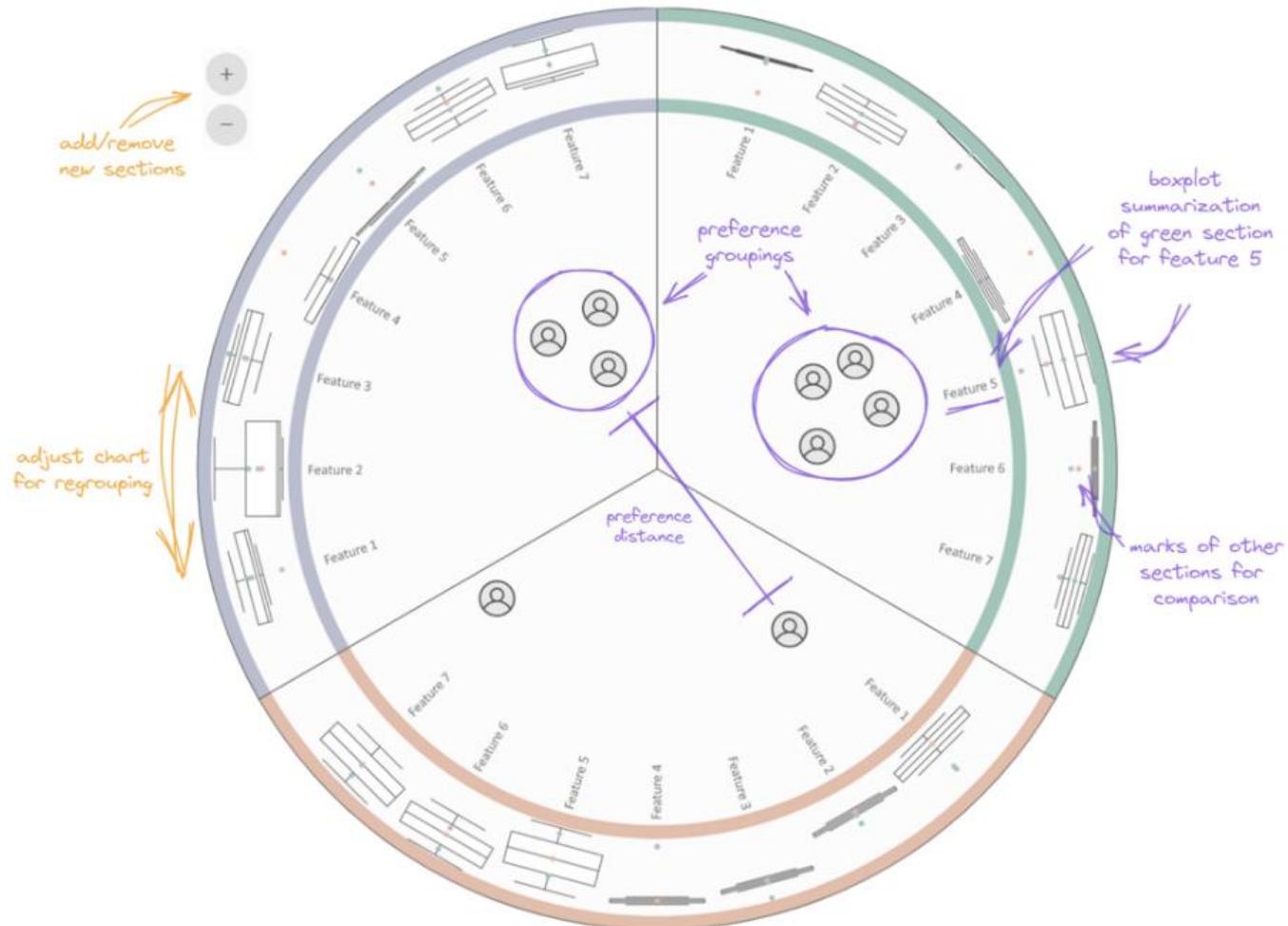
ArgPref: Exploring User Preferences in Argument Quality through Visual Analytics

Raphael Buchmüller, Mark-Matthias Zymla, Sara di Bartolomeo, Miriam Butt, Daniel Keim, Rita Sevastjanova and Mennatallah El-Assady



A VA tool to collect, annotate and explore user preferences in written arguments.

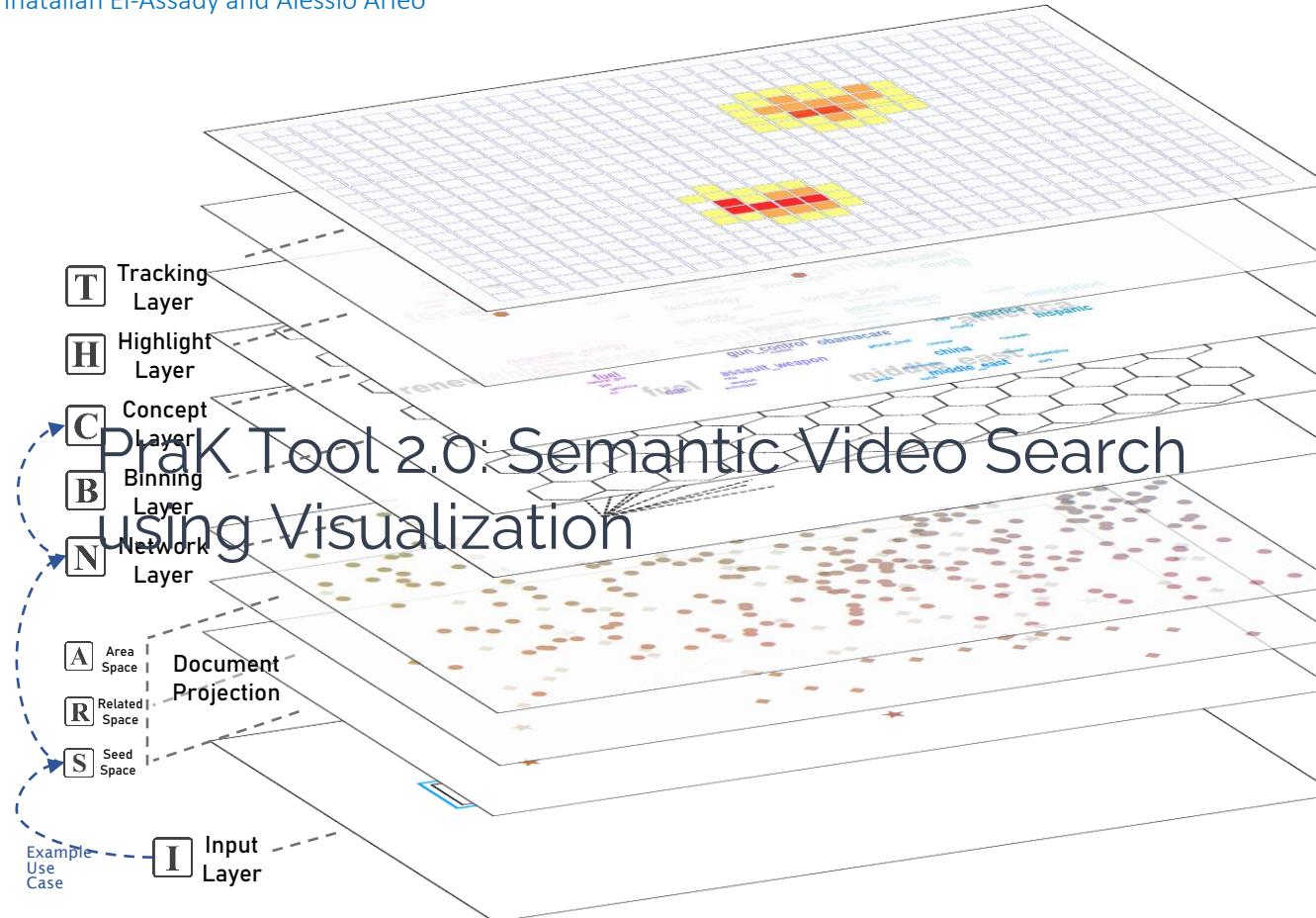
Comparative Exploration of Preference Models using Visual Analytics



Semantic Research Spaces:

Visual Analysis for the Exploration of Scientific Publications

Raphael Buchmüller, Daniel A. Keim, Mennatallah El-Assady and Alessio Arleo



A VA tool explore the semantic landscape of retrieved citation networks.

VBS Challenge at MMM2025

PraK Tool 3.0: Semantic Video Search using Visualization

Michael Stroh, Vojtech Kloda, Benjamin Verner, Zuzana Vopalkova, Raphael Buchmüller, Bastian Jäckl, and Jakub Lokoc

Video Hunter

user01 VideoHunter Task ID

Your custom result message SEND CUSTOM TEXT

← →

Your text query

SUBMIT TEXT QUERY

CHOOSE FILES or drag and dr...

BAYES UPDATE

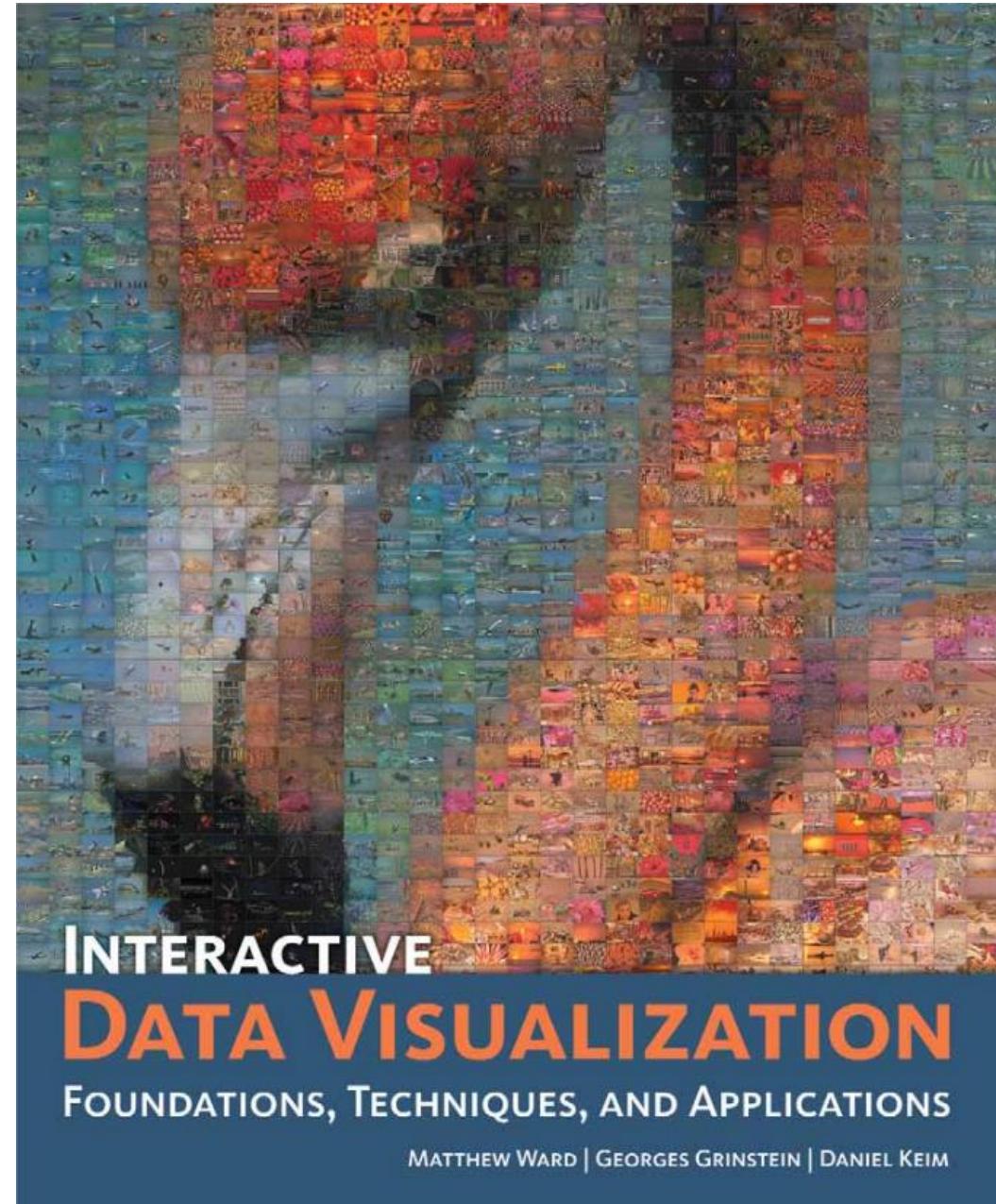
scorpionfish
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stonefish
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imboldt squid
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reef octopus
white squid

12 frames of underwater video results.

Resources

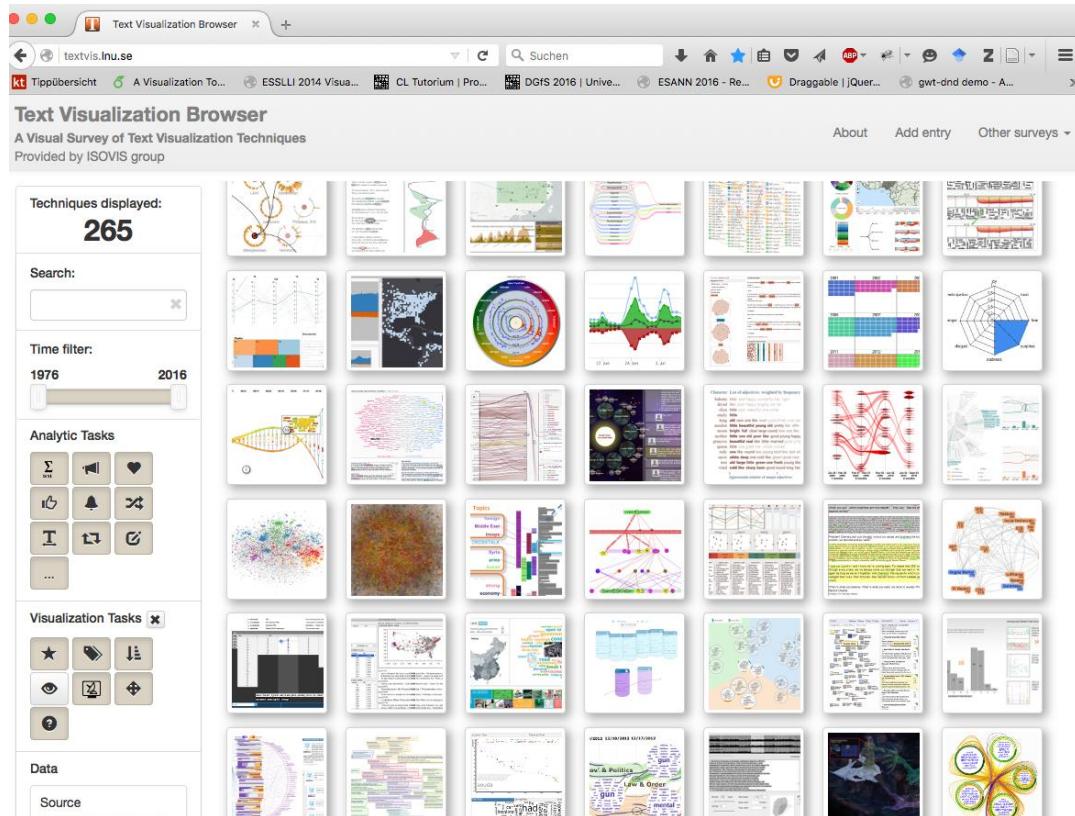
For More Detailed Information

- IDV book
- Covers all important InfoVis aspects
- Good starting point
- Also used in our InfoVis lectures

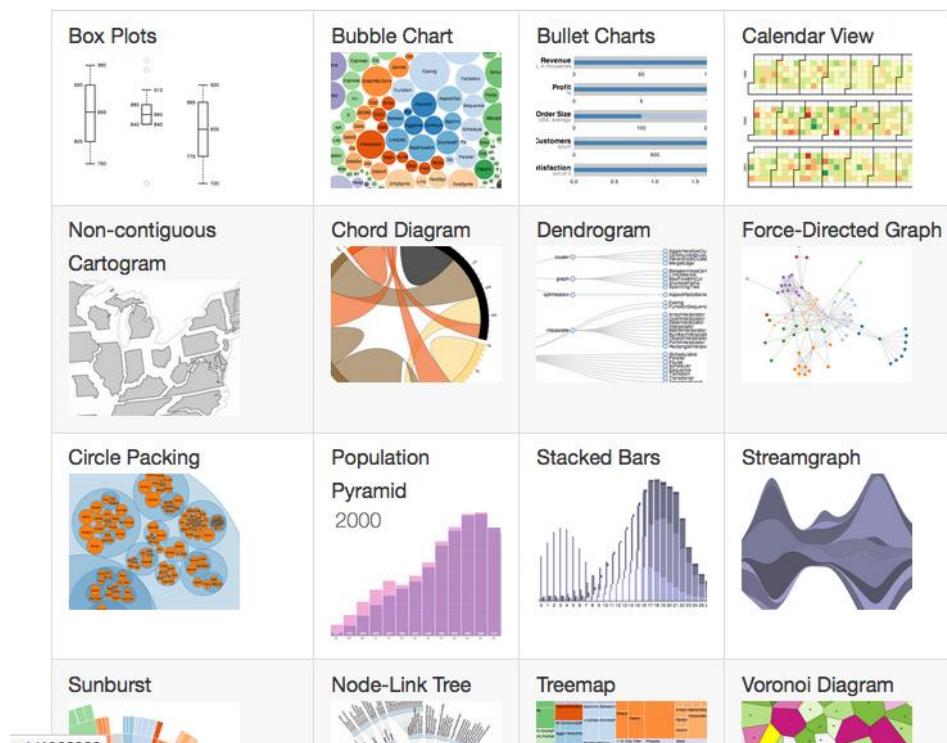


Many Design Alternatives! – Checkout Existing Visualizations

- <http://textvis.lnu.se/>
- <https://github.com/mbostock/d3/wiki/Gallery>



Visual Index

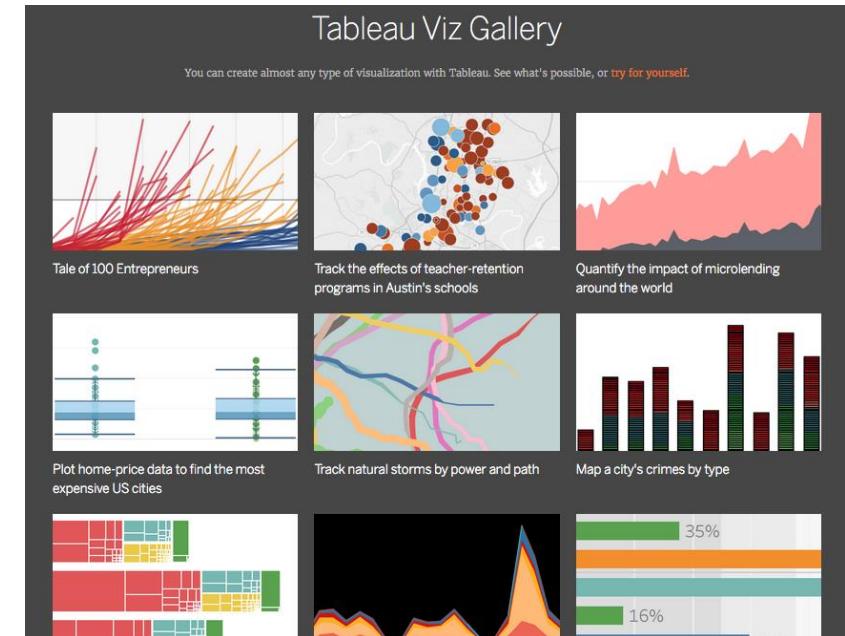


Many Design Alternatives! – Checkout Existing Visualizations

- <http://shiny.rstudio.com/gallery/>

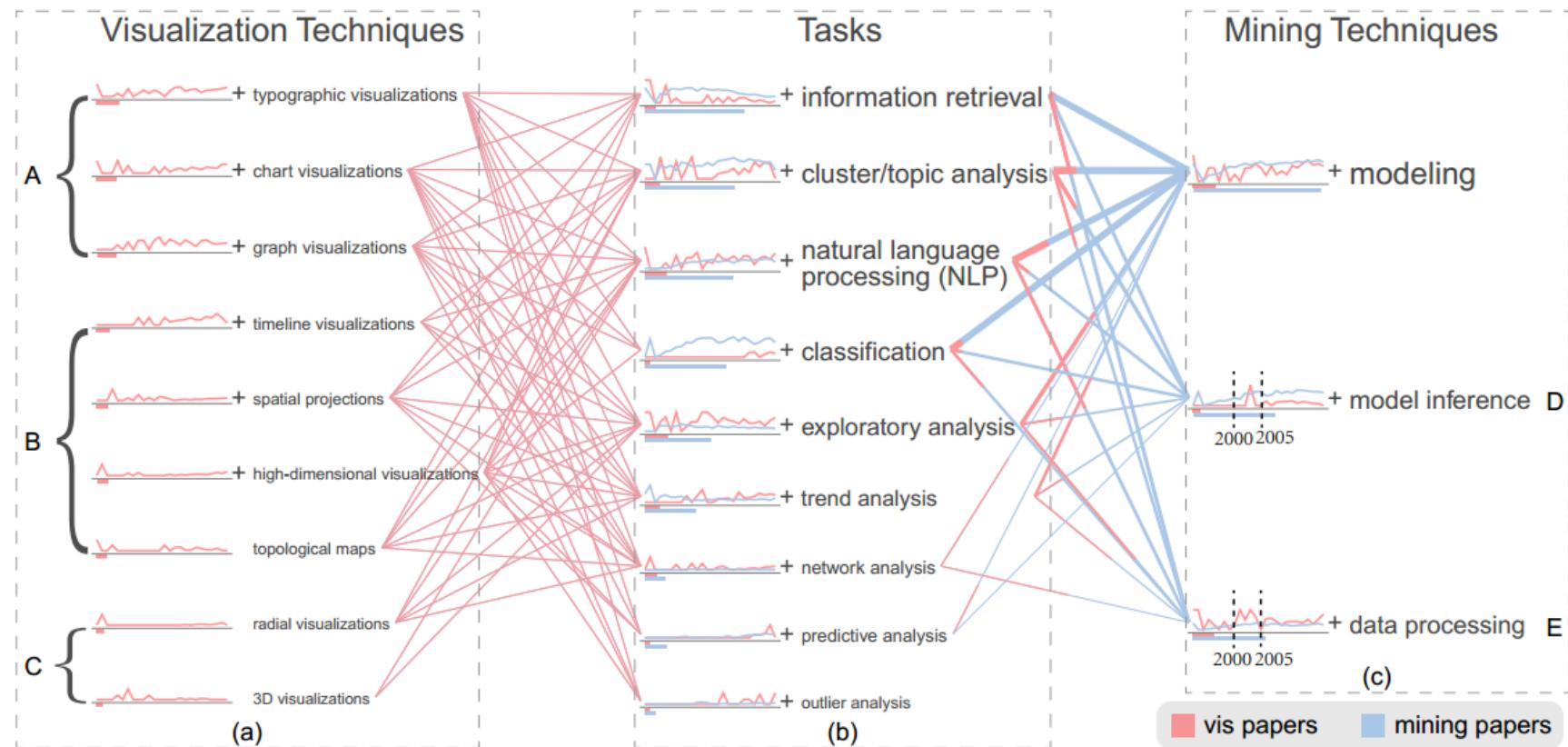
The screenshot shows the Shiny Gallery page. At the top, there's a navigation bar with links for Overview, Tutorial, Articles, **GALLERY**, Reference, Deploy, and Help. The main title is "Gallery". Below it, a sub-header says "Interactive visualizations" and describes Shiny's capability for fully interactive visualization using JavaScript libraries like d3, Leaflet, and Google Charts. It features four examples: "SuperZip example", "Bus dashboard", "Movie explorer", and "Google Charts". A section titled "Start simple" shows four more examples: "Kmeans example", "Telephones by region", "Faithful", and "Word cloud".

- <http://www.tableau.com/stories/gallery/>



Bridging Text Visualization and Mining: A Task-Driven Survey

Shixia Liu, Xiting Wang, Christopher Collins, Wenwen Dou,
Fangxin Ouyang, Mennatallah El-Assady, Liu Jiang, and Daniel A. Keim



Online Available

- <https://www.wordandphrase.info/>
- wordwanderer.org
- <https://voyant-tools.org/>
- <http://www.esono.com/boris/projects/poetry05/visualpoetry05/index.html>