#### Lecture 10

## **Search Visualization**

- "Search User Interfaces" by Hearst
- Visual Query Formulation
- Search Result Visualization
- InfoCrystal → MetaCrystal → searchCrystal
- Visual Search Tools on the Web

## **Text Visualization**

- Visualization for Text Analysis by Hearst
   <a href="http://searchuserinterfaces.com/book/sui">http://searchuserinterfaces.com/book/sui</a> ch11 text analysis visualization.html
- Visualization of Document Attributes
- Some Tools

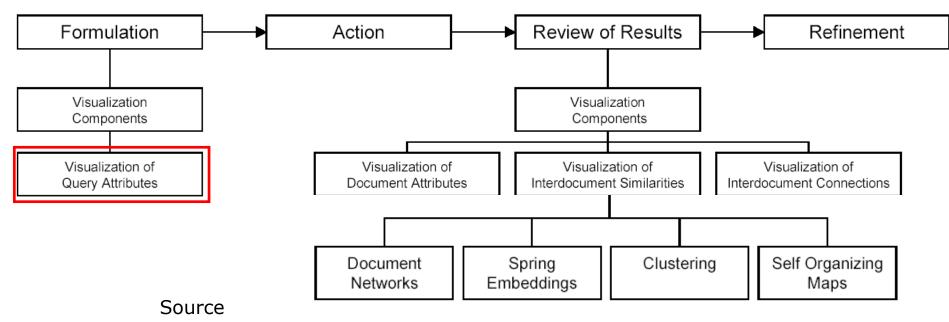
## **NYTimes Text Visualization**

#### Search Visualization

#### **Information Access = Iterative process**

Visual User Interface should help users

- Formulate Queries
- Understand Search Results
- Refine and Track Progress of Search



**Thomas Mann** (PhD Thesis Uni of Konstanz)

Visualization of search results from the World Wide Web

http://www.ub.uni-konstanz.de/v13/volltexte/2002/751//pdf/Dissertation Thomas.M.Mann 2002.V.1.07.pdf

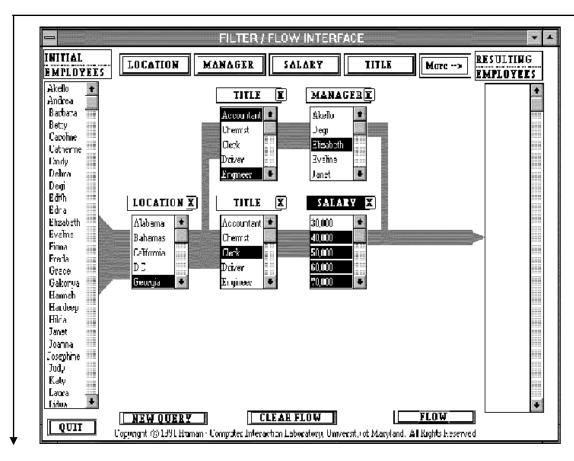
## Visual Query Formulation – Boolean → FilterFlow

**Coordination Problem:** which operator to choose?

Most people find the basic Boolean syntax counter-intuitive.

AND "implies" broadening (opposite true).

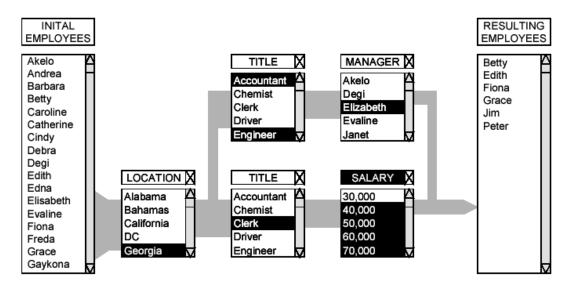
OR "implies" narrowing (opposite true).





AND

## Visual Query Formulation – Boolean → FilterFlow



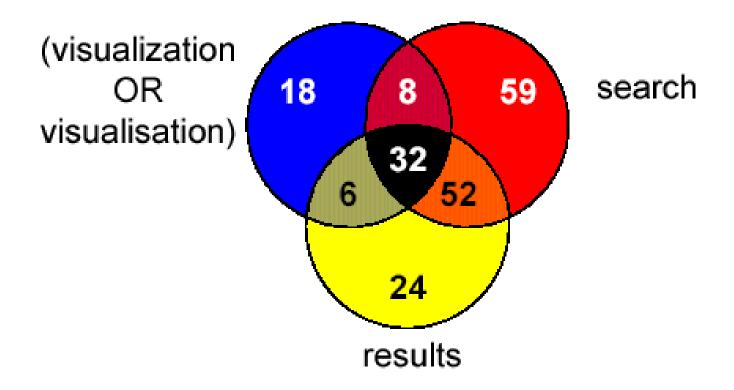
Find the accountants or engineers from Georgia who are managed by Elisabeth, or the clerks from Georgia who make more than thirty thousand

(A or B or C) and (D or E) and (not F)  $\rightarrow$  express common queries

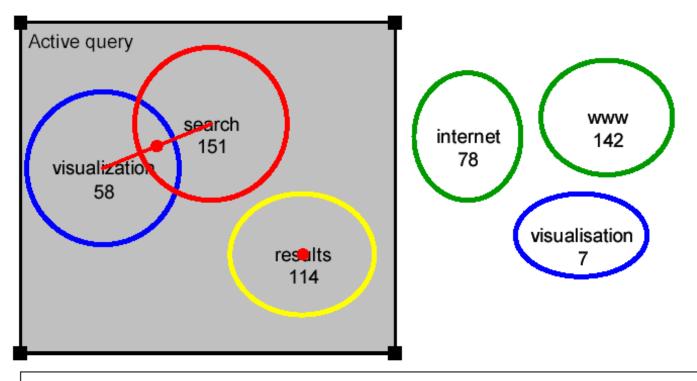
**Difficult** to express complex queries

How? → Visualize "Power Set"

# Visual Query Formulation – Venn Diagrams → TeSS



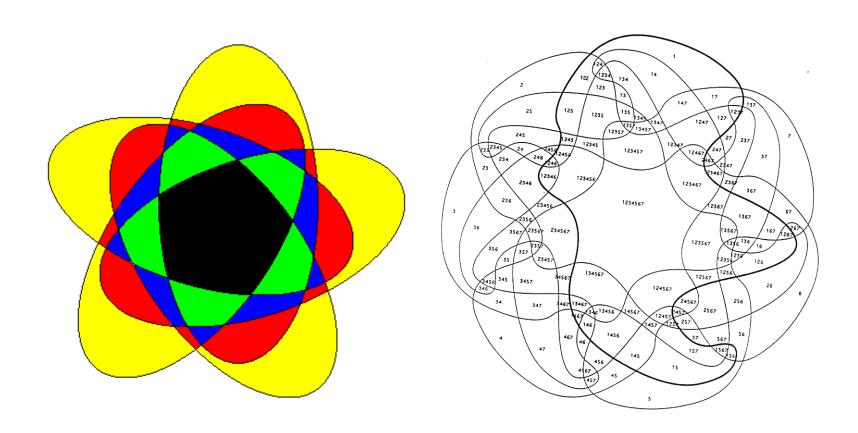
# Visual Query Formulation – Venn Diagrams → VQuery



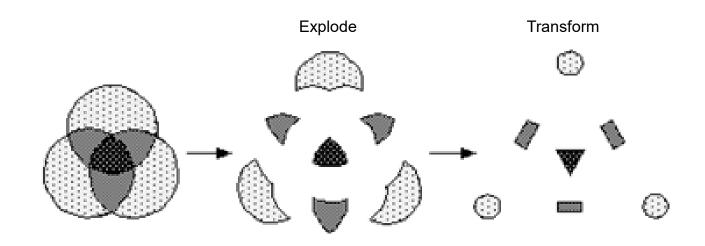
Search for any documents containing either visualization and search; or results

- 1. "AND" "OR" "NOT" → low visual saliency
  - 2. How to generalize to higher number of sets?

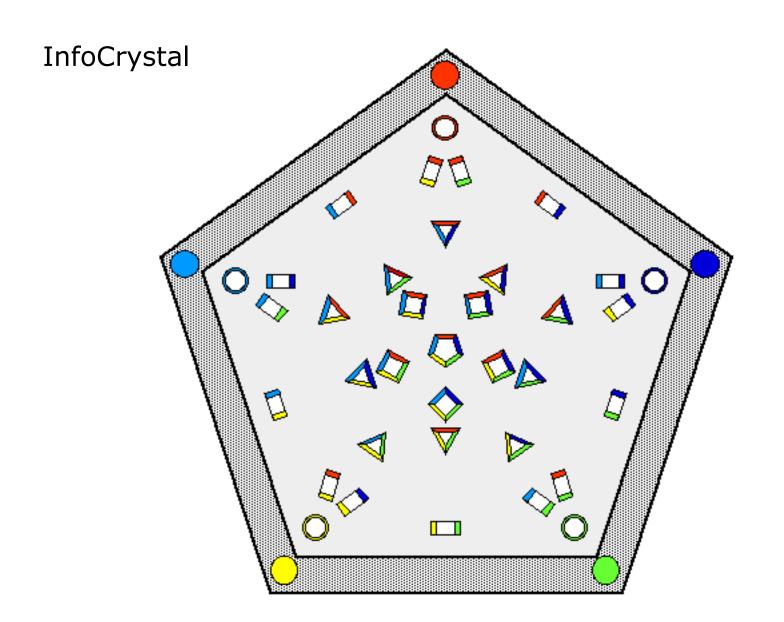
# Generalize Venn Diagrams

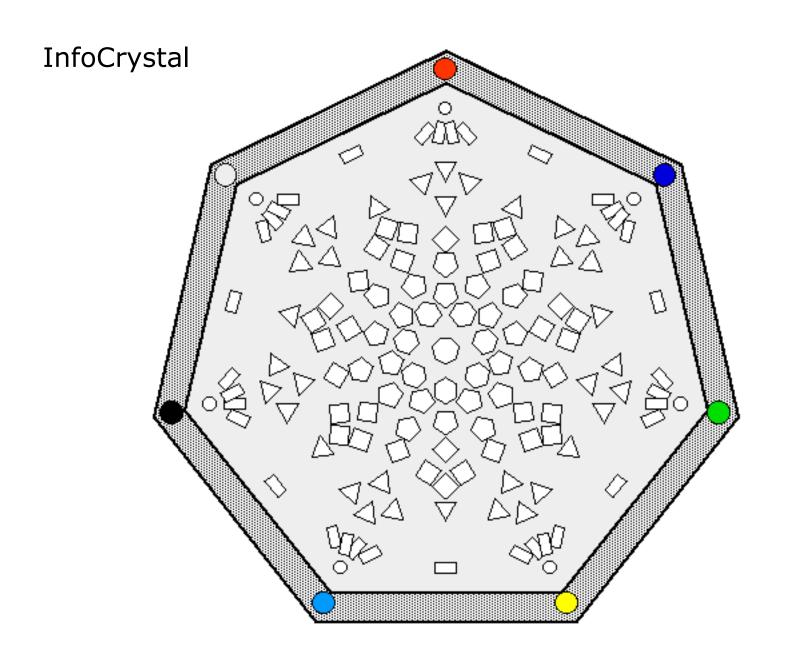


# Goal - Compare Search Results



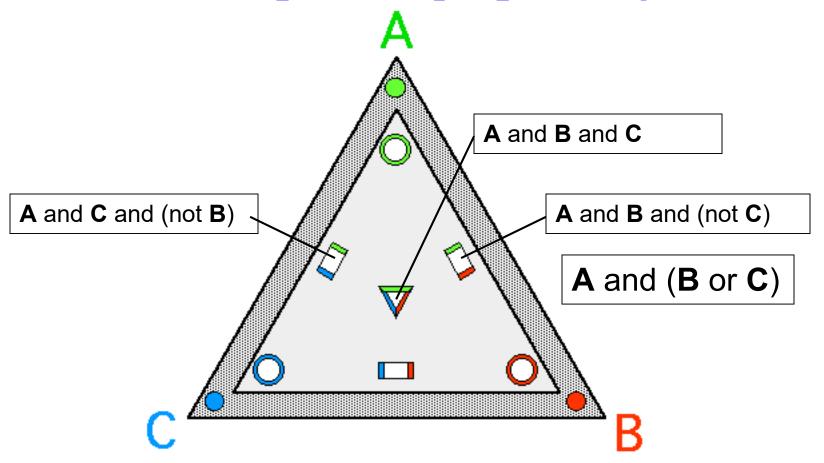
# Can be Generalized to N Sets



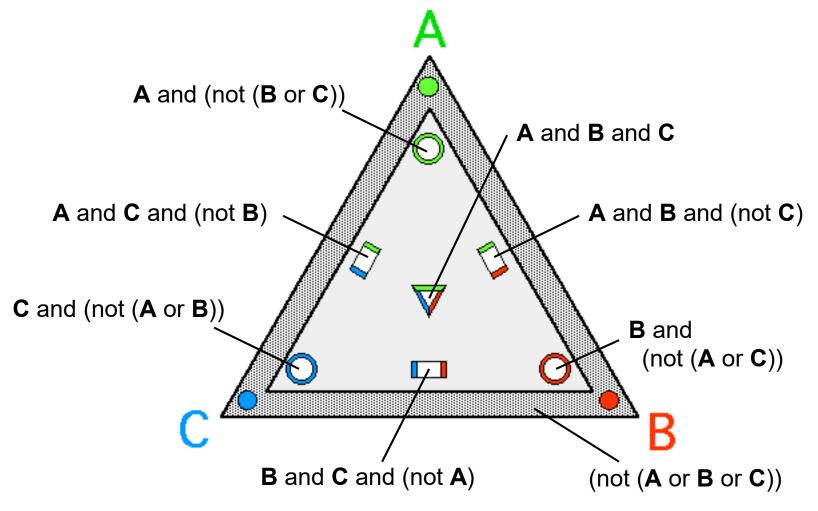


## InfoCrystal

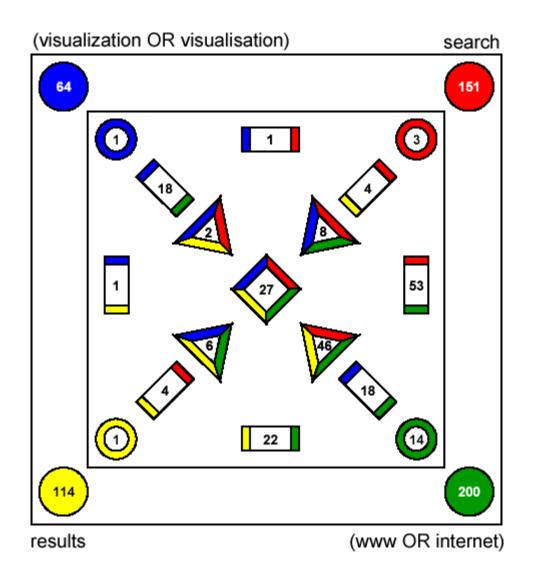
# How to formulate Boolean queries graphically?



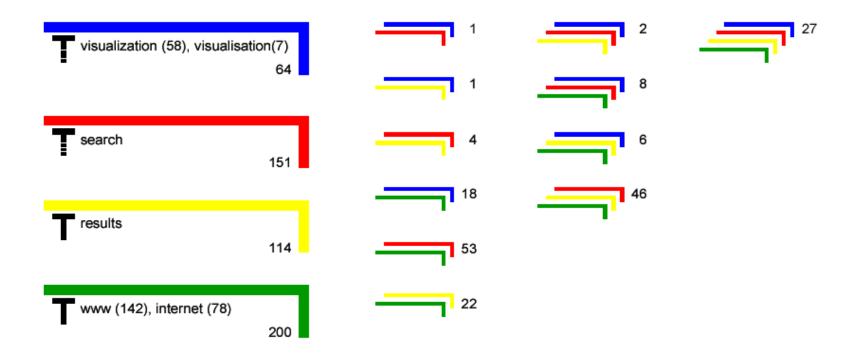
# How to formulate Boolean queries graphically?



# Visual Query Formulation – Boolean Power Set → InfoCrystal

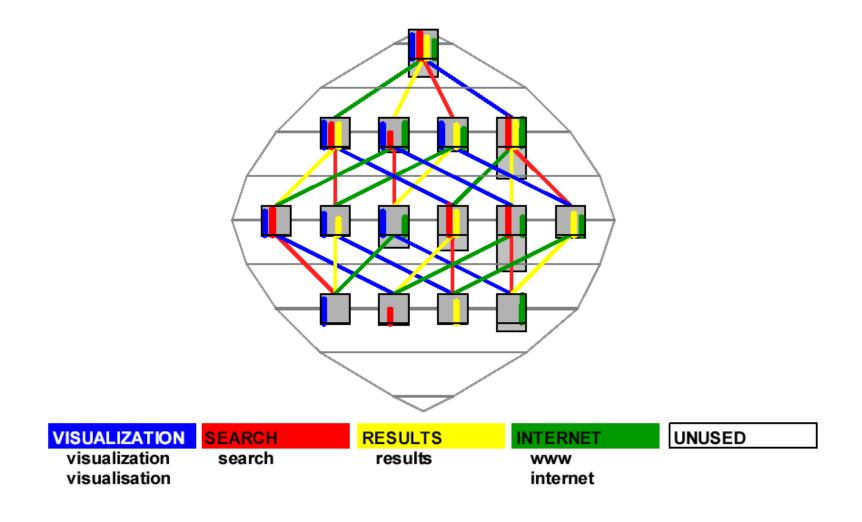


# Visual Query Formulation – Other "Power Set" Visualizations

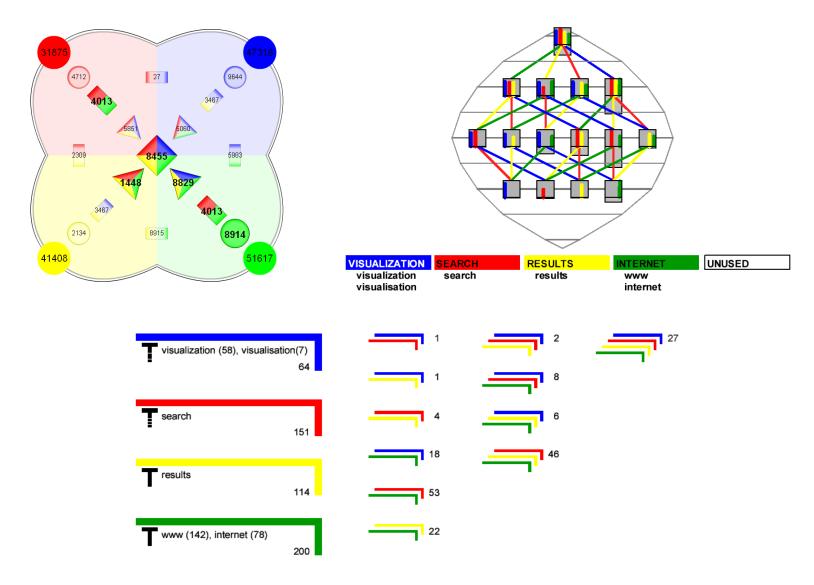


"Bracket"-visualization [Eibl 1999]

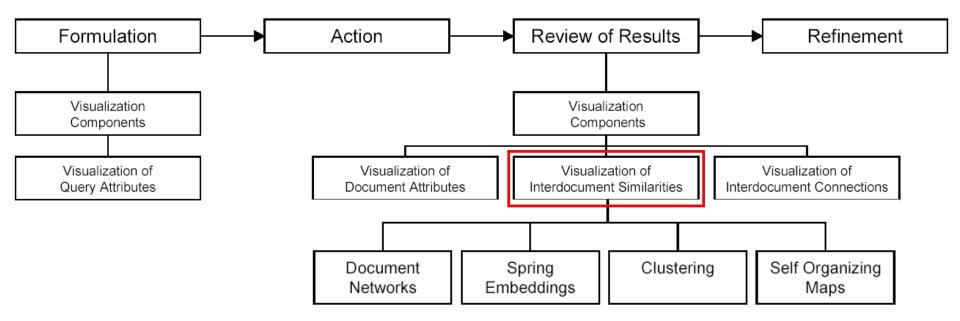
# Visual Query Formulation – "Power Set" – **NIRVE**



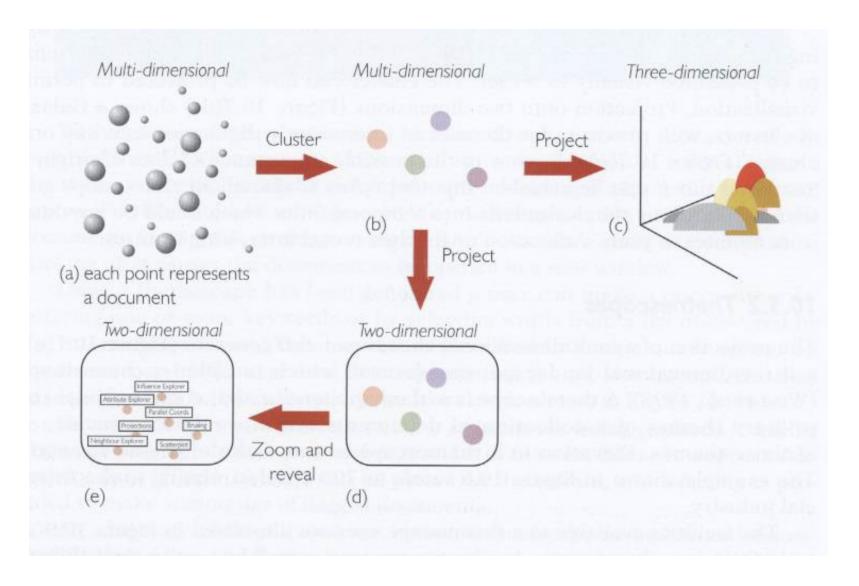
# Visual Query Formulation - "Power Set" Visualizations



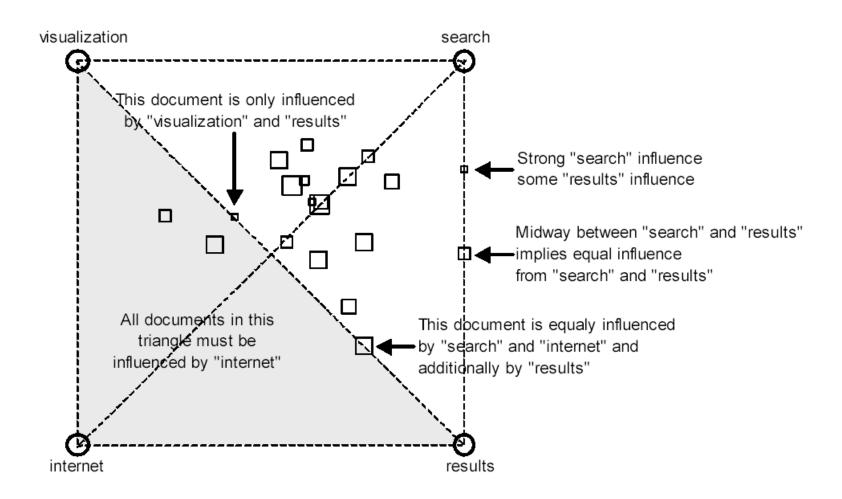
#### Visualization of Search Results & Inter-Document Similarities



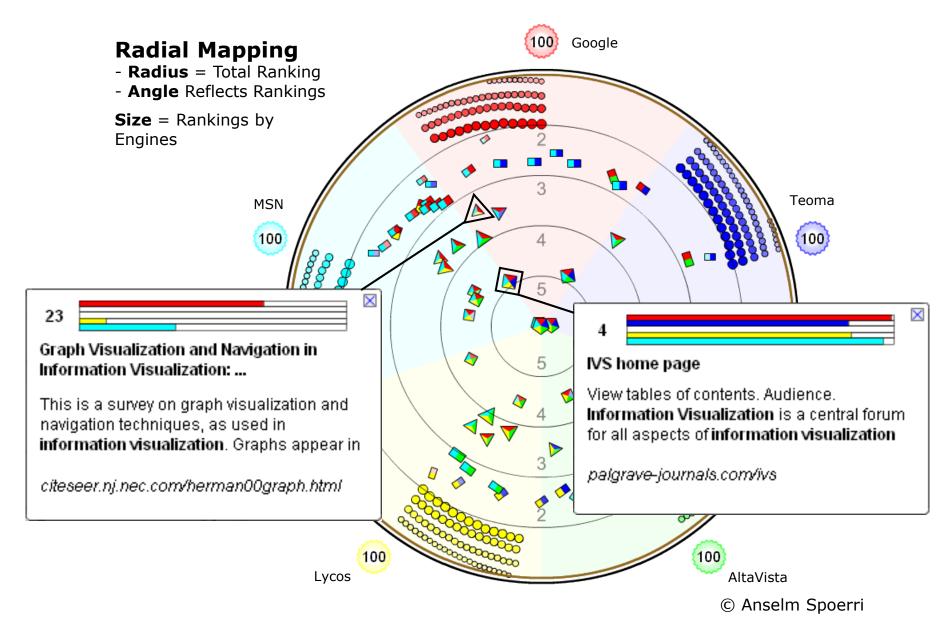
#### Visualization of Search Results & Inter-Document Similarities



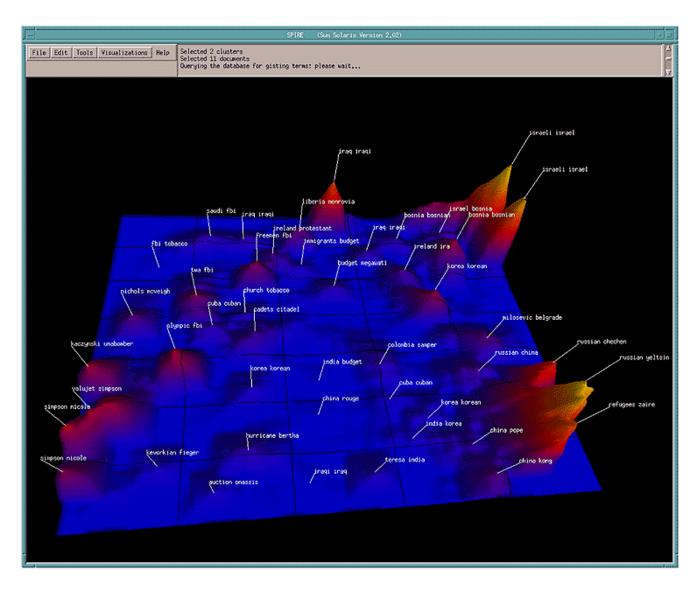
#### Search Result Visualization → VIBE



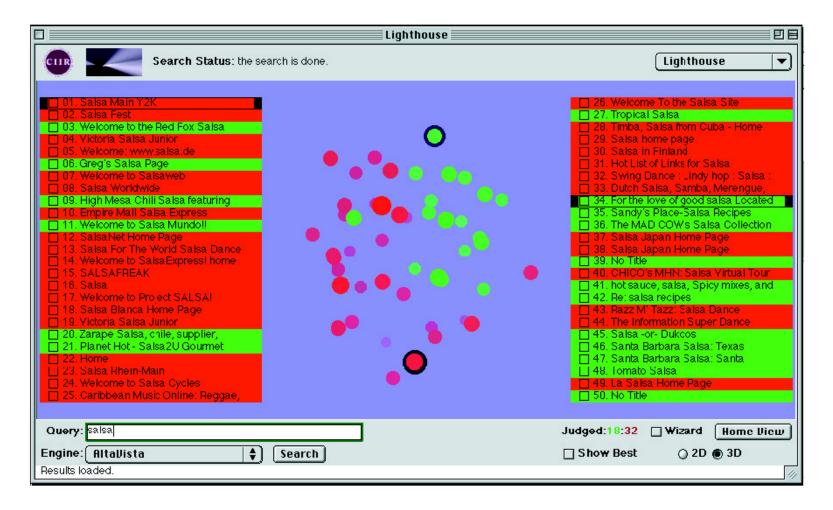
## Search Result Visualization → MetaCrystal: Cluster Bull's Eye



# Search Result Visualization → ThemeScapes

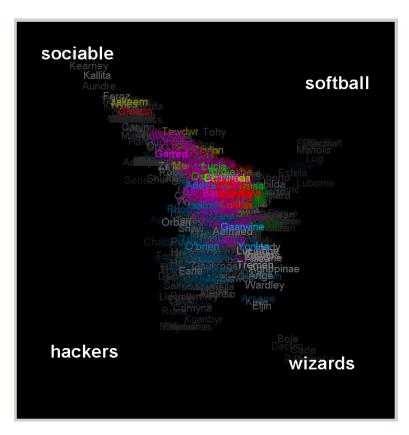


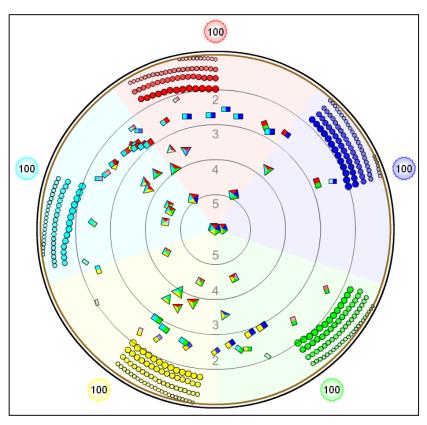
#### Search Result Visualization → **Lighthouse**



**Cluster Hypothesis** – related documents relevant to same requests and should be in close spatial proximity.

#### Search Result Visualization → Point of Reference

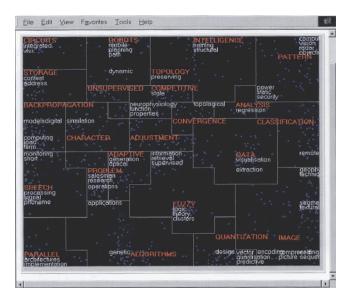




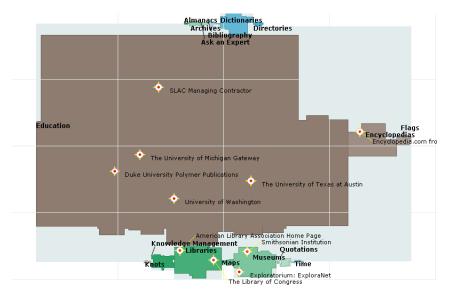
MetaCrystal

VisualWho

#### Search Result Visualization → 2D Maps

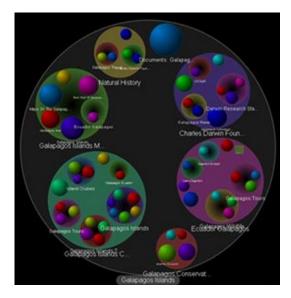


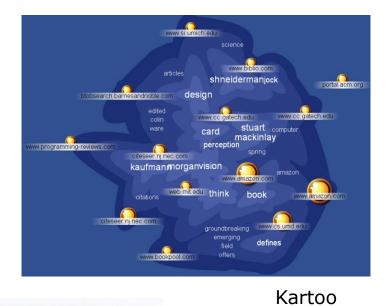
Self-Organizing Map



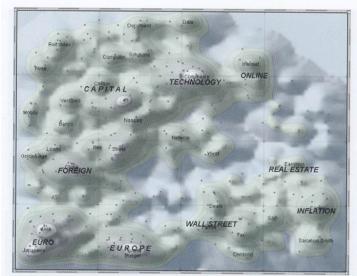
Map.net

## Search Result Visualization → 2.5D Maps



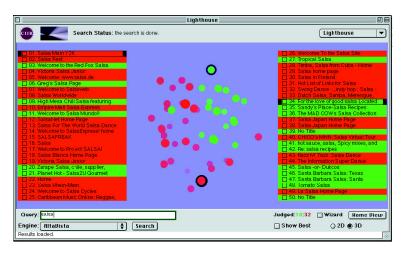


Grokker

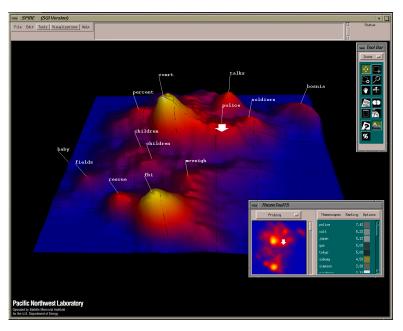


ThemeScape / Aureka

# Search Result Visualization → 3D



Lighthouse



Themescapes

# InfoCrystal → MetaCrystal → searchCrystal

#### **InfoCrystal**

Visualize Overlap between Search Results → Visualize Power Set

#### MetaCrystal

- **Visualize Overlap** between Result Sets from Different Search Engines
- Authority Effect: The more engines that find a result, the greater its probability of being relevant.
- Ranking Effect: The higher up a result is placed and the more engines that find it, the greater its probability of being relevant.

#### searchCrystal

- Compare, remix and share results from web, image, video, blog, tagging, news engines, Flickr images or RSS feeds.
- Embed on a web or blog page
- <u>Demo</u> of Most Visited Wikipedia pages (Sept 06 Jan 07)

You may find interesting **two papers published** in **First Monday**: <a href="http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/1764/1644">http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/1765/1645</a>

#### Search Visualization – Tools

Viewzi <a href="http://www.viewzi.com/search/whitevoid-photocloud/">http://www.viewzi.com/search/whitevoid-photocloud/</a>

Quintura <a href="http://www.quintura.com/">http://www.quintura.com/</a>

**SpaceTime** <a href="http://www.spacetime.com/">http://www.spacetime.com/</a>

AquaBrowser <a href="http://demo.aquabrowser.com/?q=visualization">http://demo.aquabrowser.com/?q=visualization</a>

Aduna / Vound <a href="http://www.vound-software.com/">http://www.vound-software.com/</a>

#### **Closed Down**

- Kartoo
- Grokker
- SearchMe

#### Text & Document Visualization

## **Text not pre-attentive**

## **Text = Abstract Concepts = Very High Dimensionality**

- Multiple & ambiguous meanings
- Combinations of abstract concepts more difficult to visualize
- Different combinations imply different meanings
- Language only hints at meaning
  - → based on common understanding "How much is that doggy in the window?"

#### **Facilitate Information Retrieval**

- Collection Overview
- Visualize which parts of query satisfied by document / collection
- Understand why documents retrieved

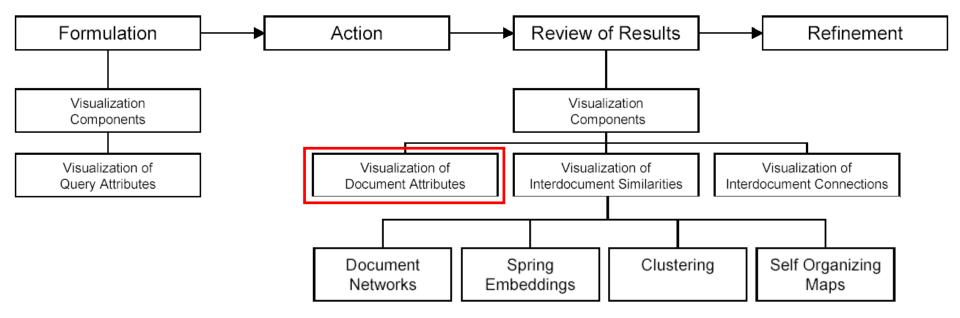
#### **Cluster Documents Based on Words in Common**

- Finds overall similarities among groups of documents
- Picks out some themes, ignores others

## Map Clusters onto 2D or 3D Representation

- Minimize time/effort to decide which documents to examine

# How to Use Visualization to Support Search



#### Source

Thomas Mann (PhD Thesis Uni of Konstanz)
Visualization of search results from the World Wide Web

http://www.ub.uni-konstanz.de/v13/volltexte/2002/751//pdf/Dissertation Thomas.M.Mann 2002.V.1.07.pdf

#### Visualization of Document Attributes







CONTRACTOR STATE



Commission of the property of the con-

Visualization of WWW-Search Results

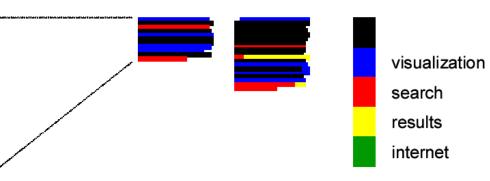
The idea of Information Visualization is to get insights into great amounts of abstract data. Especially document sets found by searching the World Wide Web are a special challenge. The paper gives a short overview on the variety of possible Visualizations for this application area. The presented ideas are grouped by using the Visualizations are discussed. An approach is presented to use alternative simple Visualizations, grouped around the traditional result-list, for the usage with a local meta web search engine.

The goal of Information Visualization (IV) is to support the exploration of large load of data, represents a special challenge. With current search engines, users typiplayed in a linear way. This paper presents research results, how to facilitate the ture about Visualization approaches (chapter 2), and a compilation of crucial factors for the usefulness of Visualizations (chapter 3), some ideas have been selected for a combined approach, called Synchronized Alternative Visualizations (chapter 4). The application domain discussed is focused on the presentation of search results from a local meta search engine.

size enterprises with business information from the Internet by using a local meta search engine. Besides the Visualization, there are a lot of factors biasing the successful like search engines. The Visualization approaches described will in the

#### **Thumbnails**

The idea of Information Visualization is to get insights into great amounts of abstract data. Especially document sets found by searching the World Wide Web are a special challenge. The paper gives a short overview on the variety of possible visualizations for this application area. The presented ideas are grouped by using the four phase framework of information seeking. Crucial factors for the success of visualizations are discussed. An approach is presented to use alternative simple visualizations, grouped around the traditional result-list, for the usage with a local mata web search agains.

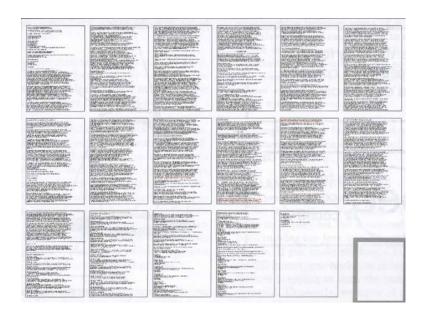


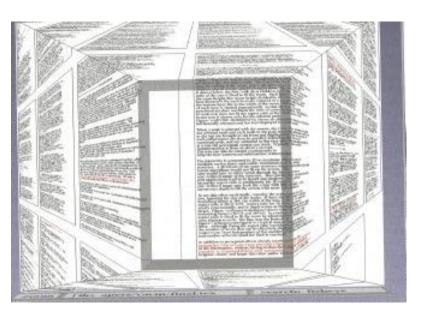
SeeSoft

## Visualization of Document Attributes → **Document Lens**

Problem: Text can be too small to read

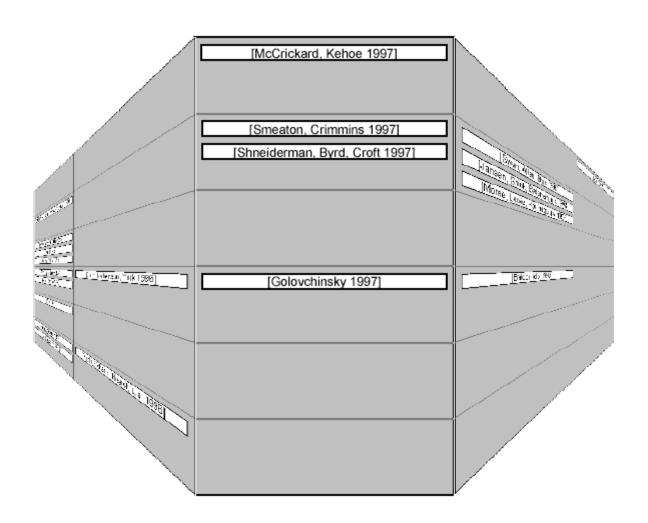
→ Focus + Context Fisheye Distortion





Does it work?

# Visualization of Document Attributes → Perspective Wall



## Visualization of Document Attributes → Bar Graphs

- 1. Visualizing Search Results using SQWID.
- 2. Visualization of WWW-Search Results.
- 3. Visualizing World Wide Web Information Resources.
- 4. Evaluating a Visual Retrieval Interface: Asplnguery at TREC-6.
- 5. Real Life Information Retrieval: a Study of User Queries on the Web.
- 6. Using A Data Fusion Agent for Searching the WWW.
- 7. Clarifying Search: A User-Interface Framework for Text Searches.
- 8. Evaluation of Text, Numeric and Graphical Presentations for Information Retrieval Interfaces.
- 9. Querying, Navigating and Visualizing a Digital Library Catalog.
- 10. TileBars: Visualization of Term Distribution Information in Full Text Information Access.
- 11. A New Paradigm for Browsing the Web.
- 12. IVEE: An Information Visualization and Exploration Environment.
- 13. Queries? Links? Is there a Difference?
- 14. The WebBook and the Web Forager: An Information Workspace in the World Wide Web.
- 15. Using Graphic History in Browsing the World Wide Web.
- 16. Interfaces for Information Exploration: Seeing the Forest.
- 17. Visual Exploration of Large Structured Data Sets.
- 18. Scatter/Gather Browsing Communicates the Topic Structure of a Very Large Text Collection.
- 19. Space-Scale Diagrams: Understand Multiscale Interfaces.
- 20. Enhanced Dynamic Queries via Movable Filters.

visualization

search

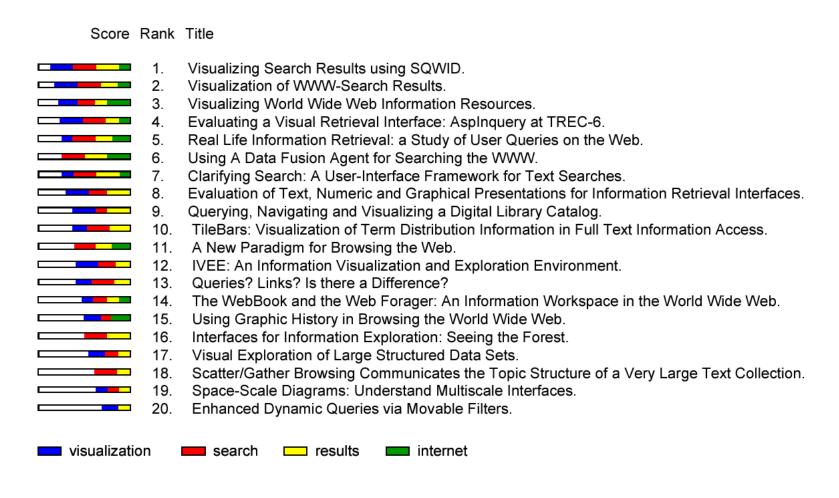
results

internet

Total sum:

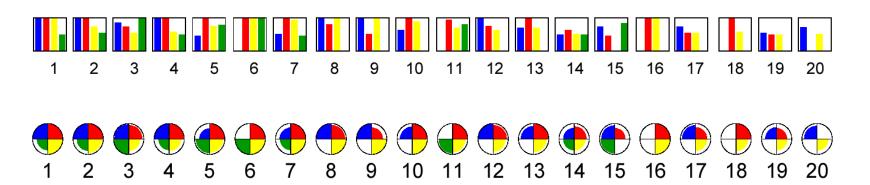
[Veerasamy 1996] / [Veerasamy, Belkin 1996]

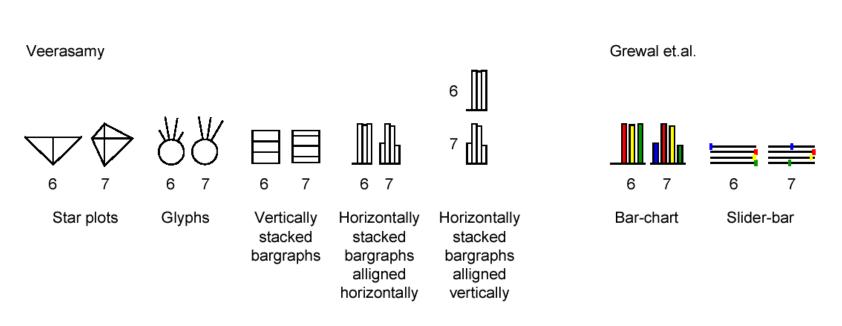
## Visualization of Document Attributes → Stacked Bar Graphs



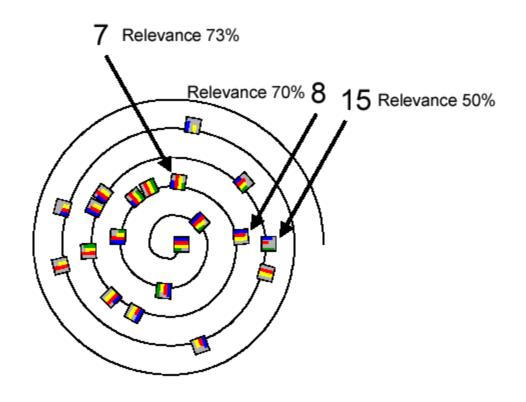
VQRa of the WInquery system [Shneiderman, Byrd, Croft 1997]

#### Visualization of Document Attributes → NIRVE & R-Wheels

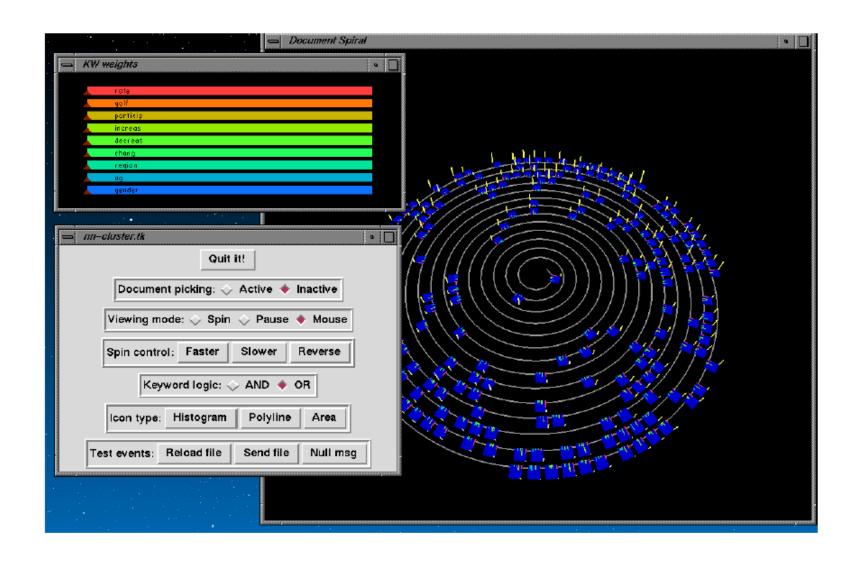




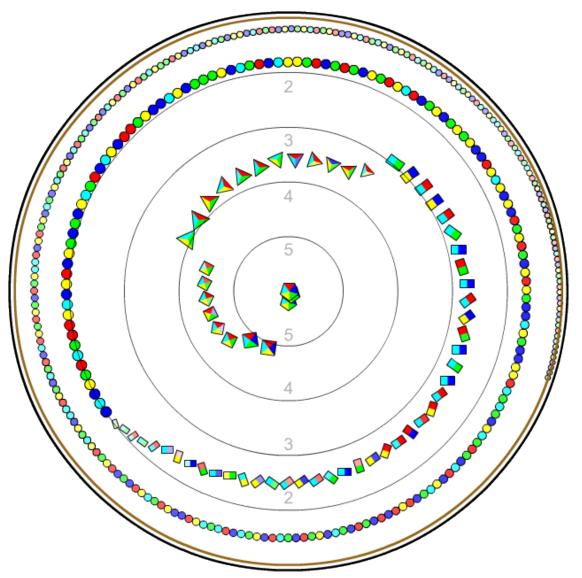
## Visualization of Document Attributes → NIRVE



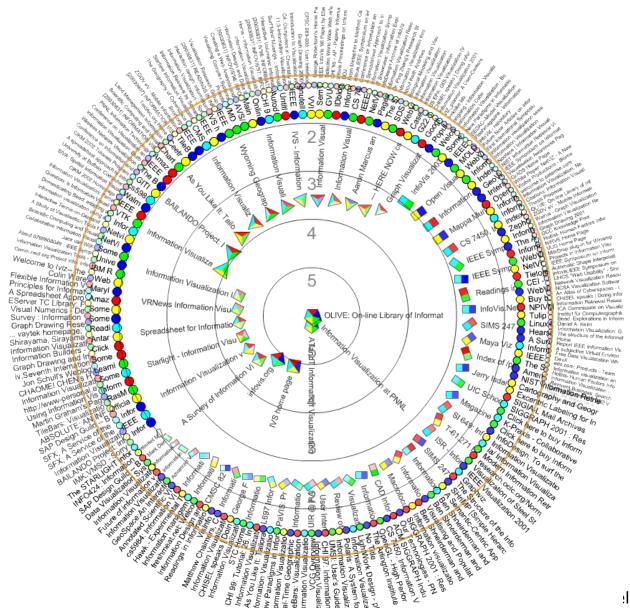
### Visualization of Document Attributes → NIRVE



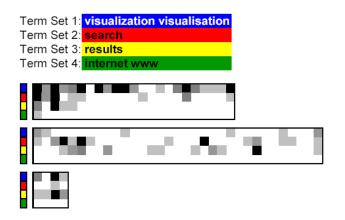
# Visualization of Document Attributes → RankSpiral



# Visualization of Document Attributes → RankSpiral



### Visualization of Document Attributes → TileBars

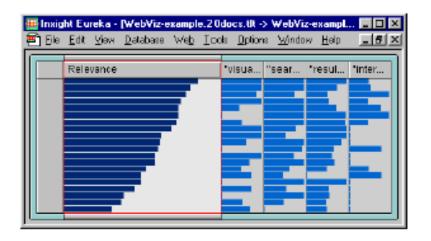


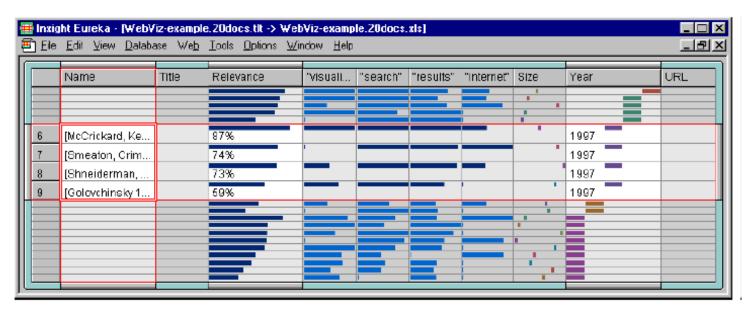
[Mann 1999] Visualization of WWW-Search Results. http://www.inf.uni-konstanz.de/~mann/papers/mann\_webvis99.html

[Hearst 1995] TileBars: Visualization of Term Distribution Information in Full Text Information Access. http://www.acm.org/sigchi/chi95/Electronic/documnts/papers/mah\_bdy.htm

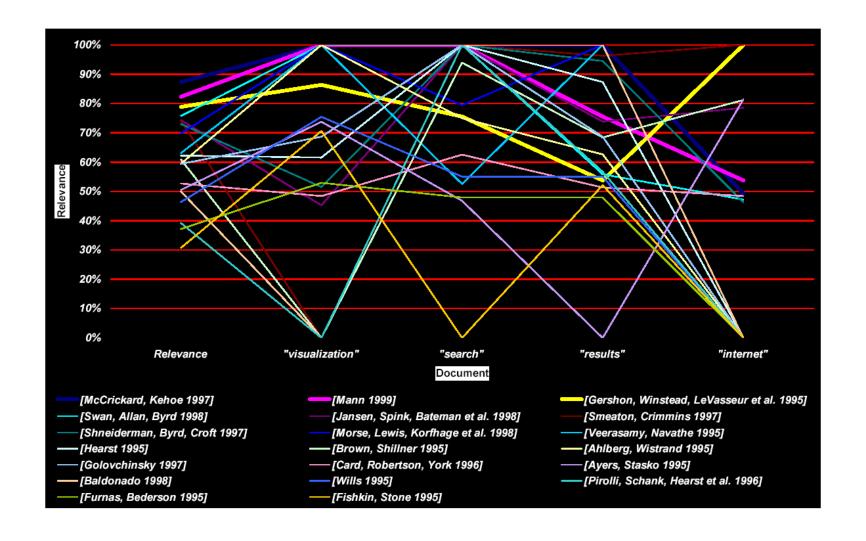
[Veerasamy, Navathe 1995] Querying, Navigating and Visualizing a Digital Library Catalog. http://www.csdl.tamu.edu/DL95/papers/veerasamy/veerasamy.html

### Visualization of Document Attributes → Table Lens





### Visualization of Document Attributes → Parallel Coordinates



### Text Visualization – Some Tools

Wordle - <a href="http://www.wordle.net/">http://www.wordle.net/</a>

**TextArc** - <a href="http://www.textarc.org/">http://www.textarc.org/</a>

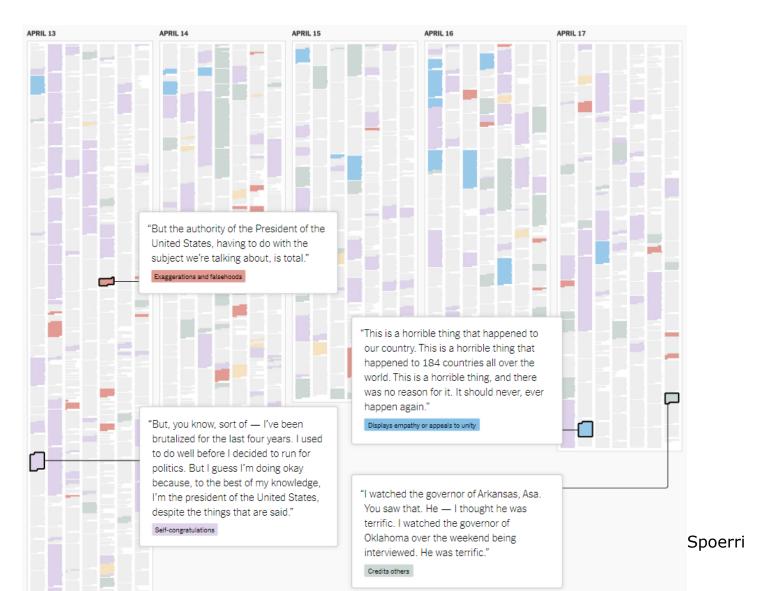
CapitolWords - <a href="http://capitolwords.org/">http://capitolwords.org/</a>

### **NYTimes State of the Union -**

http://www.nytimes.com/ref/washington/20070123 STATEOFUNION.html

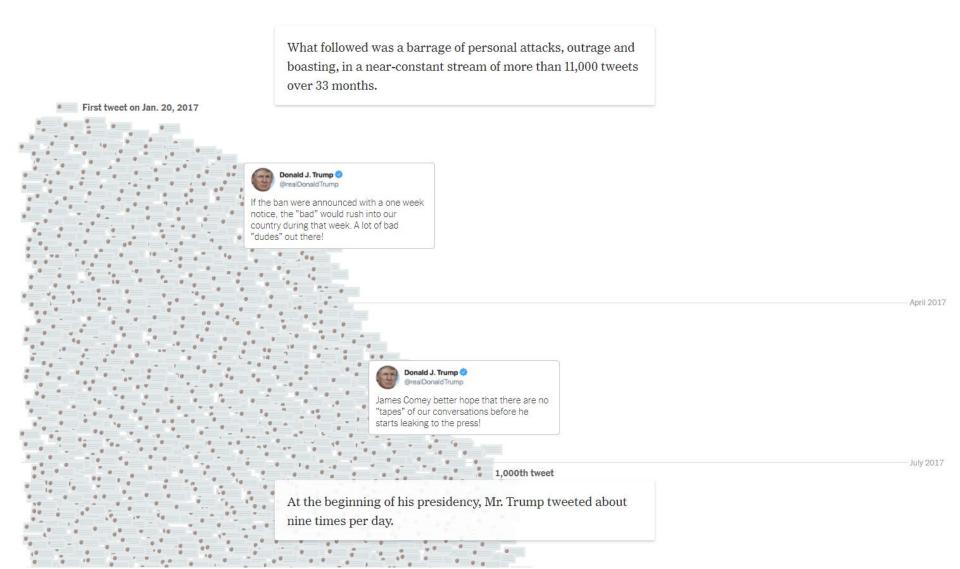
### 260,000 Words, Full of Self-Praise, From Trump on the Virus

https://www.nytimes.com/interactive/2020/04/26/us/politics/trump-coronavirus-briefings-analyzed.html



### The Twitter Presidency – Reshaping the White House

https://www.nytimes.com/interactive/2019/11/02/us/politics/trump-twitter-presidency.html



### A Detailed Timeline of Trump's Words About the Wall

https://www.nytimes.com/interactive/2019/02/13/upshot/detailed-timeline-trumps-words-border-wall.html

Barrier
 Fence
 Whatever you want/Doesn't matter what it's called

It's not a **fence**, Jeb, it's a WALL, and there's a BIG difference! For those that don't think a wall (**fence**) works, why don't they suggest taking down the **fence** around the White House? Foolish people! | Sept 2015 And if we're not going to have strong borders with a wall, which will make it very strong, by the way, and walls do work if they're properly built, not the little 11-foot walls that we have up right now, and they're not walls, they're **fences**. | Mexico, they all say the **fence**, first of all, we're going to build a wall and it's going to be a real wall, okay. | Calcabor | Mexico | Mex

#### TRUMP PRESIDENCY REGINS

Stage 2017 The WALL, which is already under construction in the form of new renovation of old and existing fences and walls, will continue to be built. | Cet 2017 It has to be built. A properly built and constructed designed wall. High, not a little fence. They had walls that they never got it done. | So - so we have sort of natural barriers. | Merch 2015 | Now, if you just have a pure fence. Now that's a fence, a very sturdy fence. But coming up | noticed the first thing | noticed, look how many holes are in that fence. | Now they fix the holes. But it doesn't look very good. They just patch it with more fence. If you take a look at the fence, and it's a very powerful fence. Not doing the trick. Because they cut holes in it and then they're patching holes all the time, I'm just looking. You have hundreds of holes cut in and patched. So, the fence is not strong enough. It's not the right idea. | But we're going to be starting work, literally, on Monday, on not only some new wall — not enough, but we're working that very quickly — but also fixing existing walls and existing be building some of it. | Sept. 2018 Tell Israel that the wall didn't work. They put up their wall... which is a series of very strong fences. | Qct. 2018 A border wall, which is moving faster than anybody would believe... is truly a life-saving barrier against deadly floods of drugs, crime, smugglers, traffickers, cartels. | Israel has a wall. ... They have a big wall. It's in the form of a very tough fence. | Seoul is 30 miles away from that border. And you talk about a protected border. That's a serious border. That's a wall like you never saw wire wall, and you see that, what they're doing. | Because most of them, if you go back to 2006, they all approved, essentially, a wall — a very powerful fence — which is pretty much the same thing. | Dec. 2018, We're going to see. One thing that I do have to say is: Tremendous amounts of wall have already been built, and a lot of — a lot of wall. When you include the renovation of existing fences and walls, we've renovated a tremendous amount and we've done a lot of work. In San Diego, we're building new walls right now. Even President Ronald Reagan tried for 8 years to build a Border Wall, or Fence, and was unable to do so. Others also have tried. We will get it done, one way or the other! The only thing that's going to stop that is great border security, with a wall, or a slat fence, or whatever you want to call it. I the barrier, wall, or steel slats — whatever you want to call it; it's all the same. The crisis of illegal activity at our Southern Border is real and will not stop until we build a great Steel Barrier or Wall. Let work begin! The only way to stop drugs, gangs, human trafficking, criminal elements and much else from coming into our Country is with a Wall or Barrier. Drones and all of the rest are wonderful and lots of fun, but it is only a good old fashioned Wall that works! | Virtually every Democrat we are dealing with today strongly supported a Border Wall or Fence. It was only when I made it an important part of my campaign, because people and drugs were pouring into our Country unchecked, that they turned against it. Desperately needed! | And yet every one of those Democrats approved the wall, or a fence, or very, very substantial barriers. | I don't want them in the country. The only way you're going to do it is to have a physical barrier, meaning a wall. | I'll meet with them, sure. I'll always meet with them. And, hopefully we're making progress on the funding of the wall, or barrier, whatever you want to call it. | I can't tell you whether government's going to be open. I can tell you it's not going to be open until we have a wall, a fence, whatever they'd like to call it. | You can't do it without a barrier. We can't do it without a wall. So you have drugs. You have human trafficking. You have illegal people coming into our country. | 150, 2019 And, by the way, for those that don't know — we don't want to talk about it all the time — but we've done tremendous amounts of renovation of existing walls and fences, and brought them back into brand-new condition. I It's very sad, if they knew they had a physical barrier. If they knew they had a wall, if they knew they had something that's going to stop them, they would have never come up in the first place. | But you can't have border security without the wall. You can't have border security without a very strong barrier. Call it anything you want. | The United States needs a physical barrier, needs a wall, to stop illegal immigration and to halt deadly inflow of drugs and crime. I If we had a wall or a barrier that was not penetrable, you wouldn't have people making that journey. All of the people you see coming up, if they knew we actually had a physical presence there, a physical barrier — I'm going to have them introduce themselves right now and also say a few words about the wall, about — you can call it a barrier. You can call it whatever you want. I Without a very strong form of barrier — call it what you will — but without a wall, you cannot have border security. | I have never had so much support, as I have in the last week, over my stance for border security, for border control and for, frankly, the wall or the barrier. | Steel is stronger than concrete. If I build this wall, or fence, or anything the Democrats need to call it — because I 'm not into names, I 'm into production. I It's essentially a right of way. So we are very, very far along on that. But eminent domain is something that has to be used. Usually you would say for anything that's long, like a road, like a pipeline, or like a wall or a fence, | If they know it's not going to take place because they can't get through because we have a great border wall, or fence, or barrier, they're not going to come up and you're not going to have the problem. | You'll see vast numbers of vehicles driving through the desert and entering where you don t have a very powerful fence or a wall. | So if I have a steel wall — or you could call it a steel fence — but it "Il be more powerful than any of the concrete walls that we' re talking about. | And we have

### See Which Sections of the Mueller Report Were Redacted

https://www.nytimes.com/interactive/2019/04/19/us/politics/redacted-mueller-report.html

#### Volume I: Russia interference in the 2016 presidential election



- 1 The Russian campaign to influence the 2016 election
- 3 Contacts that Carter Page, a Trump campaign adviser, had with the Russian government
- 5 Mueller's decision on whether or not to bring charges

- 2 Trump campaign's interest in the Wikileaks release of hacked materials
- Trump Tower meeting
- 6 People charged with lying and obstruction

### The Words Men and Women Use When They Write About Love

https://www.nytimes.com/interactive/2017/11/07/upshot/modern-love-what-we-write-when-we-write-about-love.html

