

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
http://searchuserinterfaces.com/book/sui_ch11_text_analysis_visualization.html
- **Visualization of Document Attributes**
- **Some Tools**

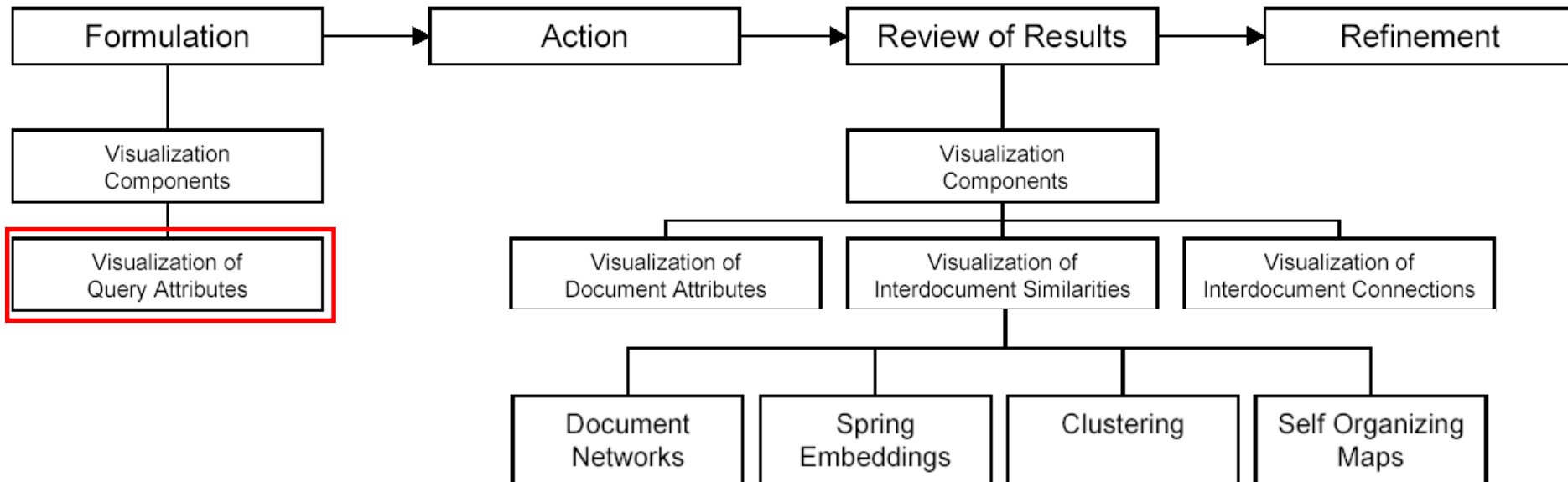
NYTimes Text Visualization

Search Visualization

Information Access = Iterative process

Visual User Interface should help users

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



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

Visual Query Formulation – Boolean → FilterFlow

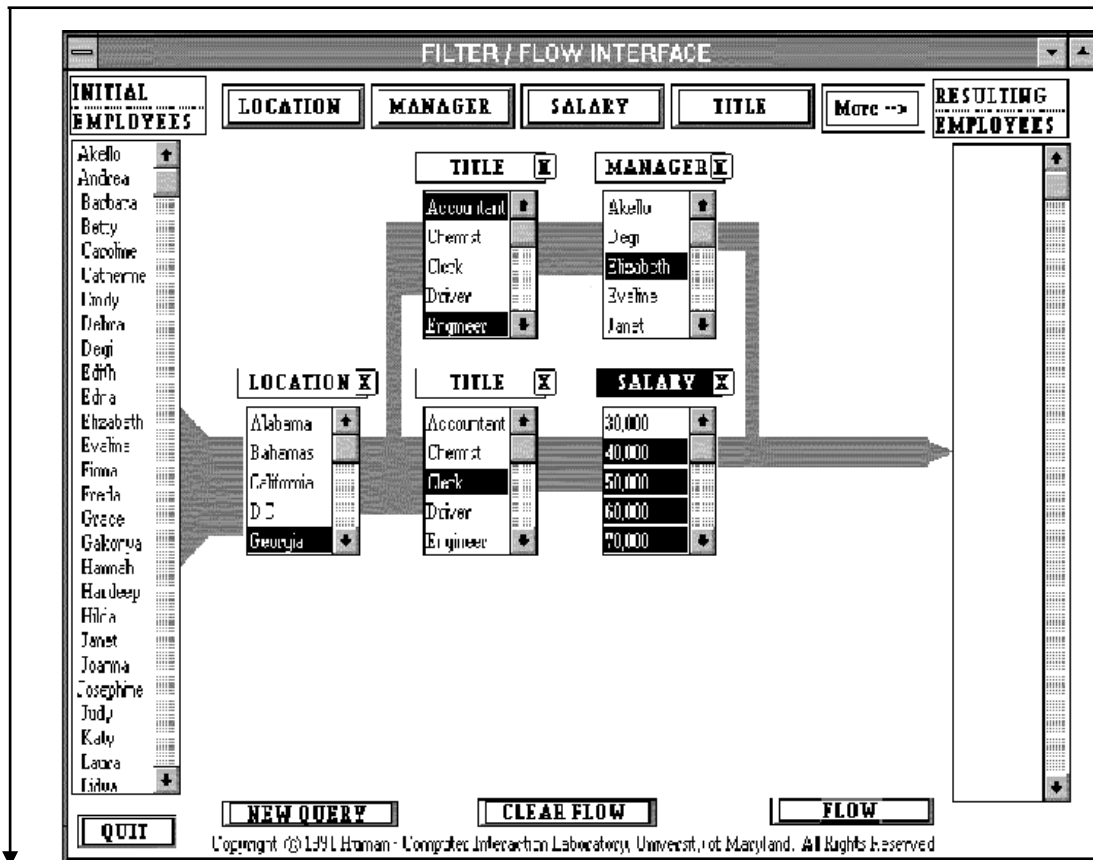
Coordination Problem: which operator to choose?

Most people find the basic Boolean syntax counter-intuitive.

AND “implies” broadening (opposite true).

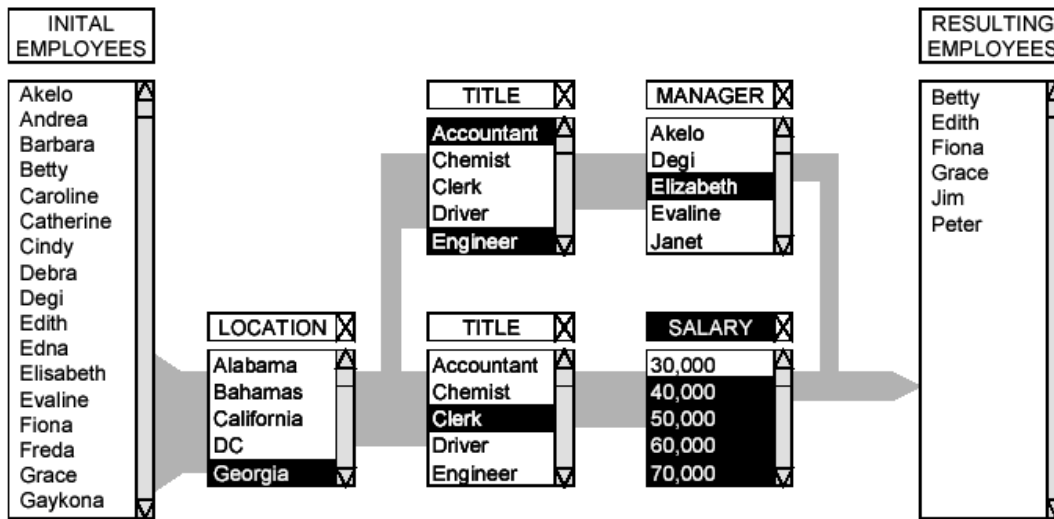
OR “implies” narrowing (opposite true).

AND



OR

Visual Query Formulation – Boolean → **FilterFlow**



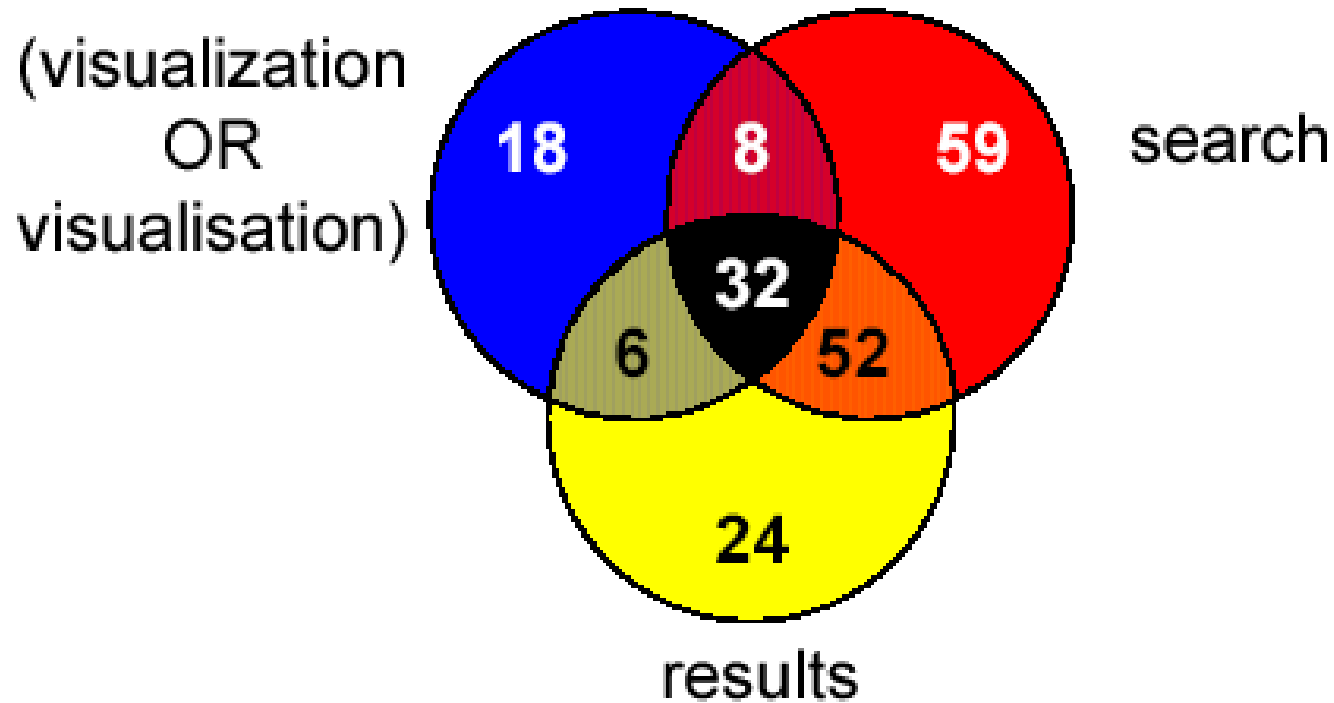
Find the accountants or engineers from Georgia who are managed by Elisabeth,
or the clerks from Georgia who make more than thirty thousand

(A or B or C) and (D or E) and (not F) → express common queries

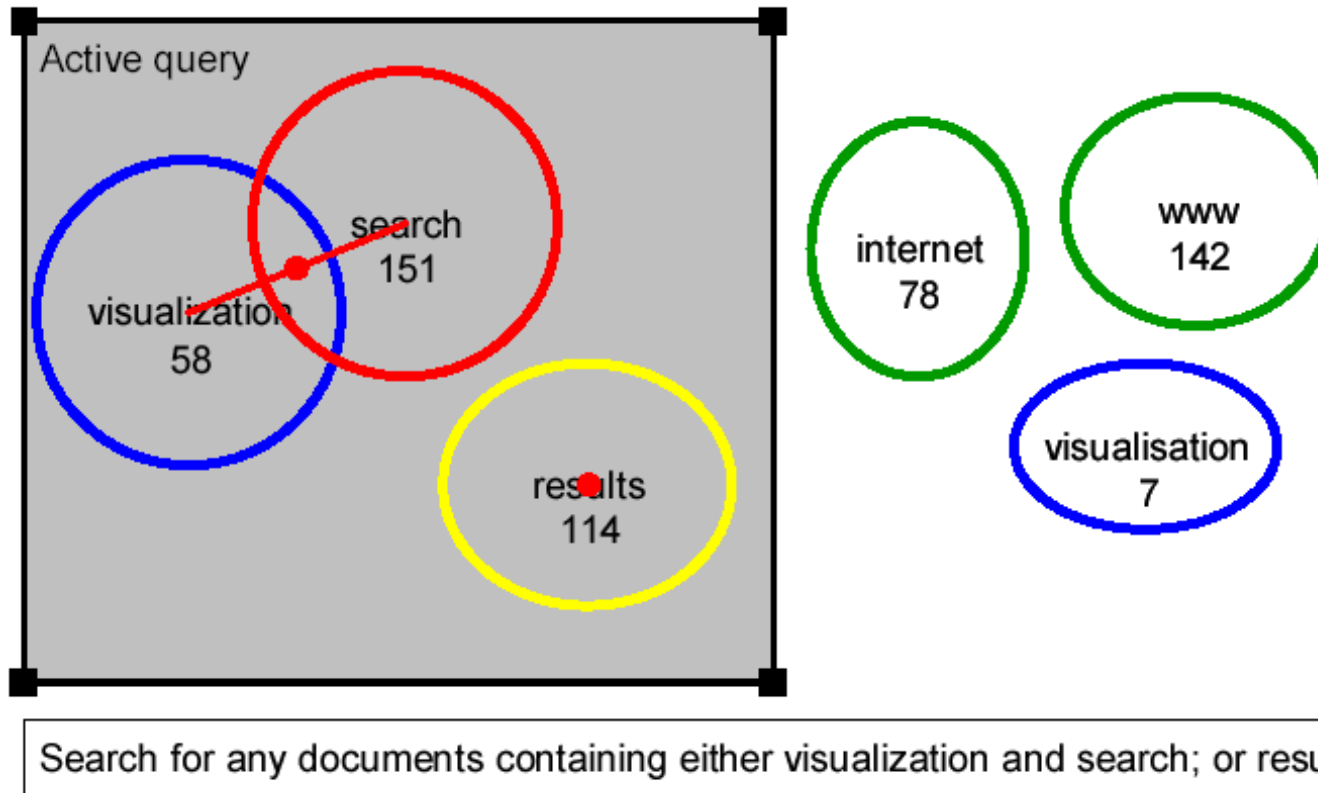
Difficult to express complex queries

How? → Visualize "**Power Set**"

Visual Query Formulation – Venn Diagrams → **TeSS**

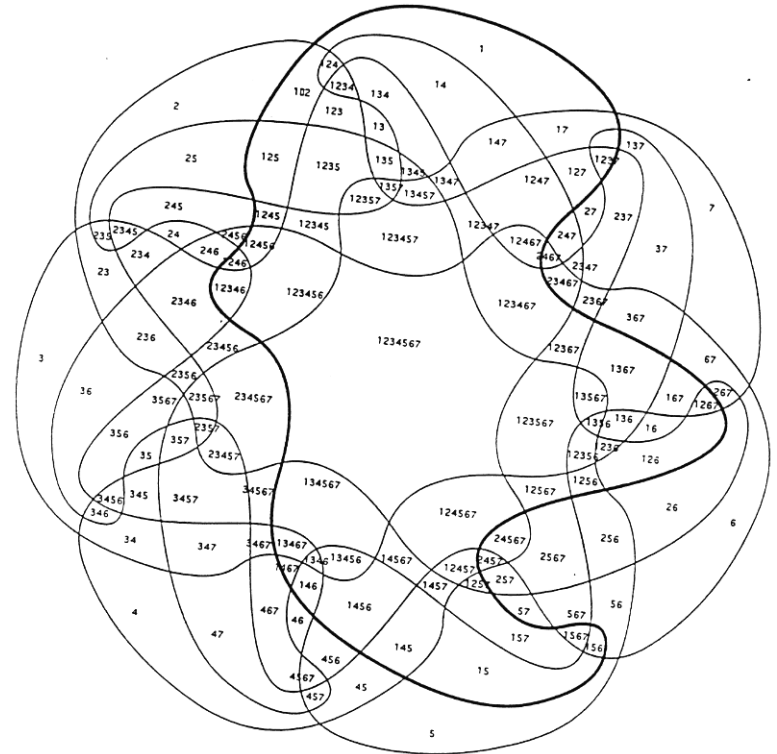
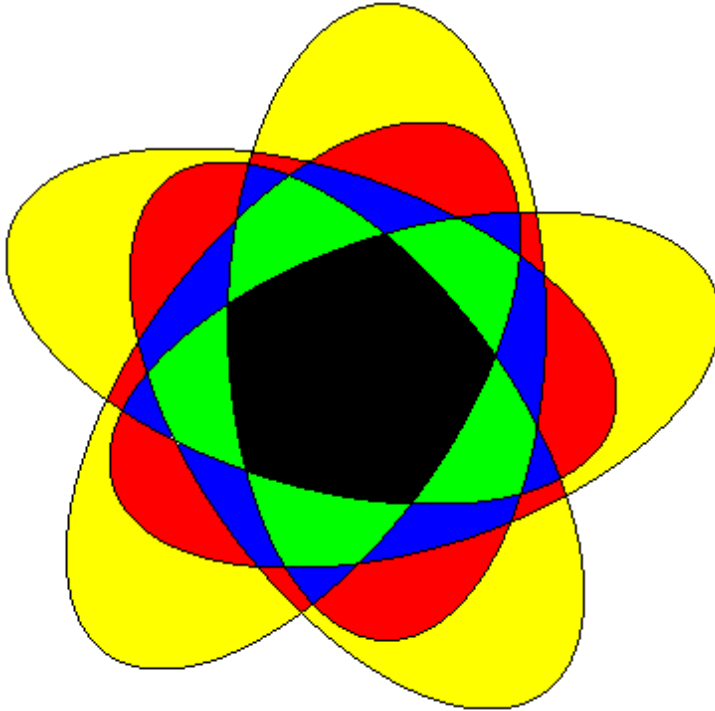


Visual Query Formulation – Venn Diagrams → **VQuery**

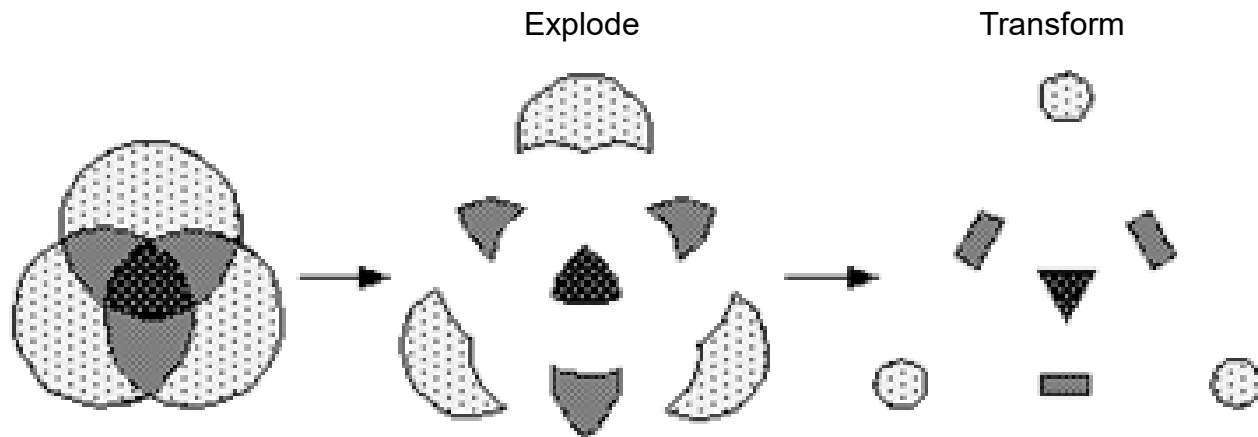


1. “AND” “OR” “NOT” → low visual saliency
2. How to generalize to higher number of sets?

Generalize Venn Diagrams

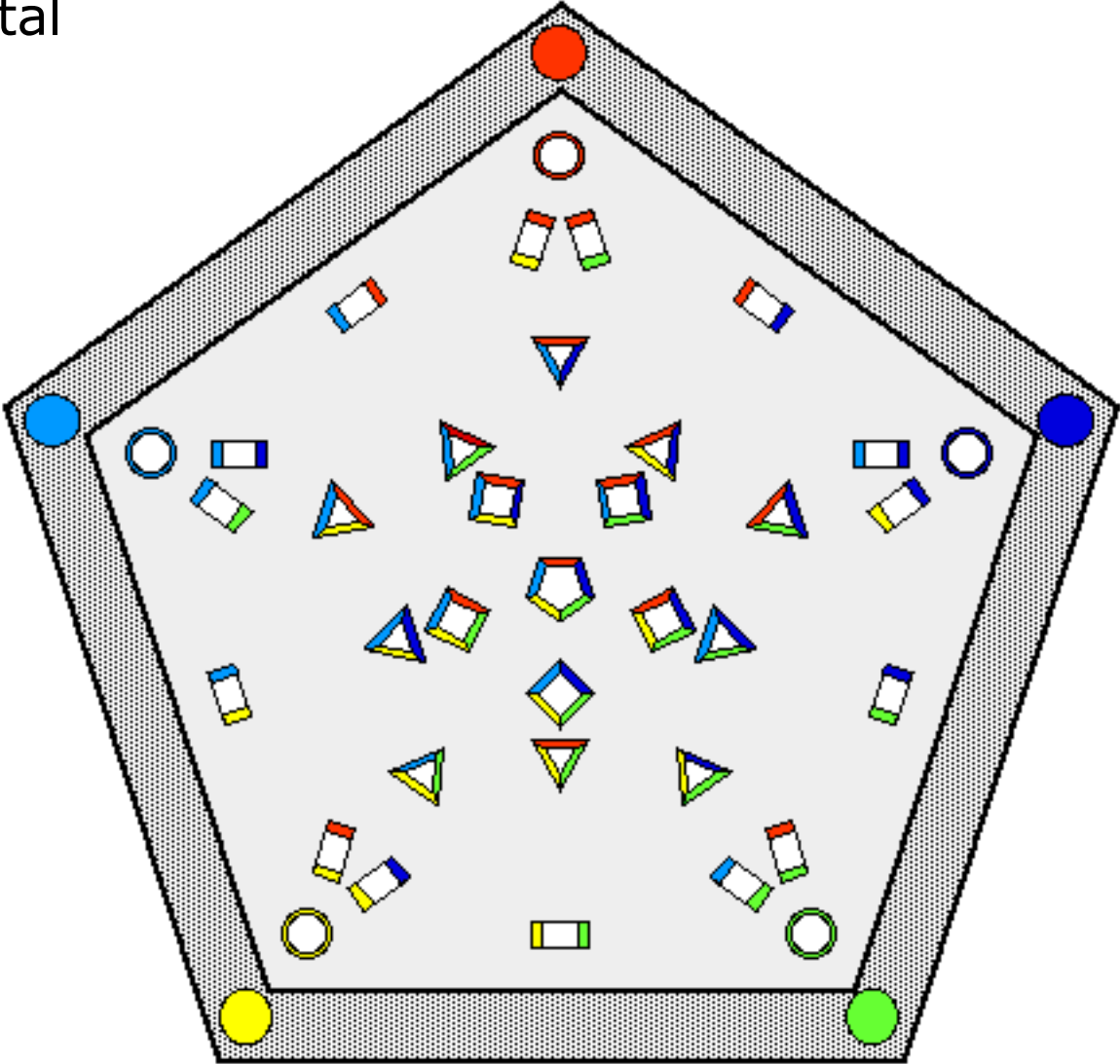


Goal – Compare Search Results

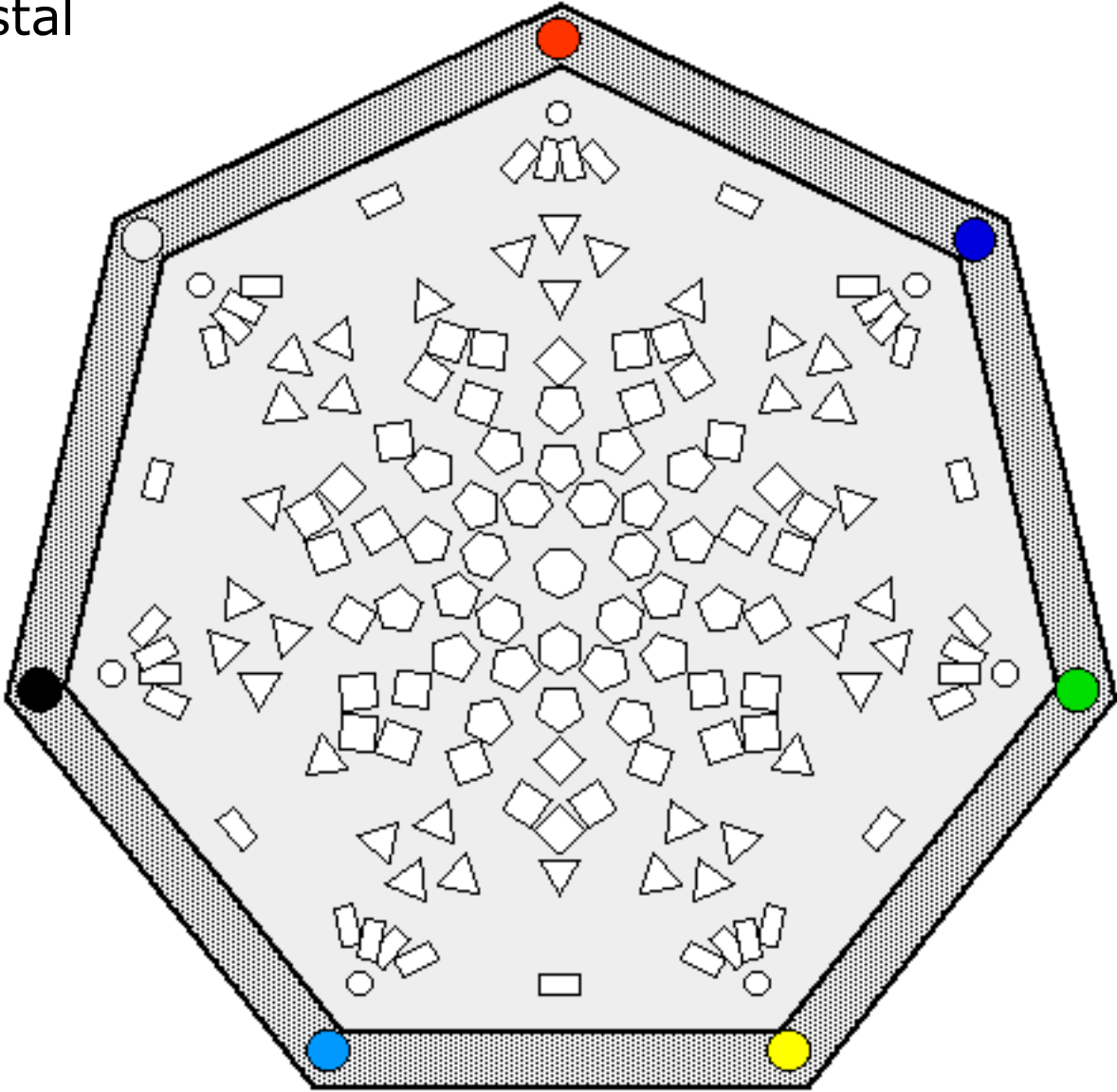


Can be Generalized to N Sets

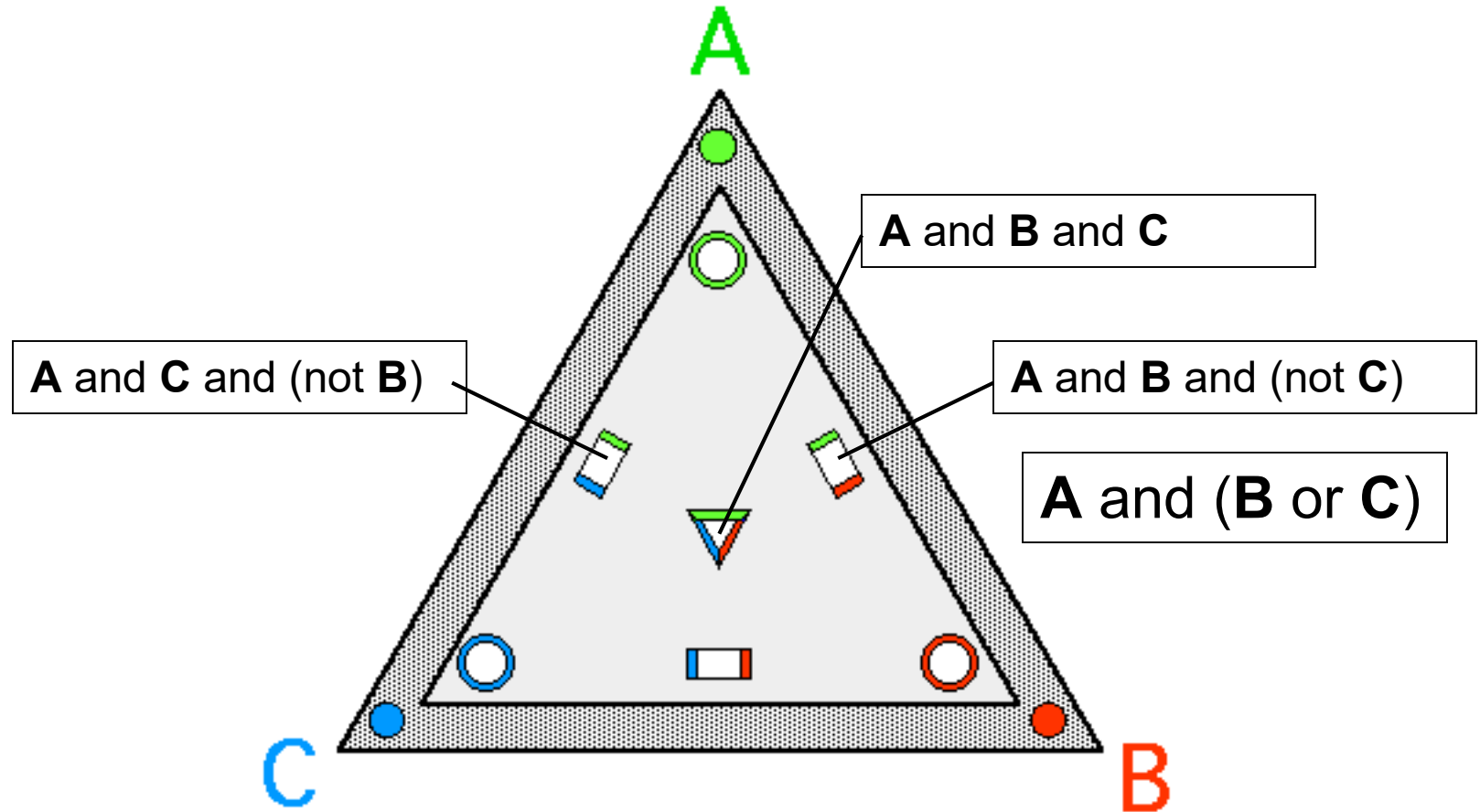
InfoCrystal



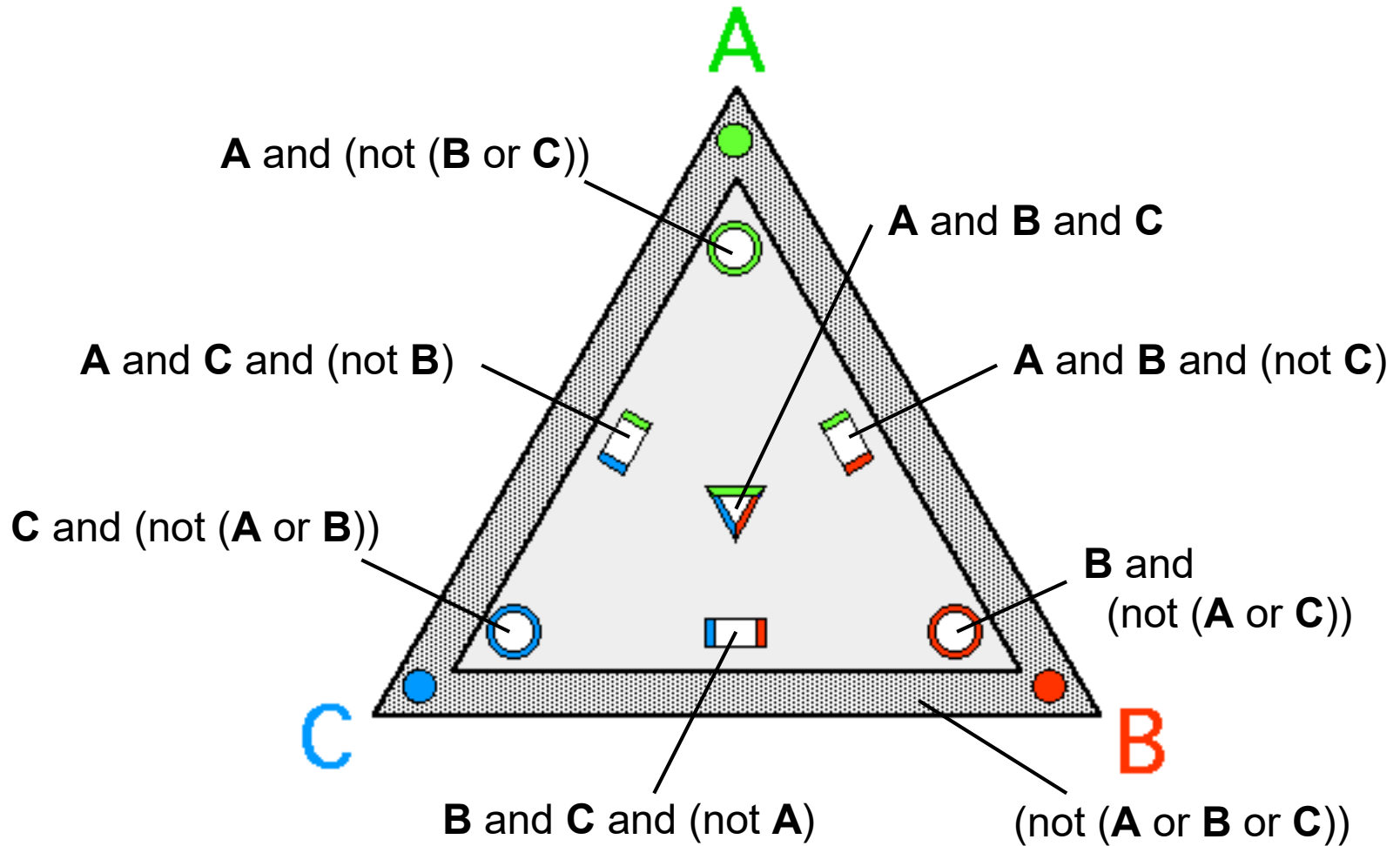
InfoCrystal



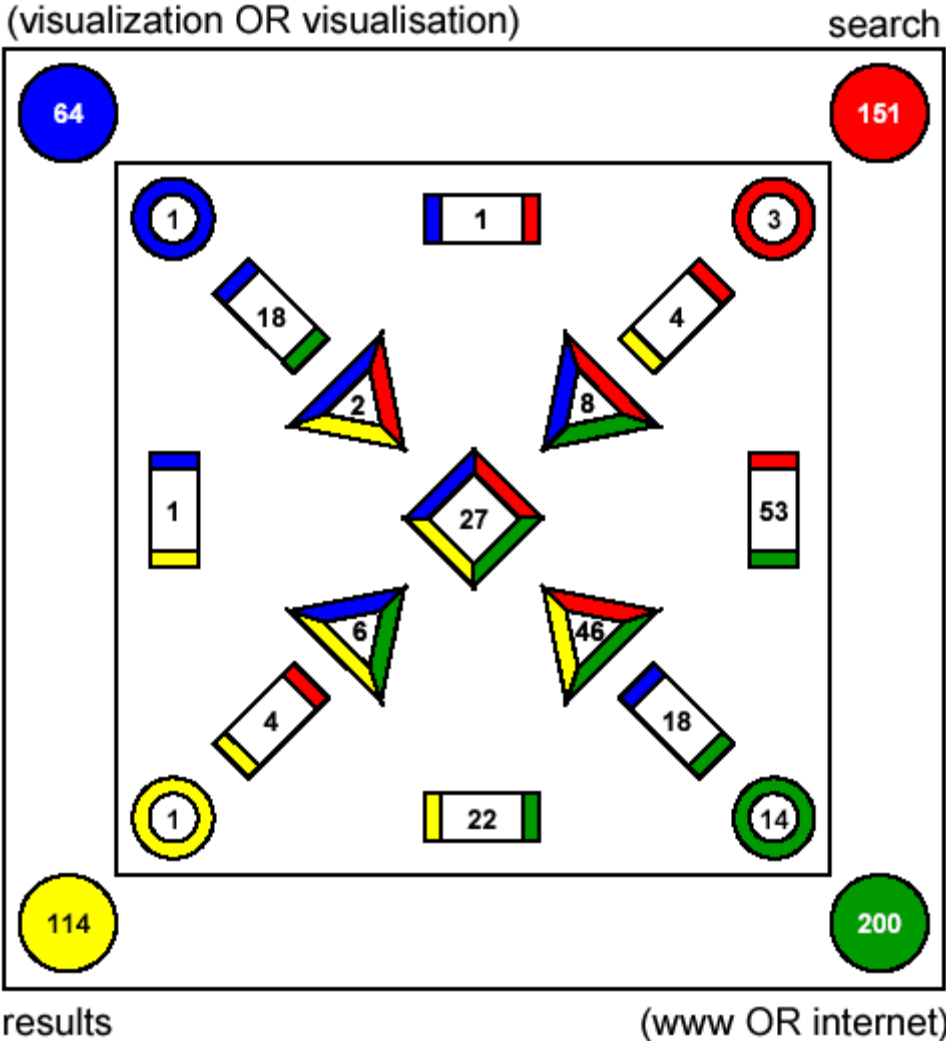
How to formulate Boolean queries graphically ?



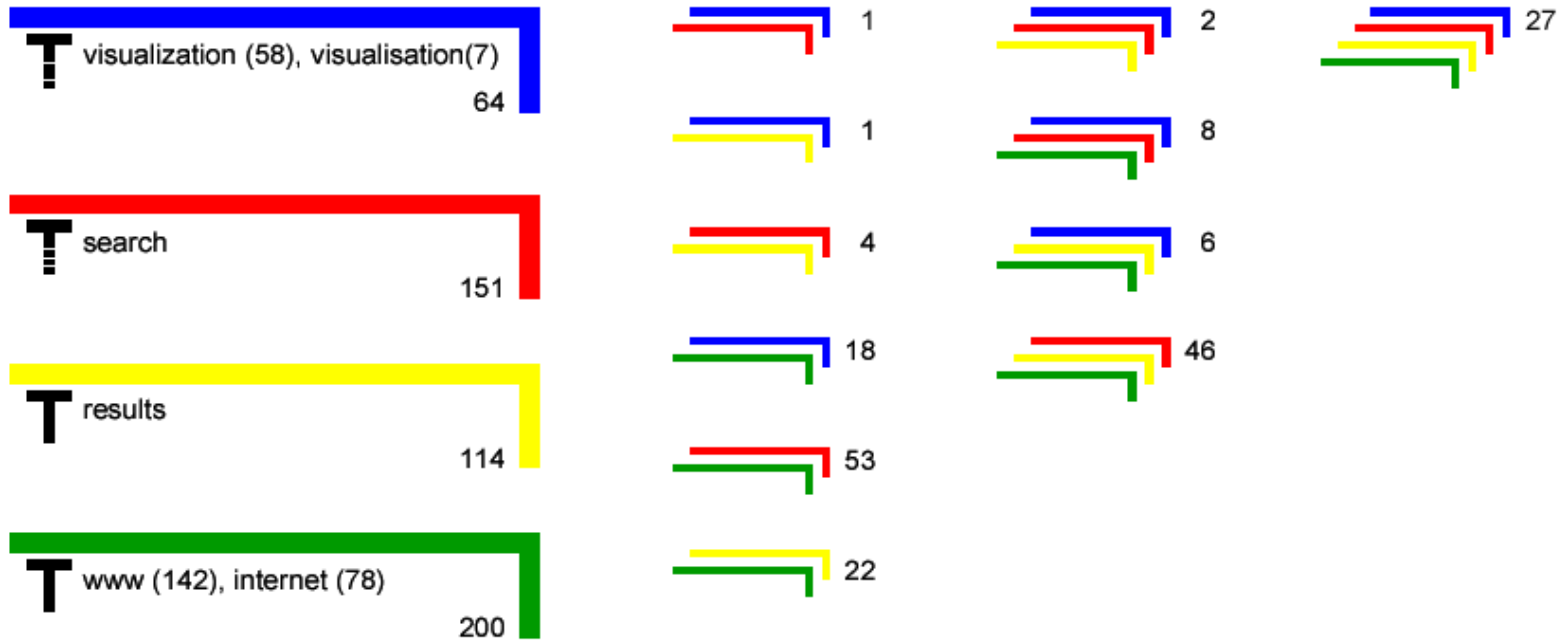
How to formulate Boolean queries graphically ?



Visual Query Formulation – Boolean Power Set → InfoCrystal

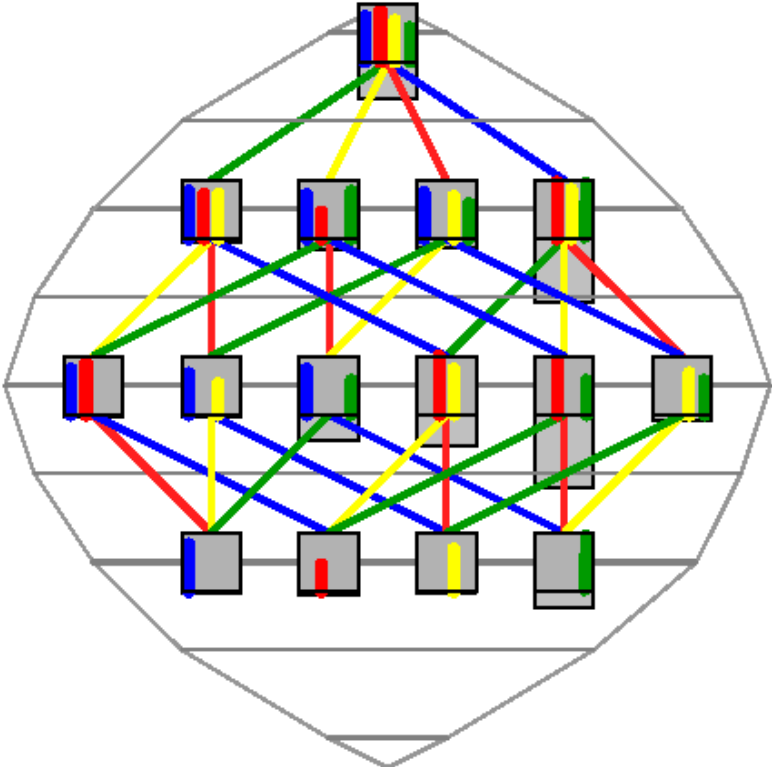


Visual Query Formulation – Other “Power Set” Visualizations



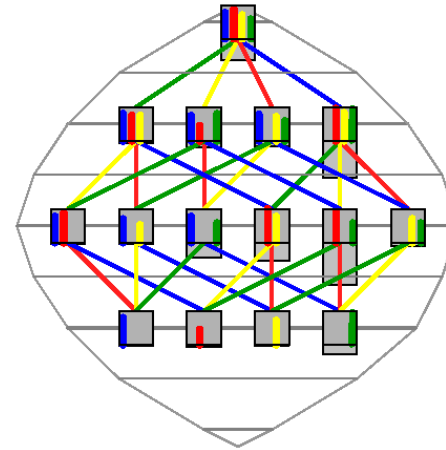
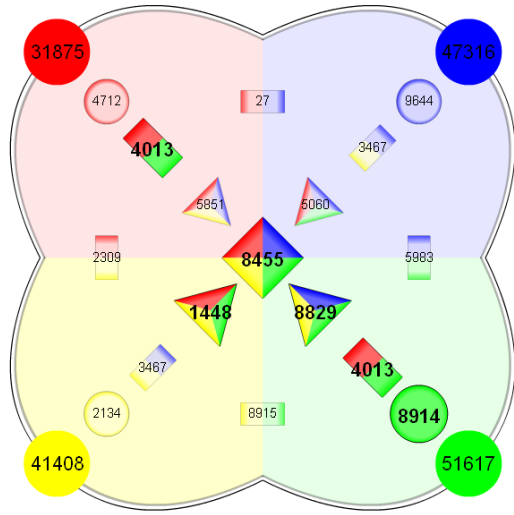
“Bracket”-visualization [Eibl 1999]

Visual Query Formulation – “Power Set” – **NIRVE**

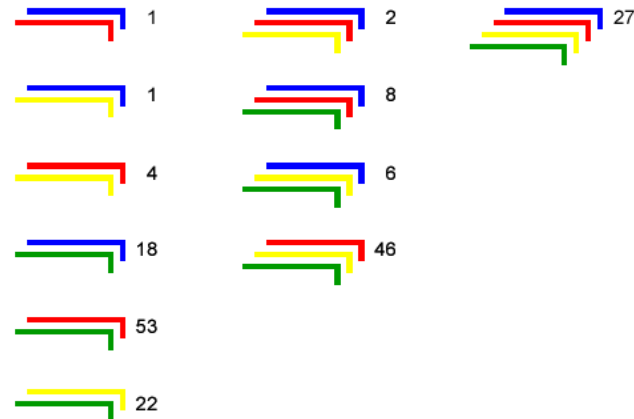
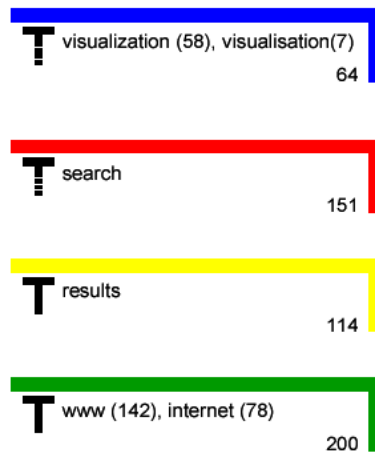


VISUALIZATION visualization visualisation	SEARCH search	RESULTS results	INTERNET www internet	UNUSED
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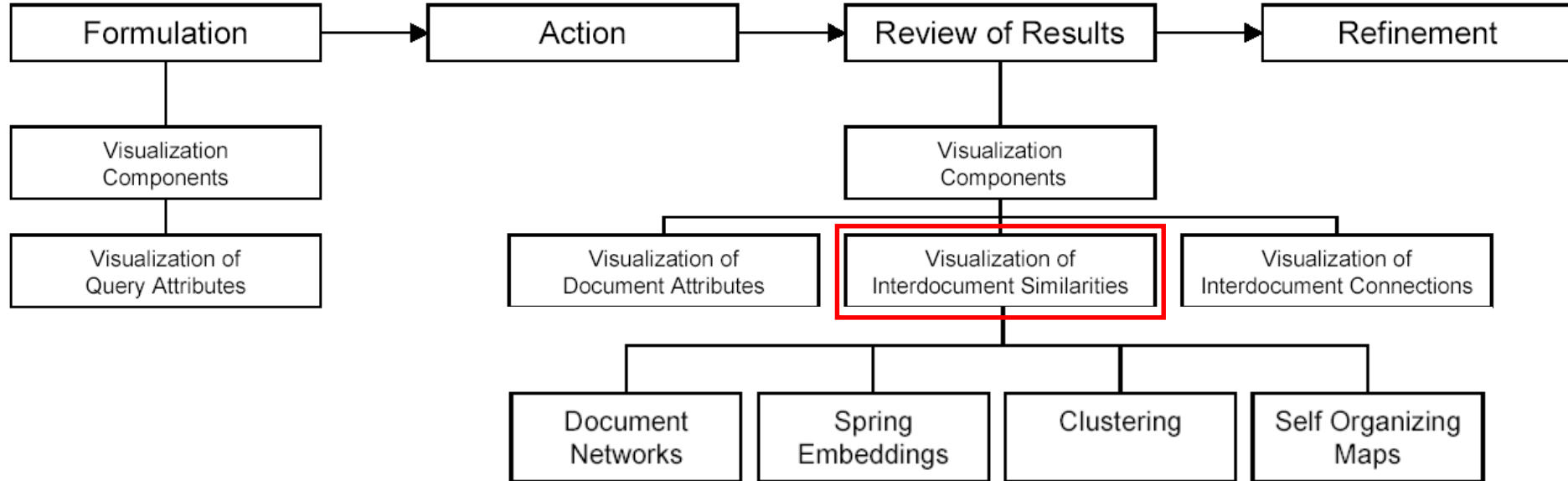
Visual Query Formulation – “Power Set” Visualizations



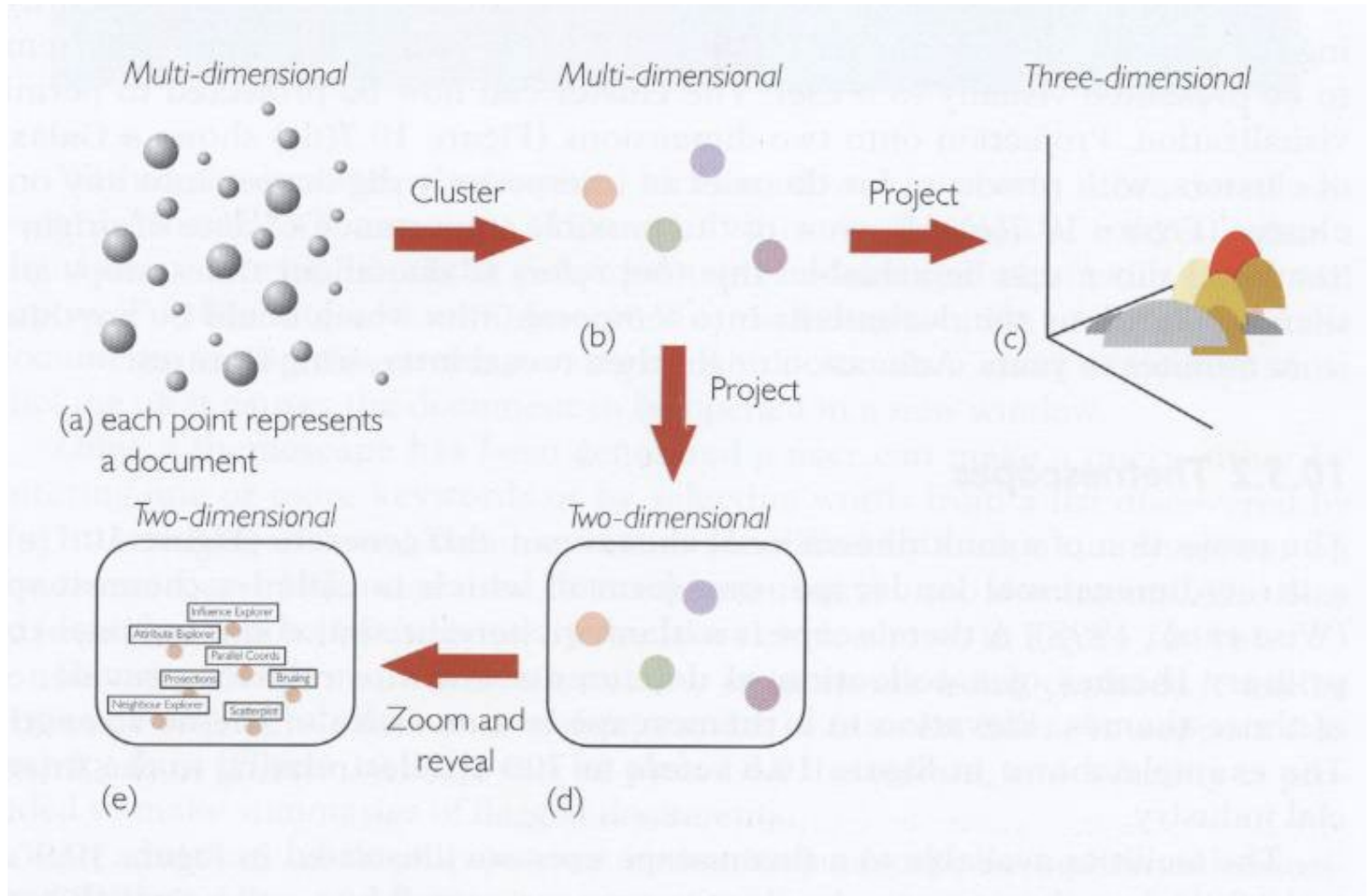
VISUALIZATION	SEARCH	RESULTS	INTERNET	UNUSED
visualization	search	results	www	internet
visualisation			internet	



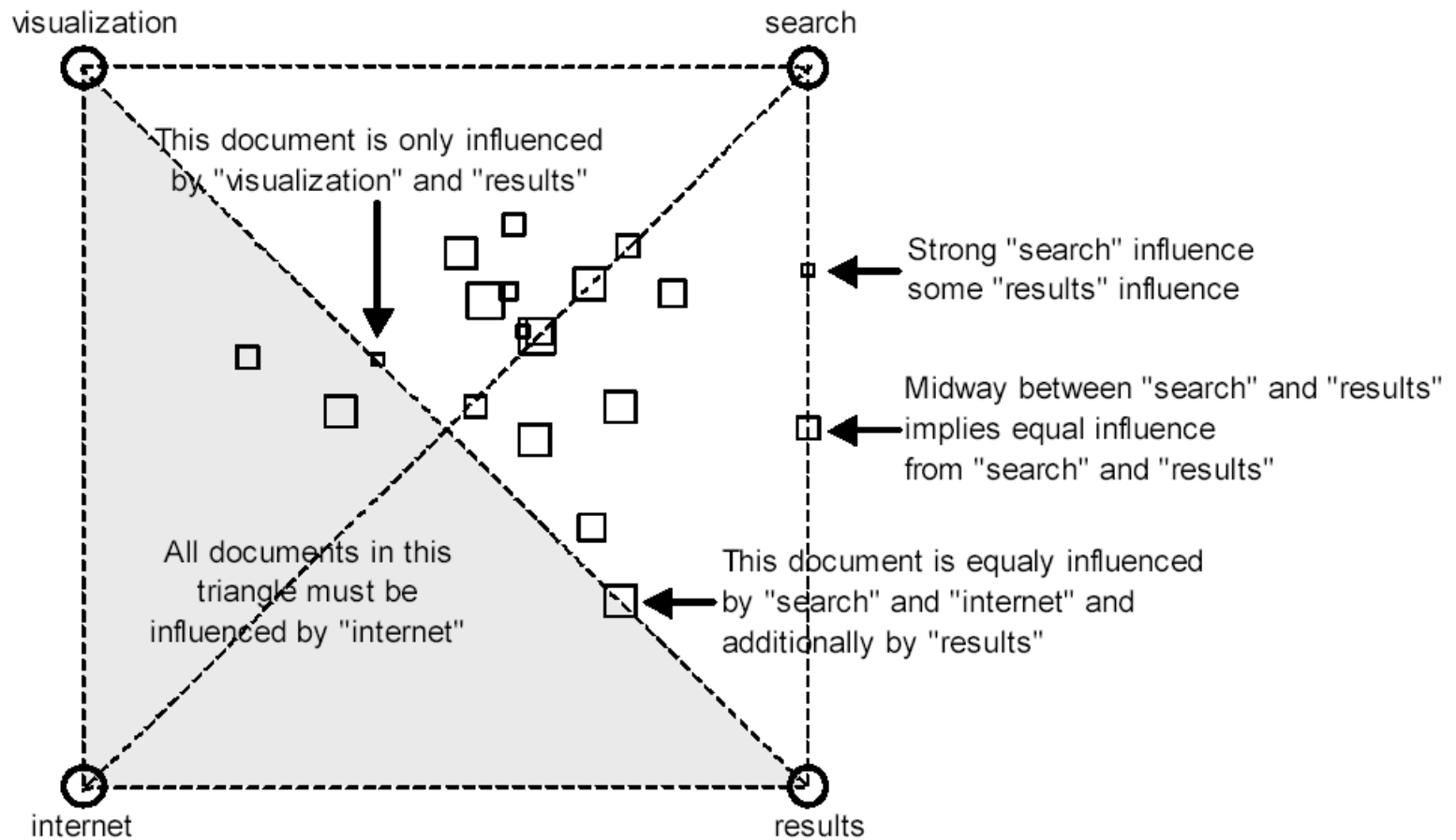
Visualization of Search Results & Inter-Document Similarities



Visualization of Search Results & Inter-Document Similarities



Search Result Visualization → **VIBE**

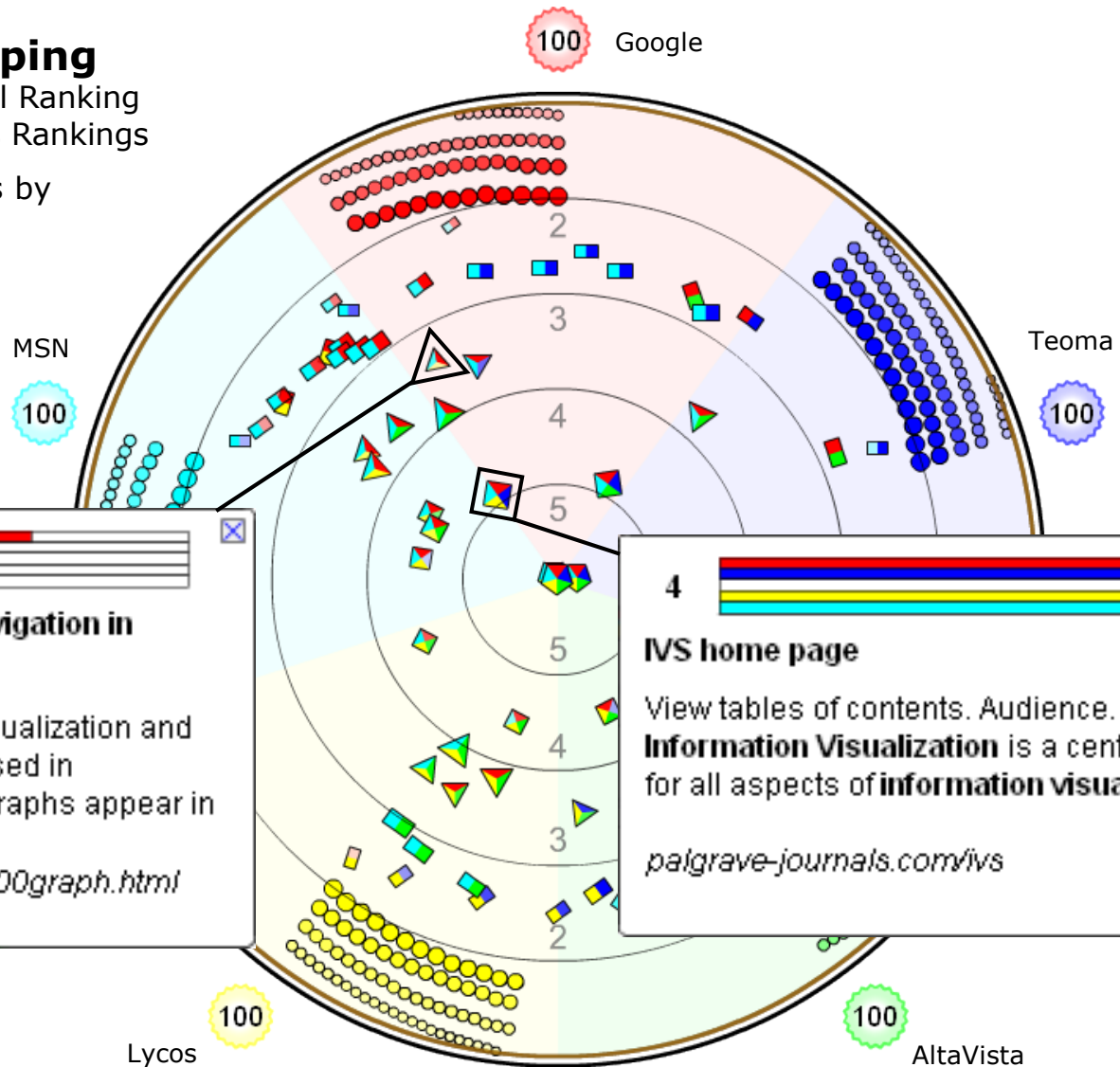


Search Result Visualization → MetaCrystal: Cluster Bull's Eye

Radial Mapping

- **Radius** = Total Ranking
- **Angle** Reflects Rankings

Size = Rankings by Engines



23

Google	100
MSN	100
Teoma	100
Lycos	100
AltaVista	100

Graph Visualization and Navigation in Information Visualization: ...

This is a survey on graph visualization and navigation techniques, as used in **information visualization**. Graphs appear in citeseer.nj.nec.com/herman00graph.html

4

Google	100
MSN	100
Teoma	100
Lycos	100
AltaVista	100

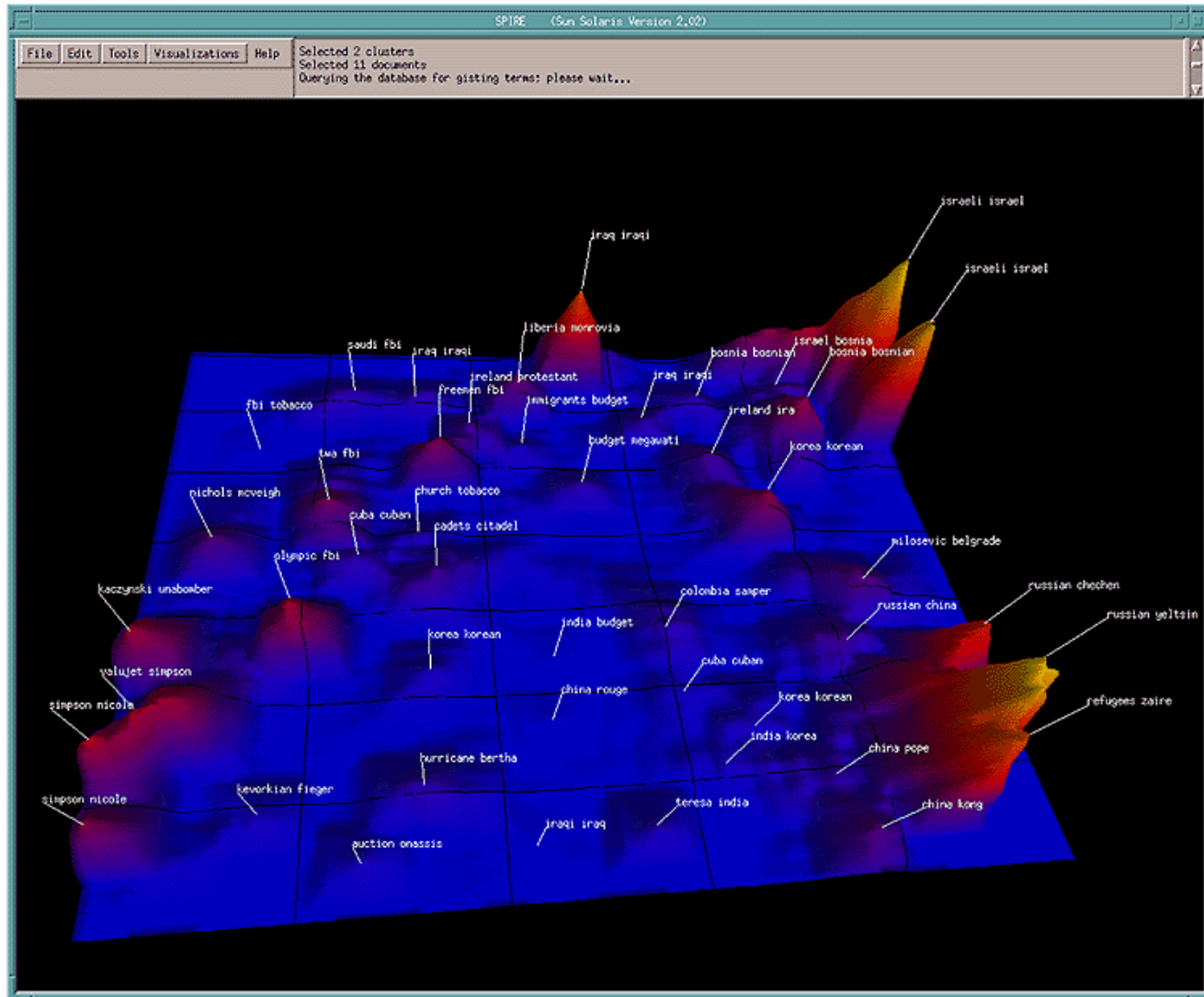
IVS home page

View tables of contents. Audience.

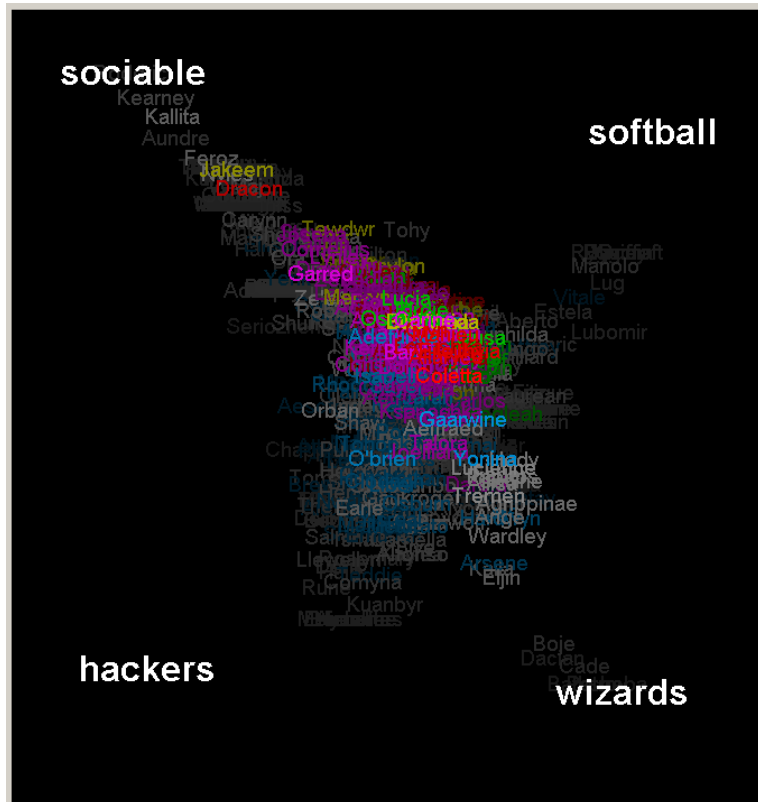
Information Visualization is a central forum for all aspects of **information visualization**

palgrave-journals.com/ivs

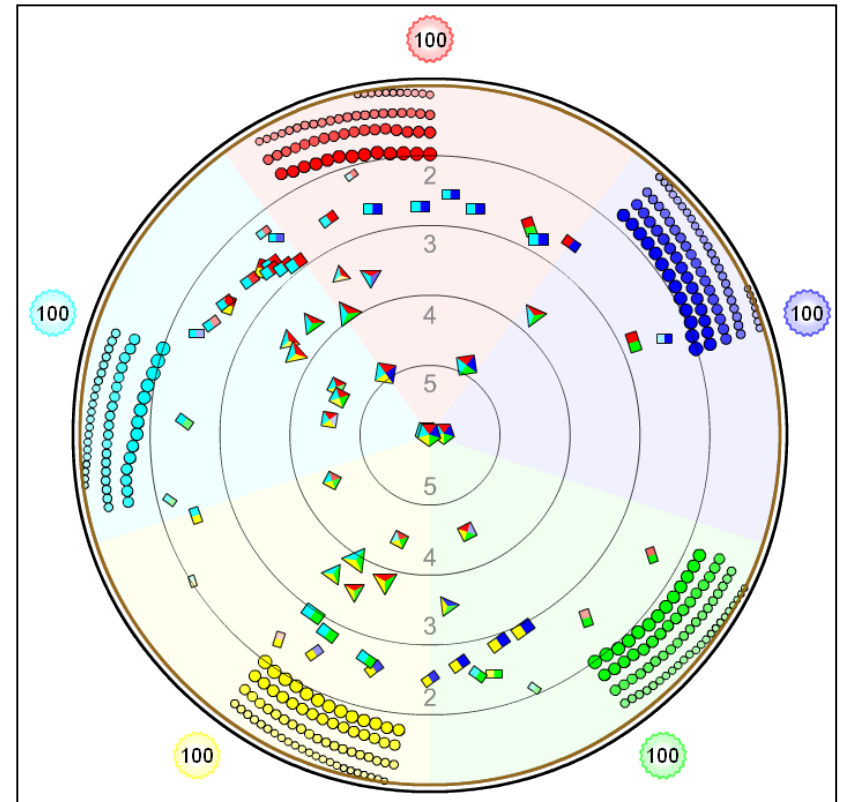
Search Result Visualization → ThemeScapes



Search Result Visualization → Point of Reference

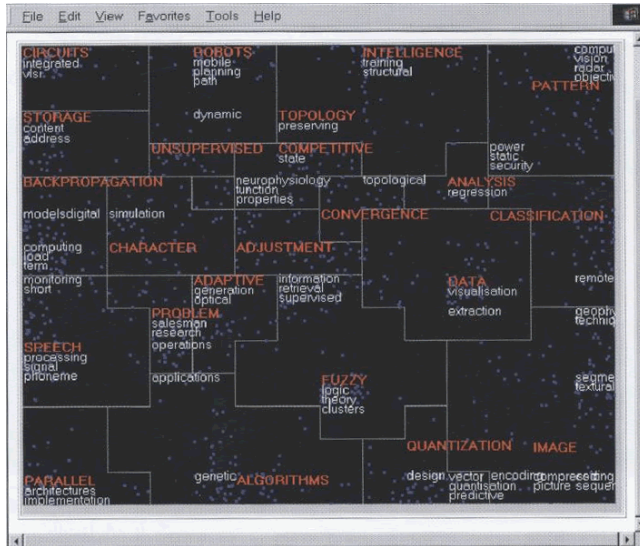


VisualWho

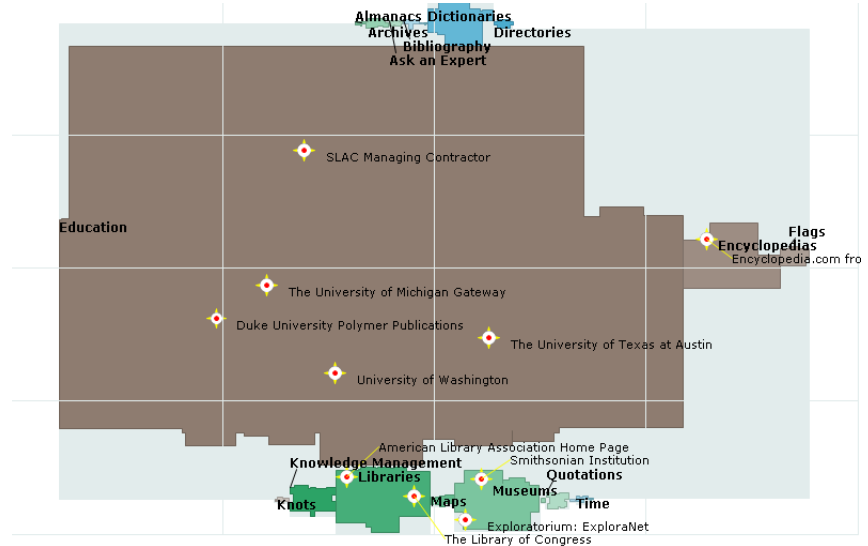


MetaCrystal

Search Result Visualization → 2D Maps

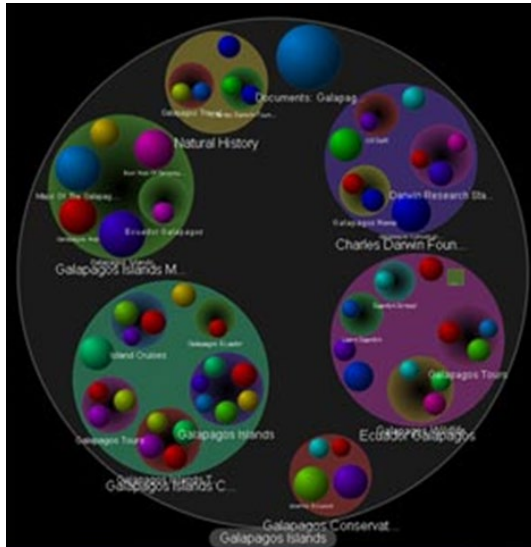


Self-Organizing Map

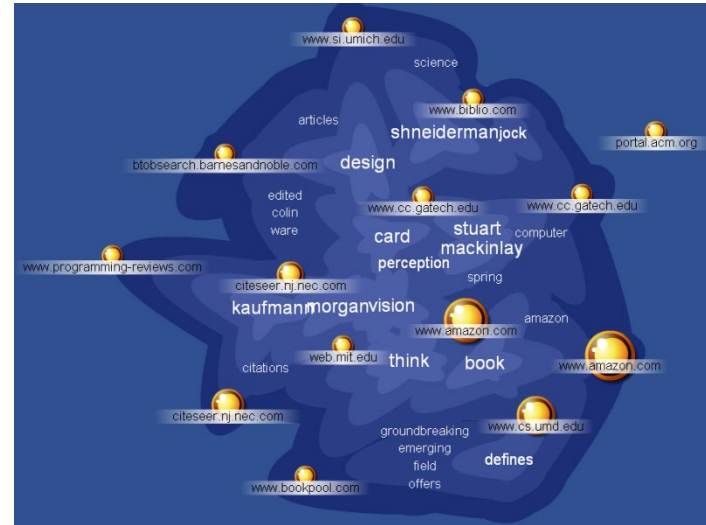


Map.net

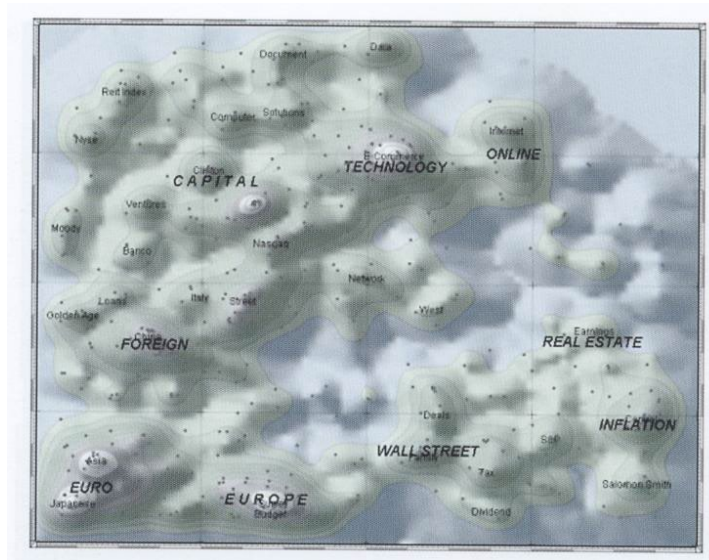
Search Result Visualization → 2.5D Maps



Grokker

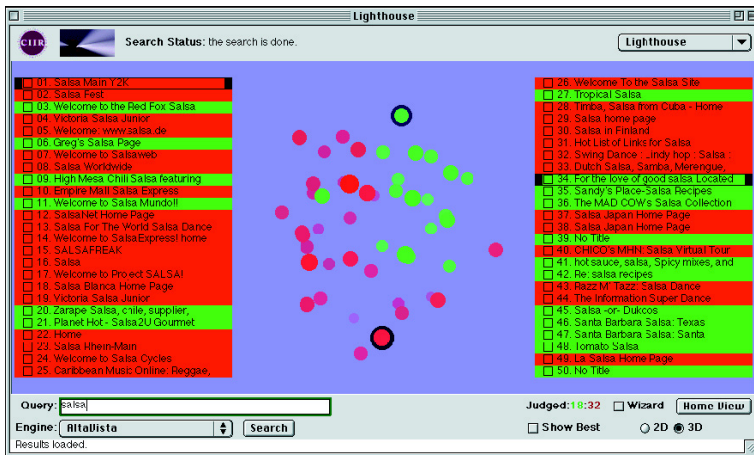


Kartoo

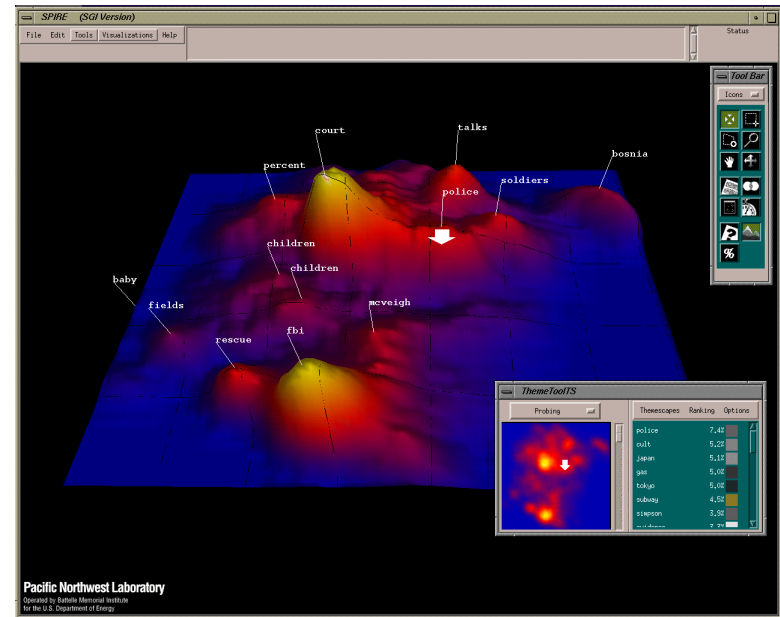


ThemeScape / Aureka

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
- **Demo** of Most Visited Wikipedia pages (Sept 06 – Jan 07)

You may find interesting **two papers published** in **First Monday**:

<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>

Search Visualization – Tools

Viewzi <http://www.viewzi.com/search/whitevoid-photocloud/>

Quintura <http://www.quintura.com/>

SpaceTime <http://www.spacetime.com/>

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

Aduna / Vound <http://www.vound-software.com/>

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

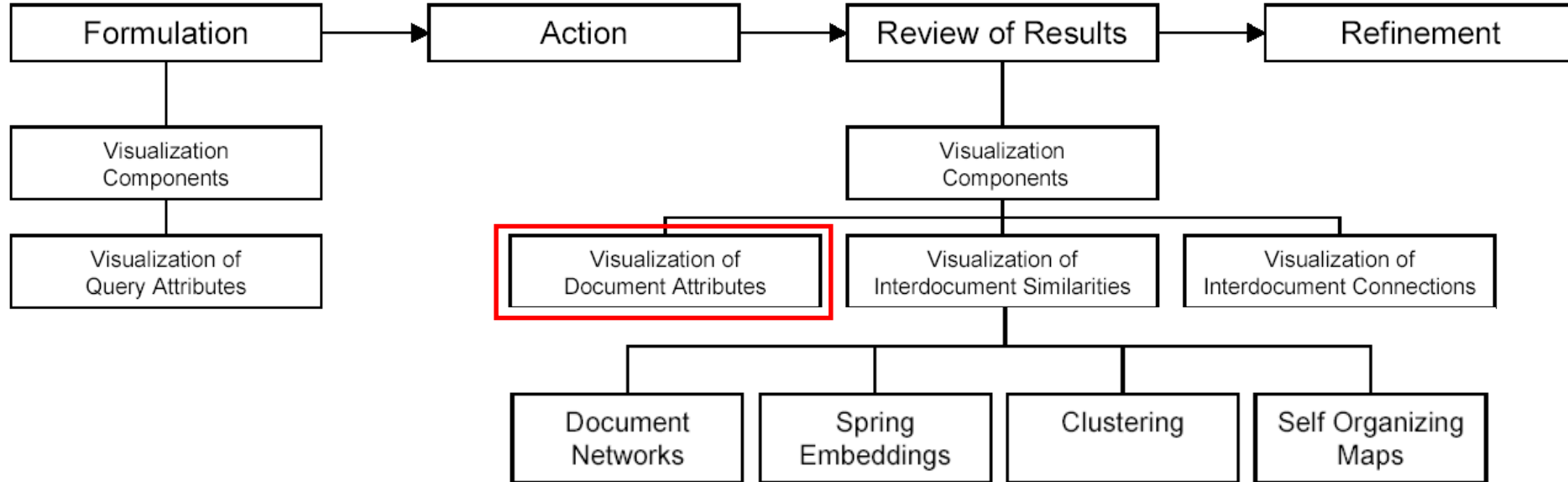
Cluster Documents Based on Words in Common

- 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



Visualization of WWW-Search Results

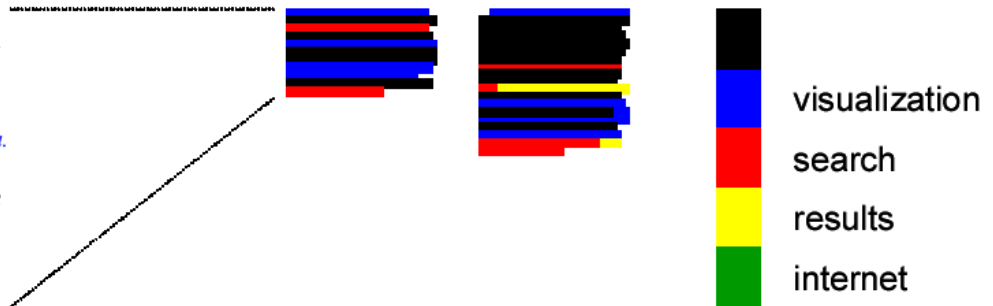
The idea of Information **Visualization** is to get insights into great amounts of abstract data. Especially document sets found by **searching** the World Wide Web are a special challenge. The paper gives a short overview on the variety of possible **Visualizations** for this application area. The presented ideas are grouped by using the **Visualization** approaches 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 typically in a linear way. This paper presents **search results**, how to facilitate the pure 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 sources 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 meta web **search engine**.

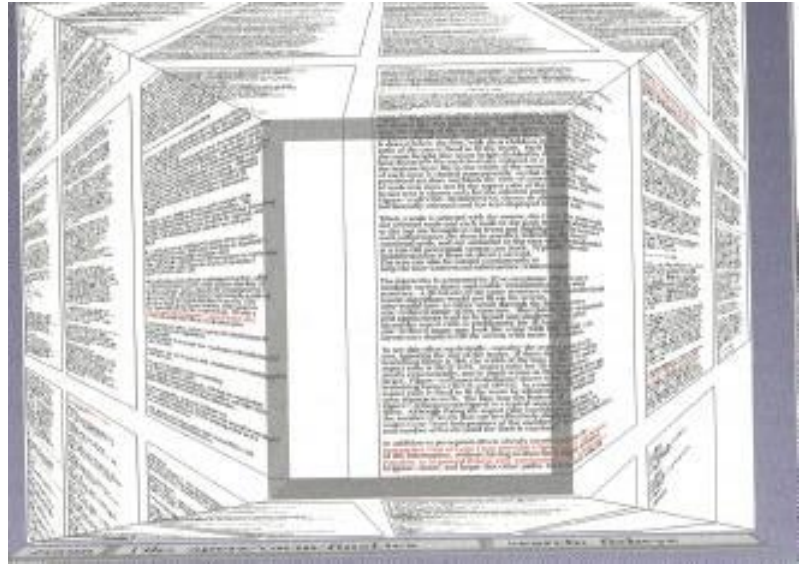
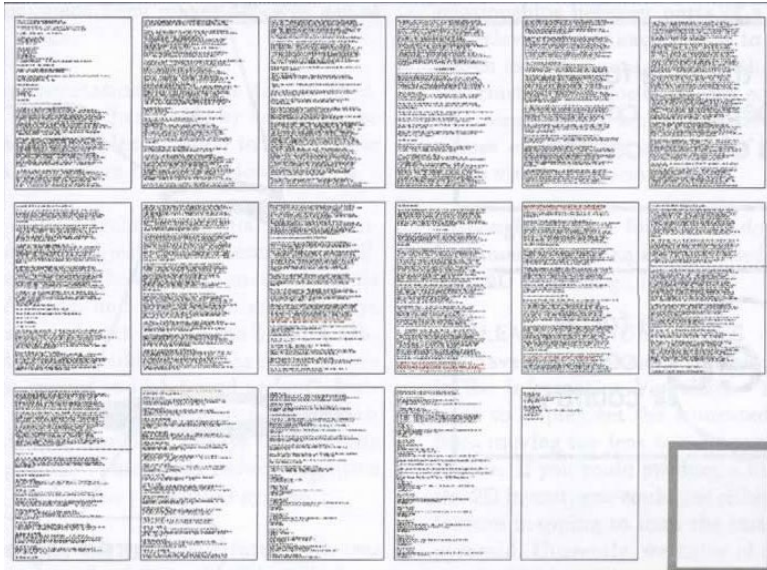


SeeSoft

Visualization of Document Attributes → Document Lens

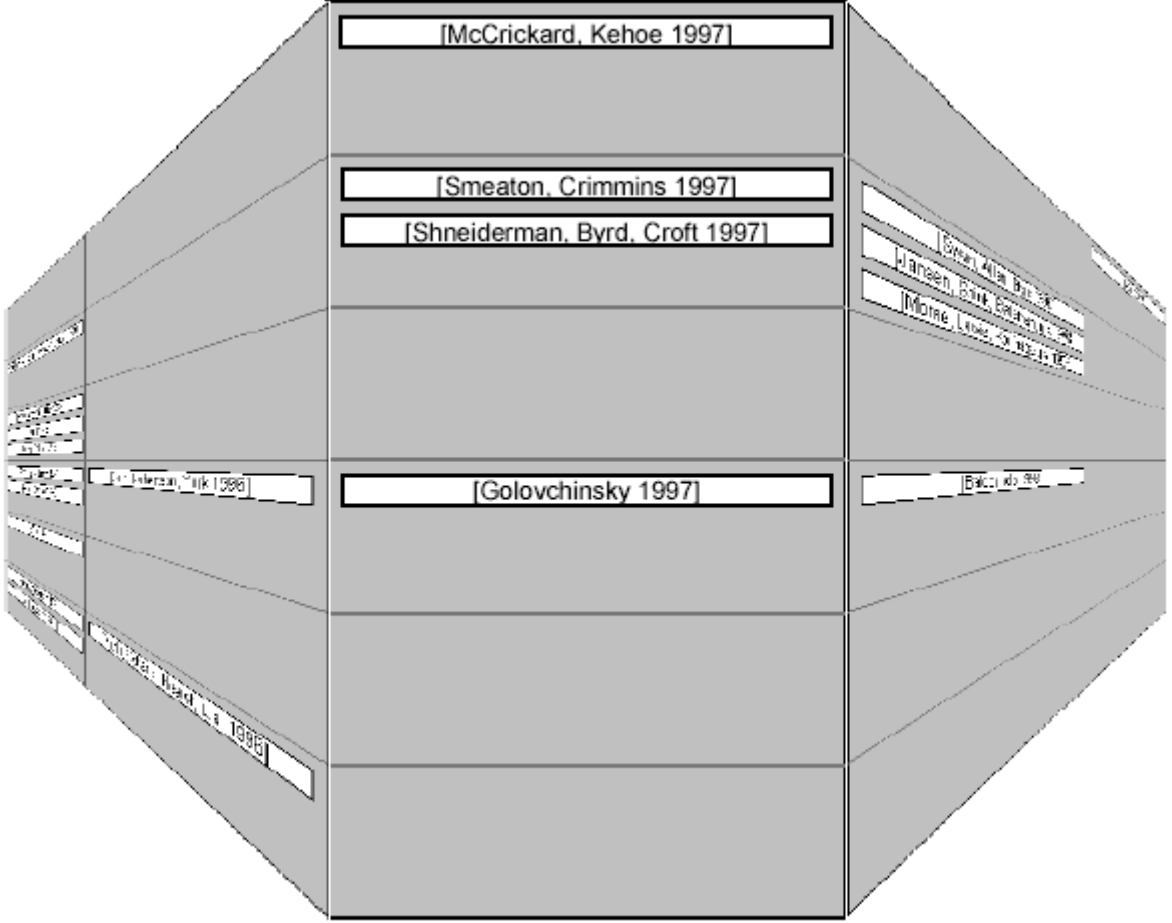
Problem: Text can be too small to read

→ Focus + Context Fisheye Distortion



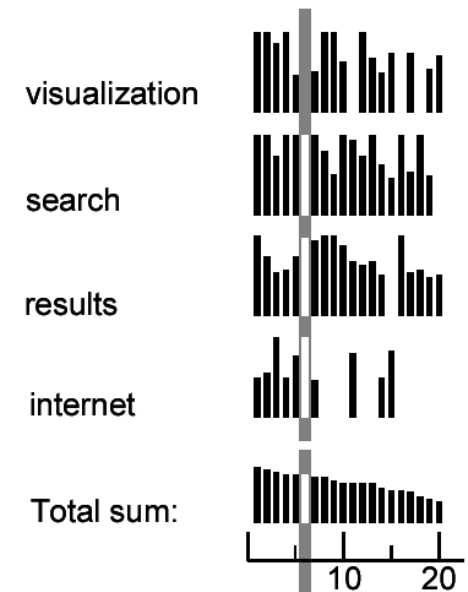
Does it work?

Visualization of Document Attributes → **Perspective Wall**



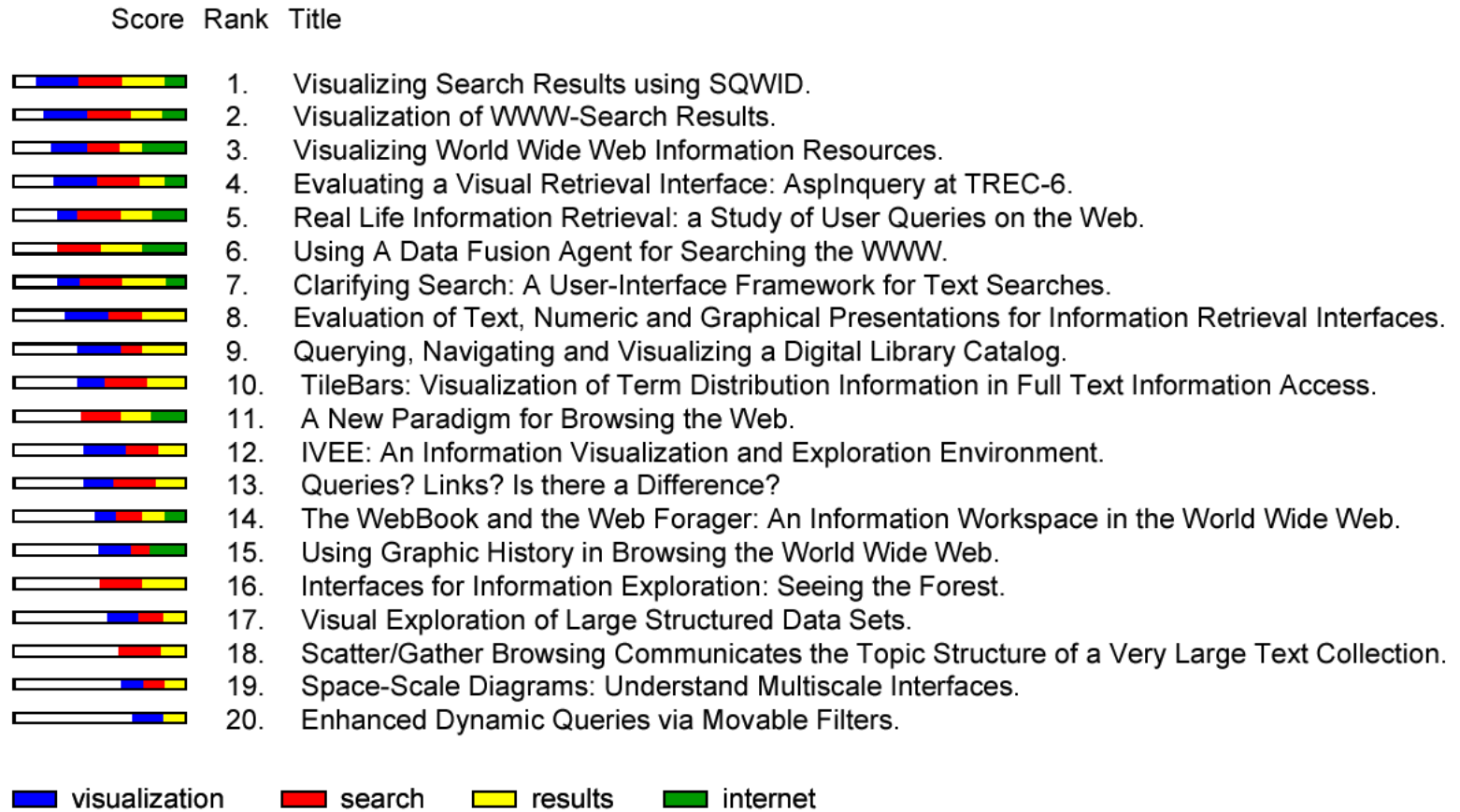
Visualization of Document Attributes → Bar Graphs

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: Asplnquery 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.



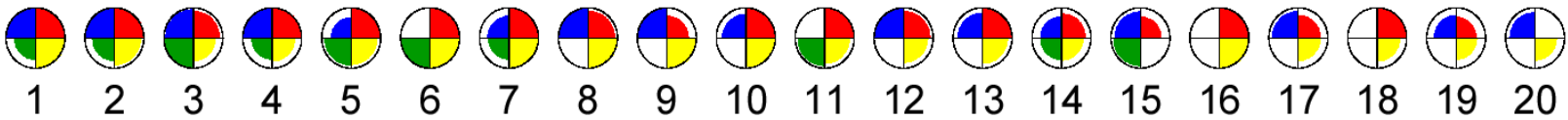
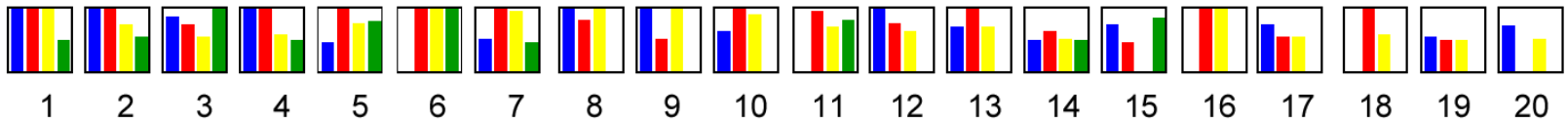
[Veerasamy 1996] / [Veerasamy, Belkin 1996]

Visualization of Document Attributes → **Stacked Bar Graphs**

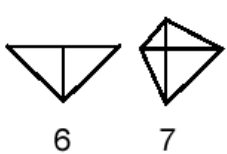


VQRa of the WInquery system [**Shneiderman, Byrd, Croft 1997**]

Visualization of Document Attributes → NIRVE & R-Wheels



Veerasamy



Star plots



Glyphs



Vertically stacked bargraphs

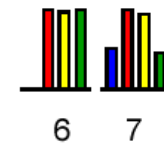


Horizontally stacked bargraphs aligned horizontally



Horizontally stacked bargraphs aligned vertically

Grewal et.al.

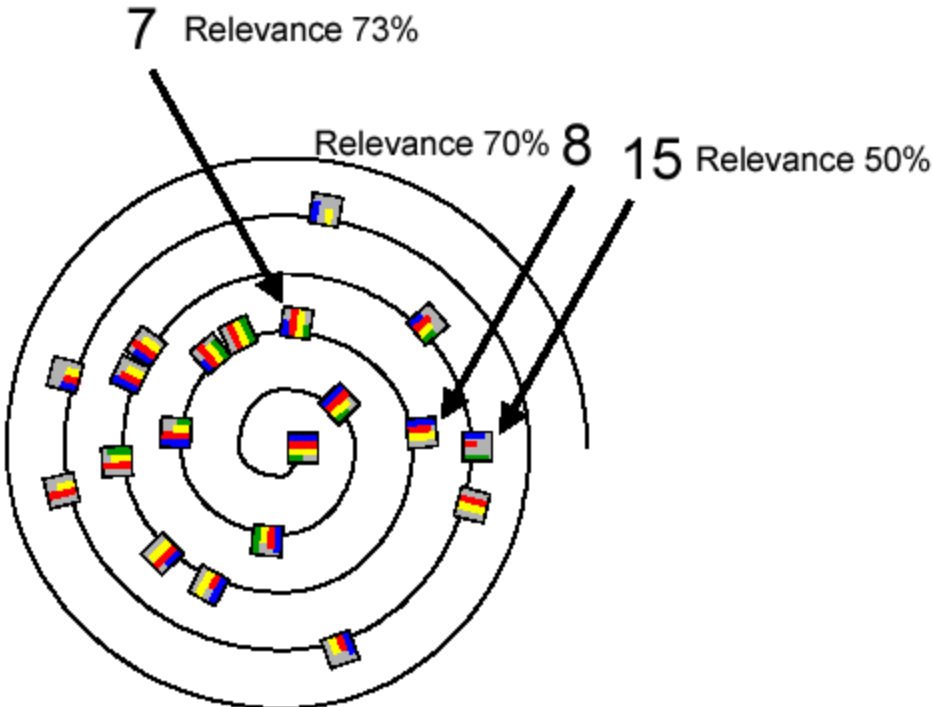


Bar-chart

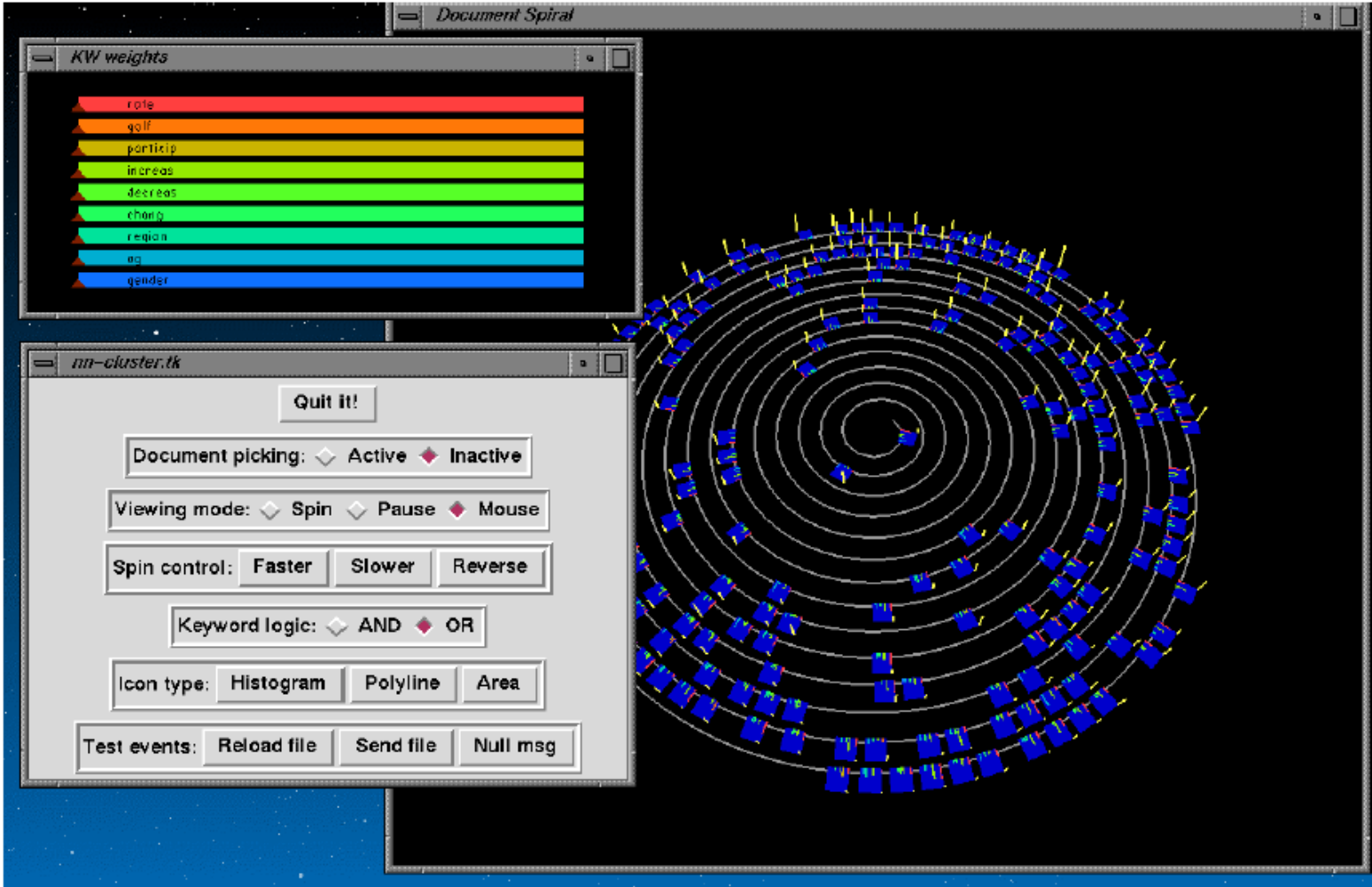


Slider-bar

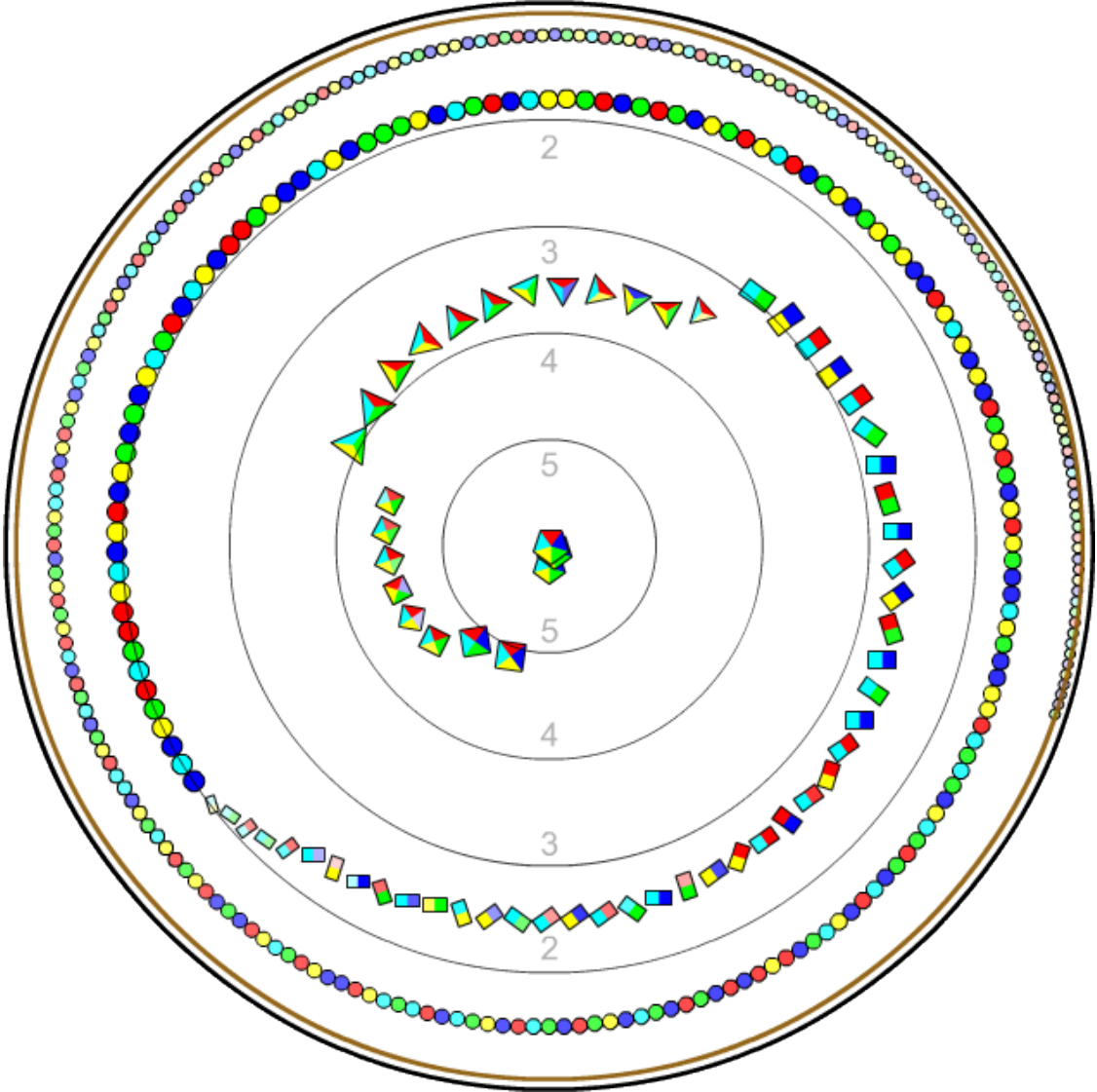
Visualization of Document Attributes → **NIRVE**



Visualization of Document Attributes → NIRVE



Visualization of Document Attributes → RankSpiral



Visualization of Document Attributes → **TileBars**

Term Set 1: **visualization visualisation**
Term Set 2: **search**
Term Set 3: **results**
Term Set 4: **internet www**

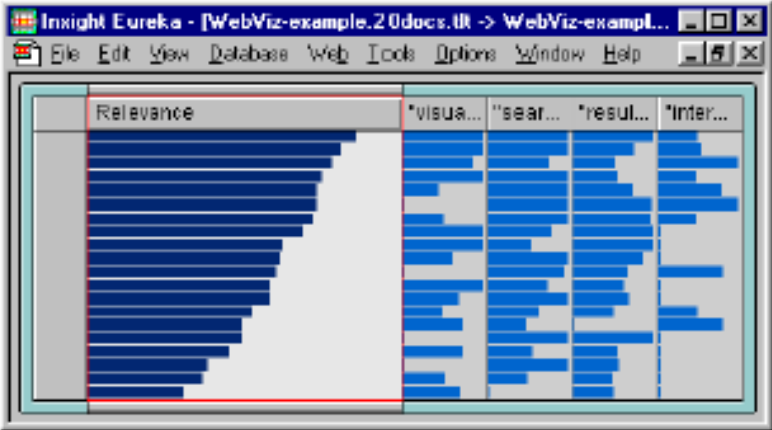


[Mann 1999] Visualization of WWW-Search Results.
http://www.inf.uni-konstanz.de/~mann/papers/mann_webvis99.html

[Hearst 1995] TileBars: Visualization of Term Distribution Information in Full Text Information Access.
http://www.acm.org/sigchi/ch95/Electronic/documnts/papers/mah_bdy.htm

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

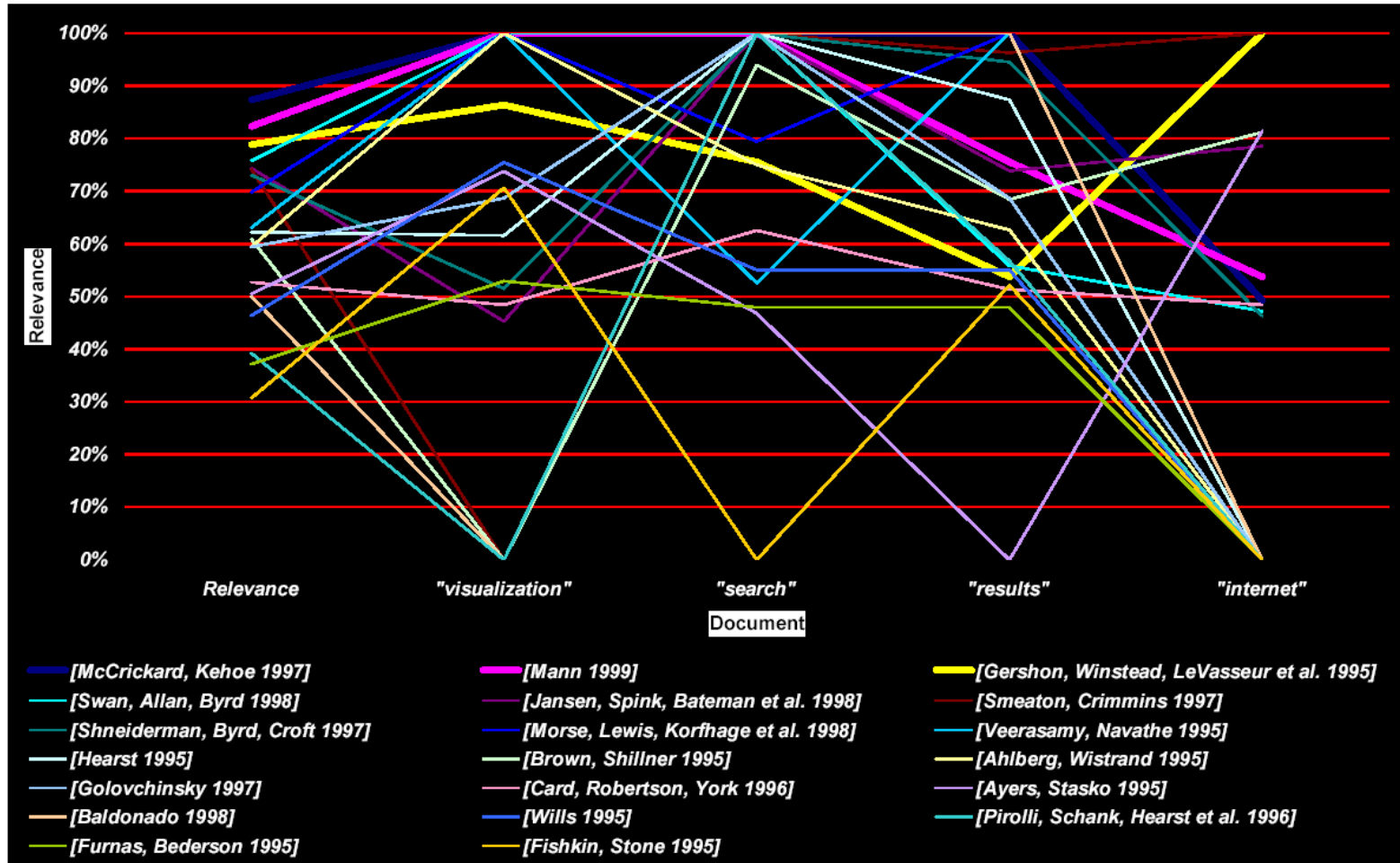
Visualization of Document Attributes → **Table Lens**



The screenshot shows the Inlight Eureka interface with a detailed table view of document attributes. The table has columns for Name, Title, Relevance, "visual...", "search", "results", "internet", Size, Year, and URL. A red box highlights a specific row with the following data:

	Name	Title	Relevance	"visual..."	"search"	"results"	"internet"	Size	Year	URL
6	[McCrickard, Ke...		87%						1997	
7	[Smeaton, Crim...		74%						1997	
8	[Shneiderman, ...		73%						1997	
9	[Golovchinsky 1...		69%						1997	

Visualization of Document Attributes → Parallel Coordinates



Text Visualization – Some Tools

Wordle – <http://www.wordle.net/>

TextArc – <http://www.textarc.org/>

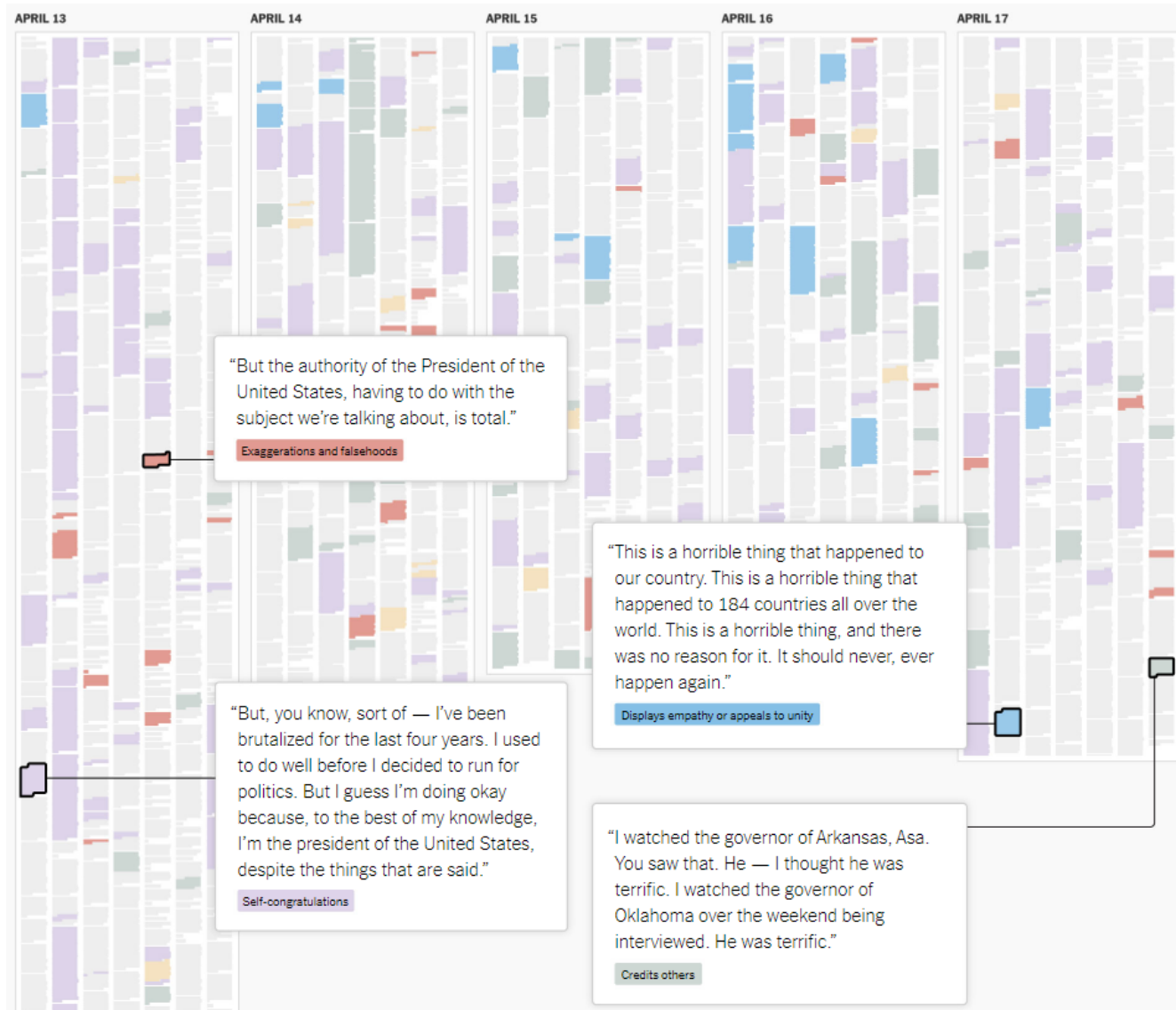
CapitolWords – <http://capitolwords.org/>

NYTimes State of the Union –
http://www.nytimes.com/ref/washington/20070123_STATEOFUNION.html

NYTimes Visualizations – Text Visualization

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>

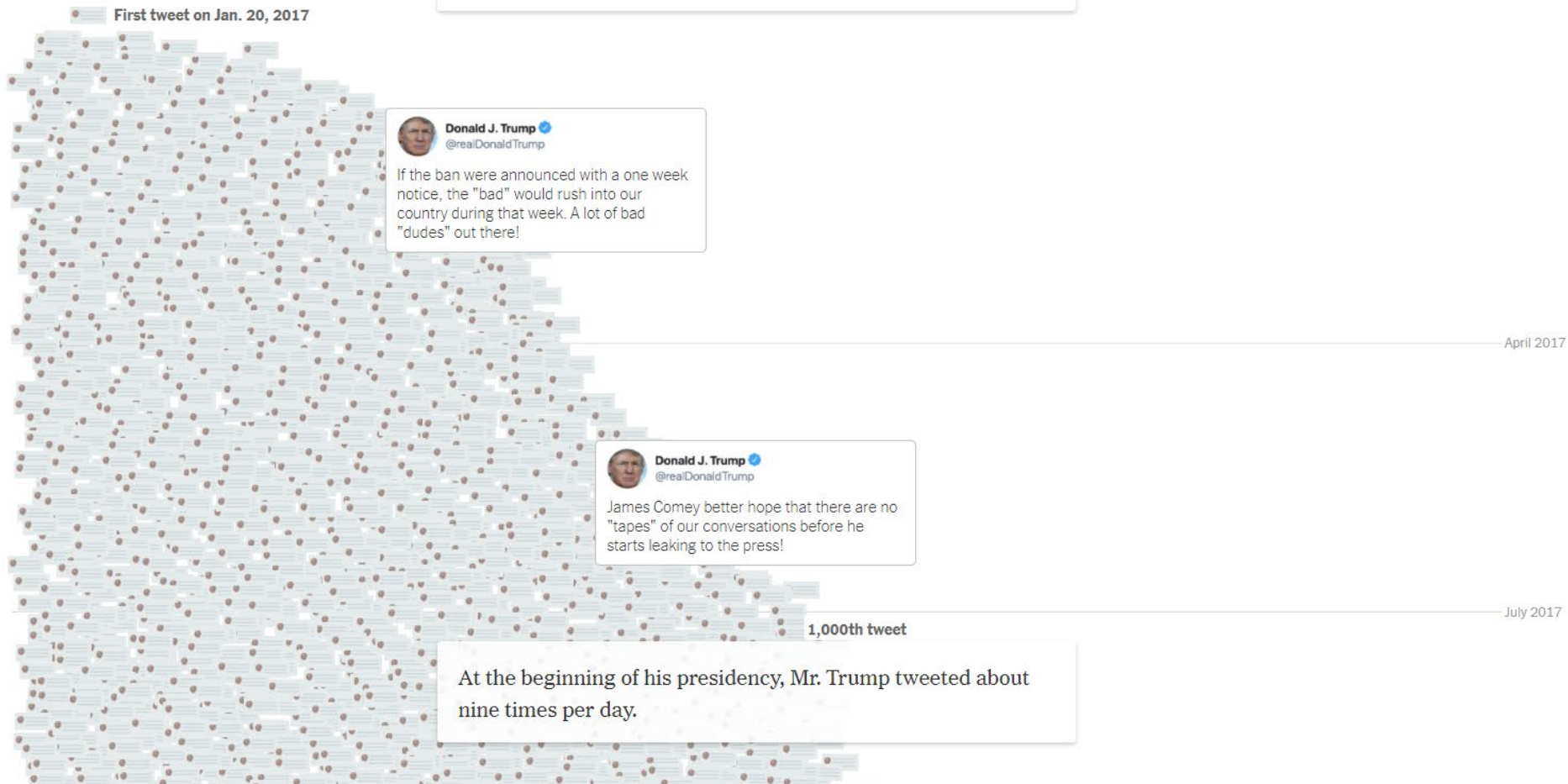


NYTimes Visualizations – Text Visualization

The Twitter Presidency – Reshaping the White House

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

What followed was a barrage of personal attacks, outrage and boasting, in a near-constant stream of more than 11,000 tweets over 33 months.



NYTimes Visualizations – Text Visualization

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

2 Trump campaign's interest in the Wikileaks release of hacked materials

3 Contacts that Carter Page, a Trump campaign adviser, had with the Russian government

4 Trump Tower meeting

5 Mueller's decision on whether or not to bring charges

6 People charged with lying and obstruction

