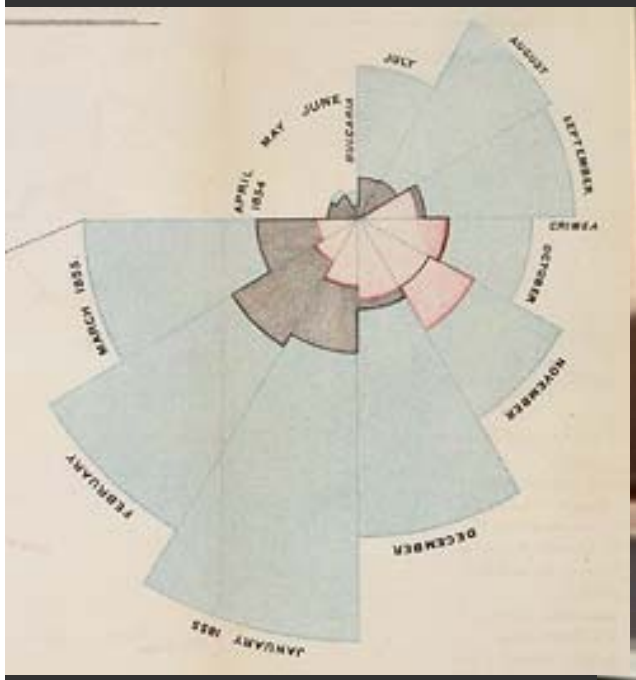
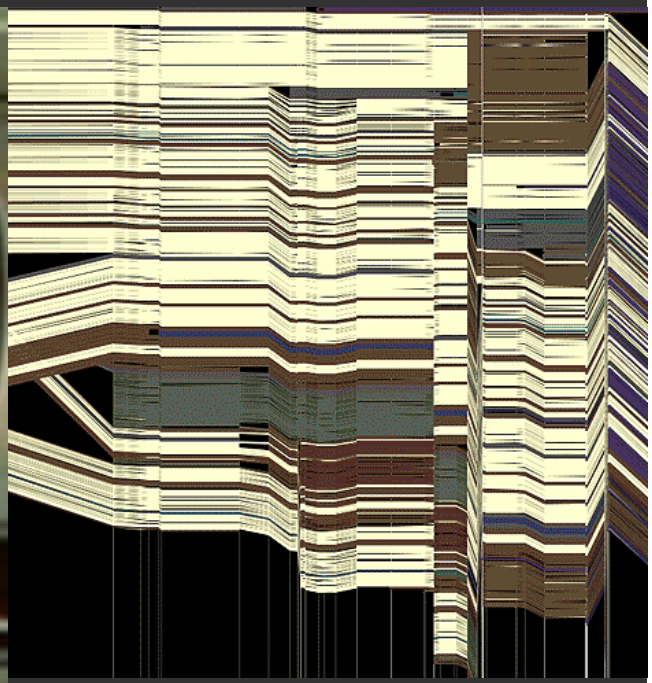
a brief overview of

Data Visualization





Jeffrey Heer Stanford University

Set A		Set B		Set C		Set D	
X	Y	X	Y	X	Y	X	Y
10	8.04	10	9.14	10	7.46	8	6.58
8	6.95	8	8.14	8	6.77	8	5.76
13	7.58	13	8.74	13	12.74	8	7.71
9	8.81	9	8.77	9	7.11	8	8.84
11	8.33	11	9.26	11	7.81	8	8.47
14	9.96	14	8.1	14	8.84	8	7.04
6	7.24	6	6.13	6	6.08	8	5.25
4	4.26	4	3.1	4	5.39	19	12.5
12	10.84	12	9.11	12	8.15	8	5.56
7	4.82	7	7.26	7	6.42	8	7.91
5	5.68	5	4.74	5	5.73	8	6.89

Summary Statistics

u_X = 9.0 σ_X = 3.317

u_Y = 7.5 σ_Y = 2.03

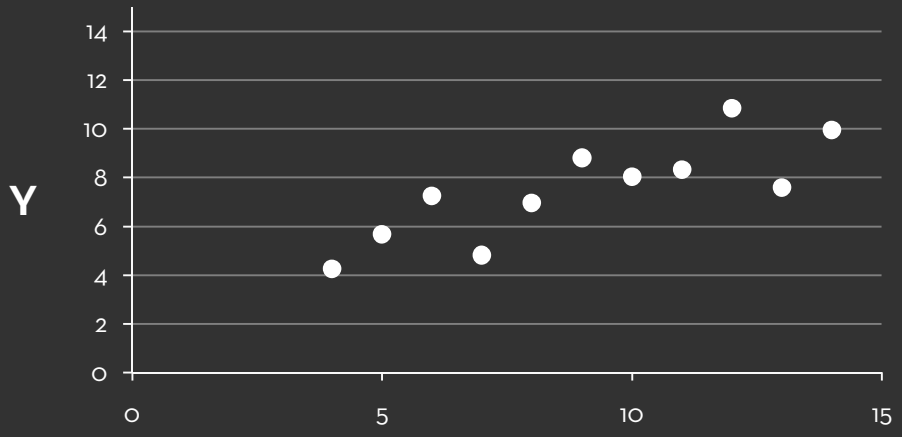
Linear Regression

Y^2 = 3 + 0.5 X

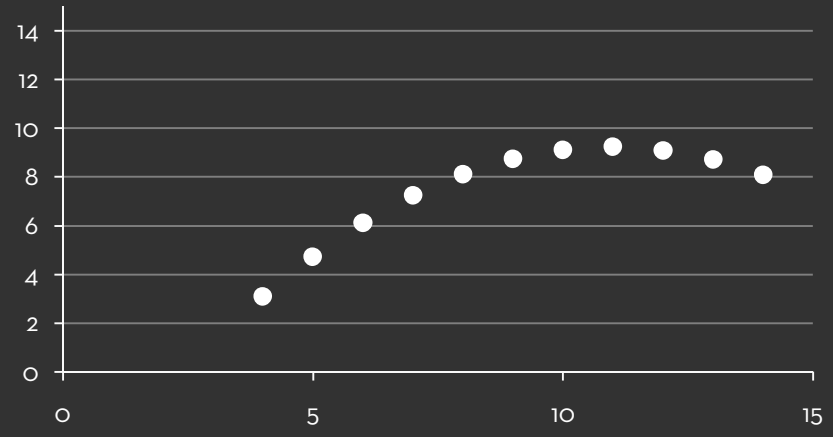
R^2 = 0.67

[Anscombe 73]

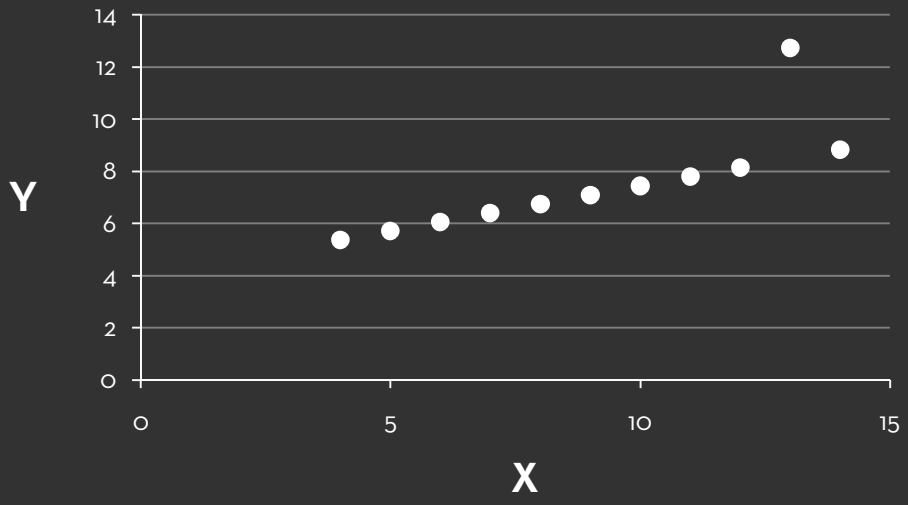
Set A



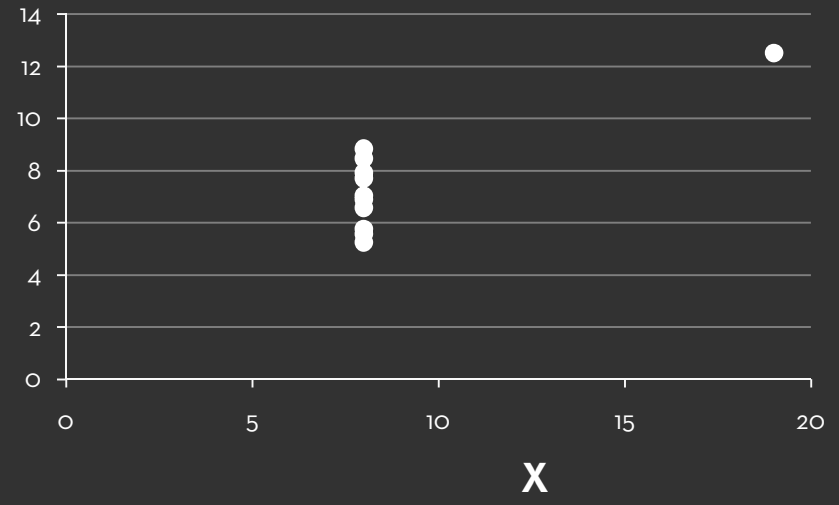
Set B



Set C



Set D



cabspotting.org

Revision history of Chocolate

From Wikipedia, the free encyclopedia

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Main page
Contents
Featured content
Current events
Random article
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Interaction
About Wikipedia
Community portal
Recent changes
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Browse history

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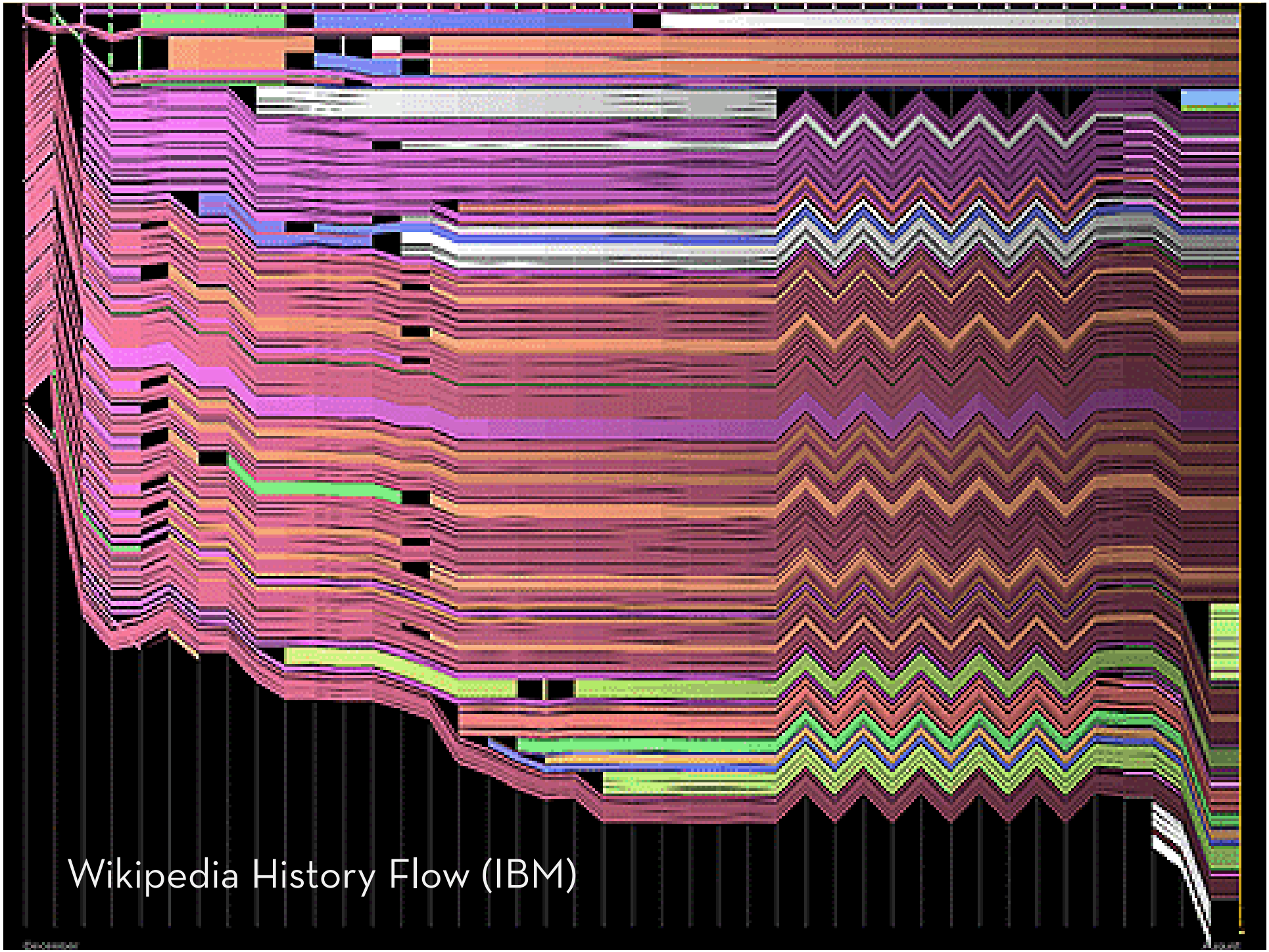
Go

For any version listed below, click on its date to view it. For more help, see Help:Page history and Help:Edit summary.
External tools: Revision history statistics · Revision history search · Number of watchers · Page view statistics

(cur) = difference from current version, (prev) = difference from preceding version,
m = minor edit, → = section edit, ← = automatic edit summary
(latest | earliest) View (newer 50 | older 50) (20 | 50 | 100 | 250 | 500)

Compare selected revisions

- (cur | prev) 23:15, 31 October 2010 Darrell Greenwood (talk | contribs) **m** (53,615 bytes) *(→External links: added info on The Food of the Gods ebook)*
- (cur | prev) 21:01, 31 October 2010 Dzsi (talk | contribs) **m** (53,583 bytes) *(Adjusting link)*
- (cur | prev) 13:06, 29 October 2010 Darrell Greenwood (talk | contribs) **m** (53,593 bytes) *(→External links: book -> ebook)*
- (cur | prev) 09:37, 29 October 2010 Lukeonia1 (talk | contribs) (53,592 bytes) *(→History: Counting beans - restored the bean-avocado conversion)*
- (cur | prev) 15:56, 25 October 2010 H3llBot (talk | contribs) **m** (53,587 bytes) *(BOT: Checking dead links; Added 1 archived Wayback link)*
- (cur | prev) 17:34, 23 October 2010 Xqbot (talk | contribs) **m** (53,404 bytes) *(robot Adding: bjn:Suklat)*
- (cur | prev) 23:55, 17 October 2010 Darrell Greenwood (talk | contribs) **m** (53,388 bytes) *(Added Food of the Gods (Project Gutenberg) external link)*
- (cur | prev) 13:48, 7 October 2010 ShelfSkewed (talk | contribs) **m** (53,249 bytes) *(rm silliness)*
- (cur | prev) 00:11, 3 October 2010 Royote (talk | contribs) **m** (53,265 bytes) *(→Manufacturers: this heading is inappropriate)*
- (cur | prev) 23:49, 2 October 2010 Royote (talk | contribs) **m** (53,250 bytes) *(→Etymology)*
- (cur | prev) 23:47, 2 October 2010 Royote (talk | contribs) **m** (53,252 bytes)
- (cur | prev) 23:45, 2 October 2010 Royote (talk | contribs) **m** (53,223 bytes)


Wikipedia History Flow (IBM)

Information Visualization:
The use of computer-generated, interactive, visual representations of data to amplify cognition.

Card, Mackinlay & Shneiderman 1999

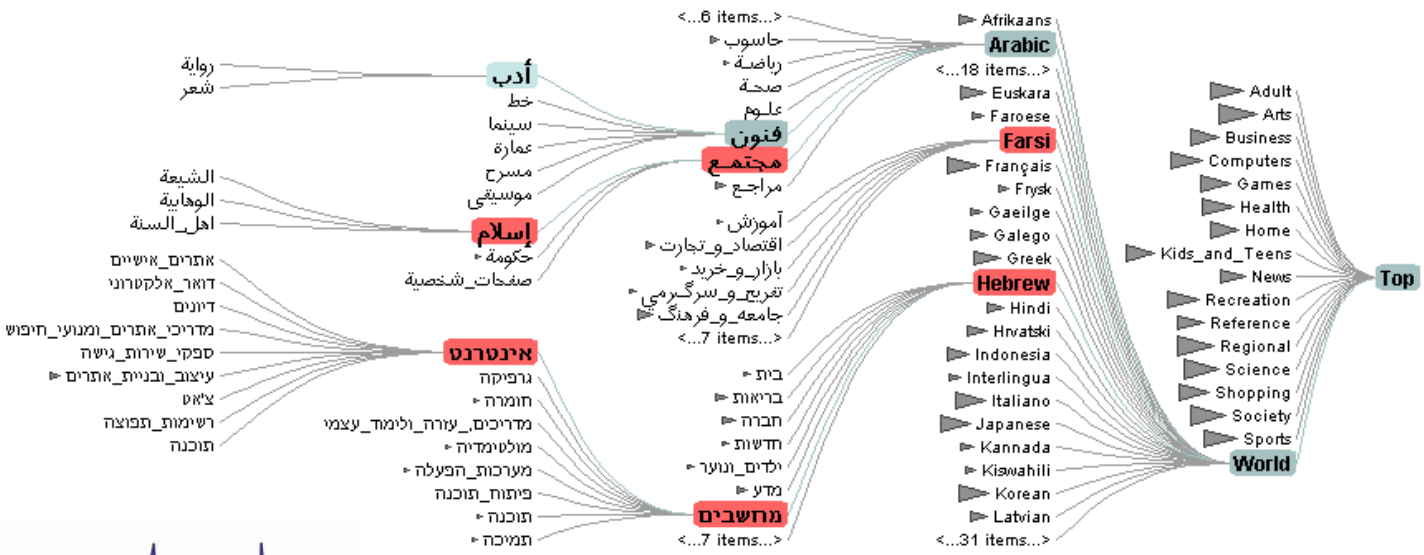
Visualization Research

1. **Understand** how people use visualizations to gain insight
2. **Formulate** design principles and techniques for visual analysis
3. **Develop** novel visualization applications for new domains

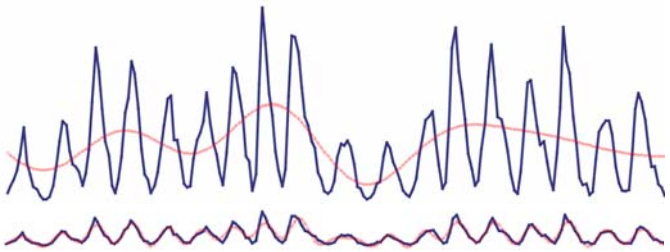
Visualization Techniques & Tools

Visualization Techniques

Improve visual analysis and communication via novel algorithms, encodings, and interactions

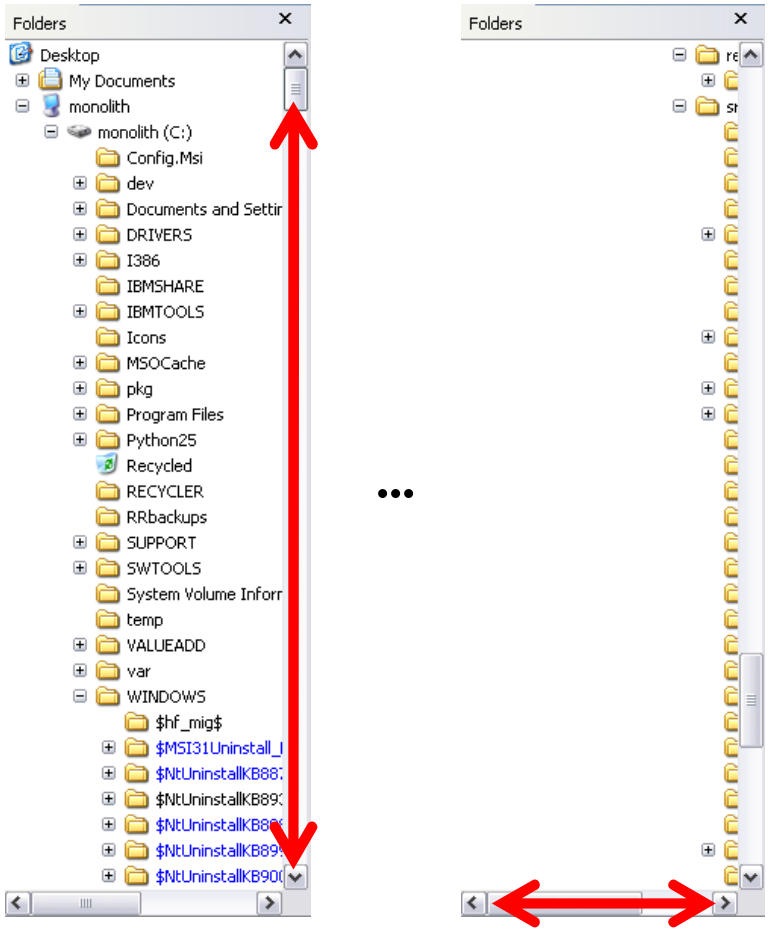


Degree-of-Interest Trees

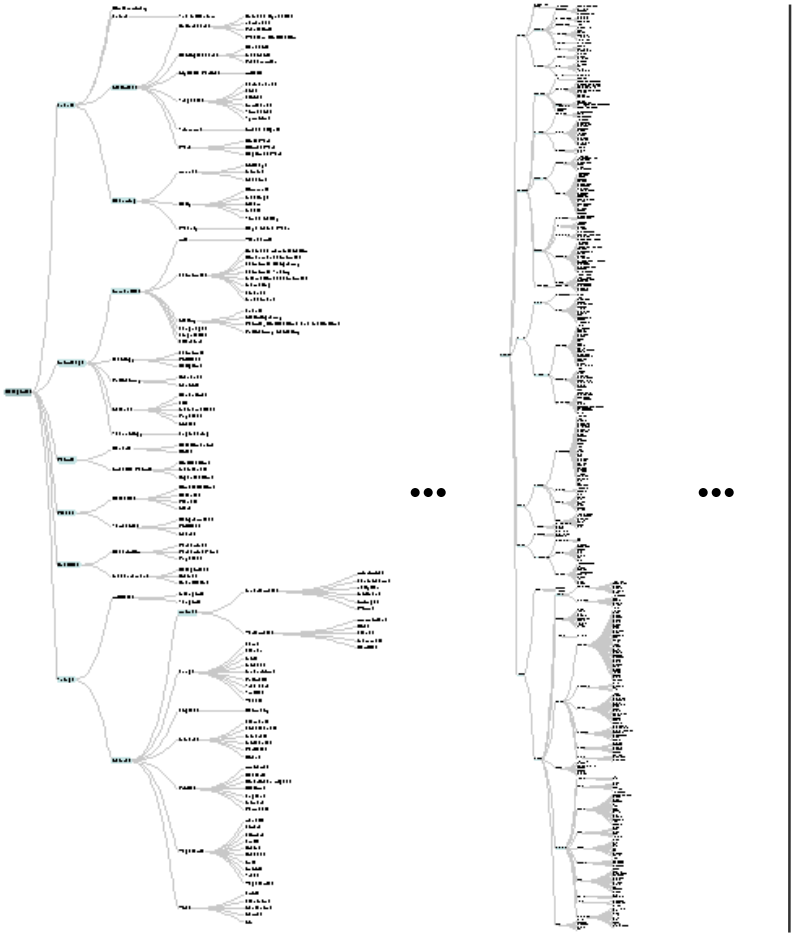


Aspect Ratio Optimization

Visualizing Large Hierarchies

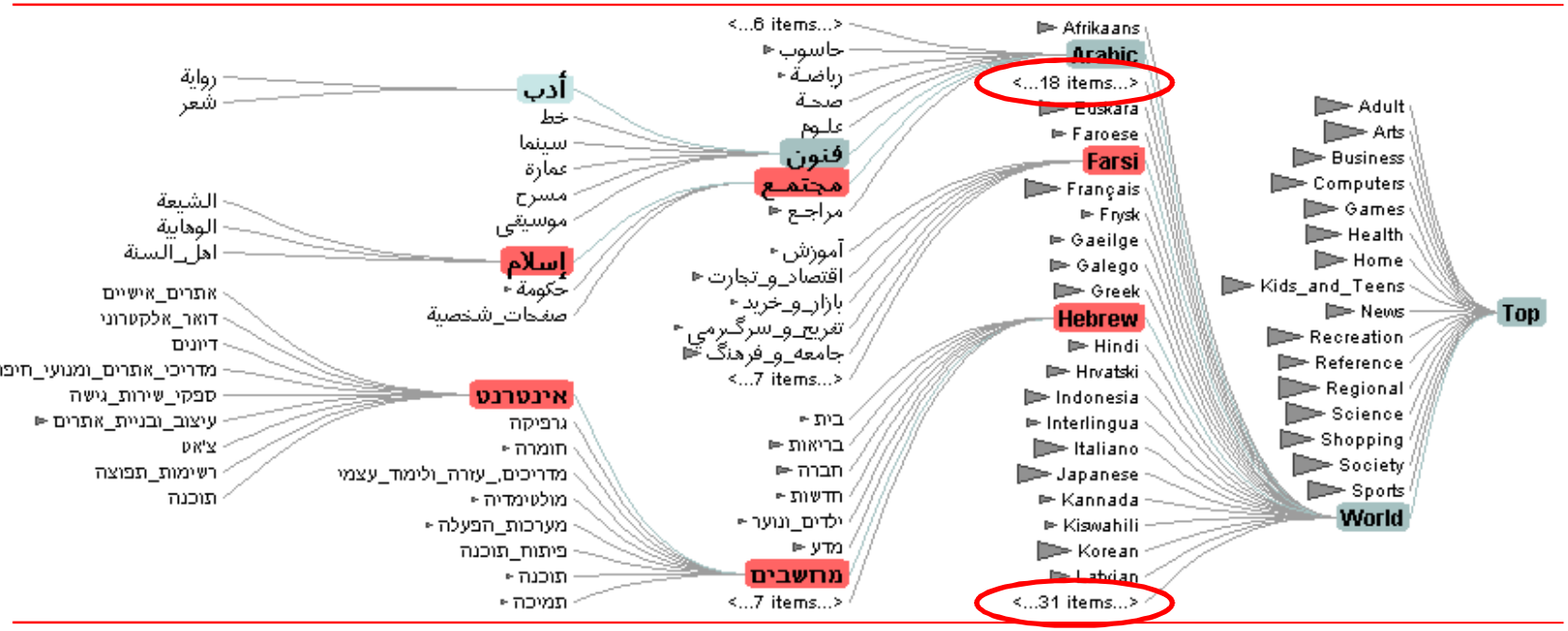


Indented Layout



Reingold-Tilford Layout

Degree-of-Interest Trees

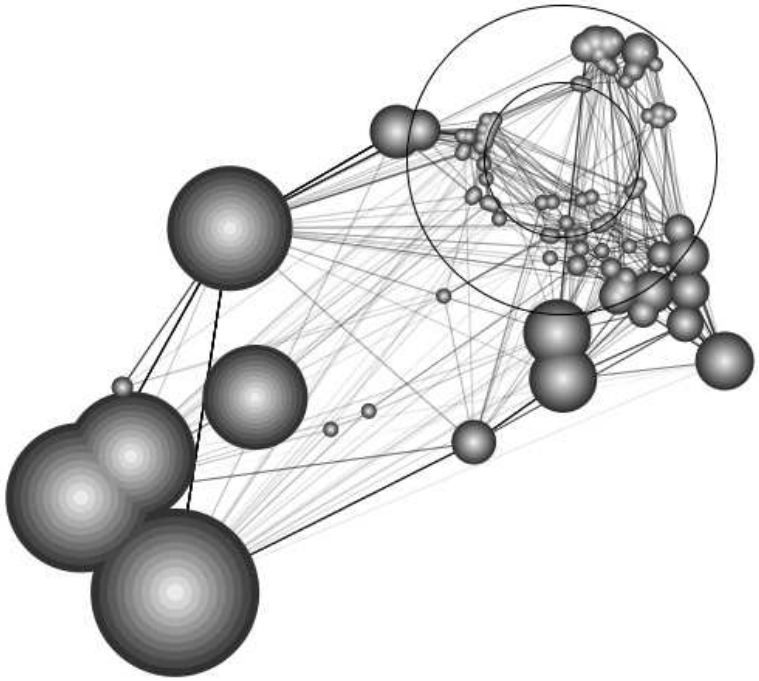


Space-constrained, multi-focal tree layout

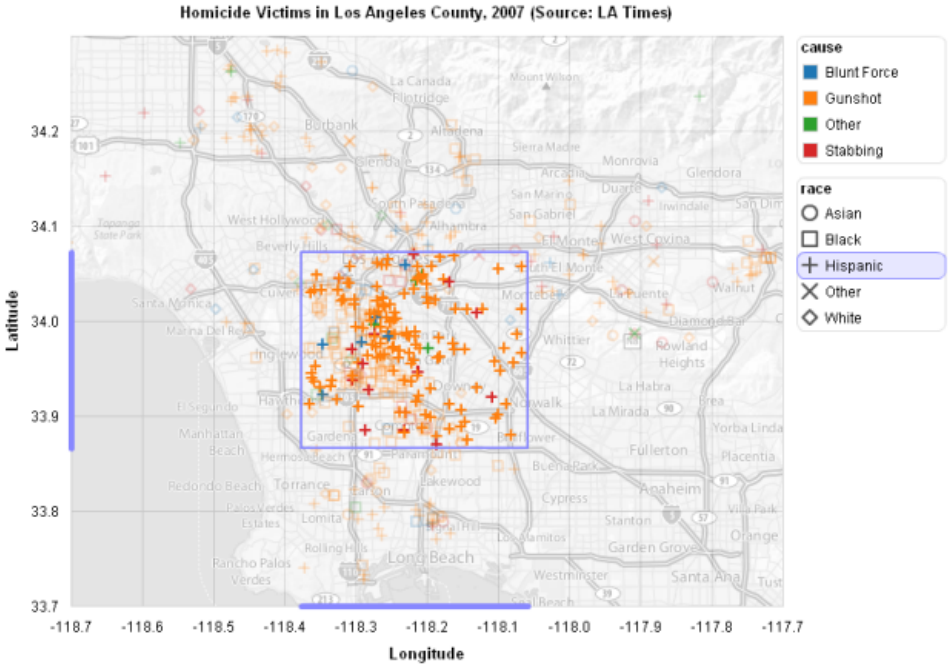
Show only information predicted to be relevant

Visualization Tools

Support visualization design through novel architectures and tools for visualization creation



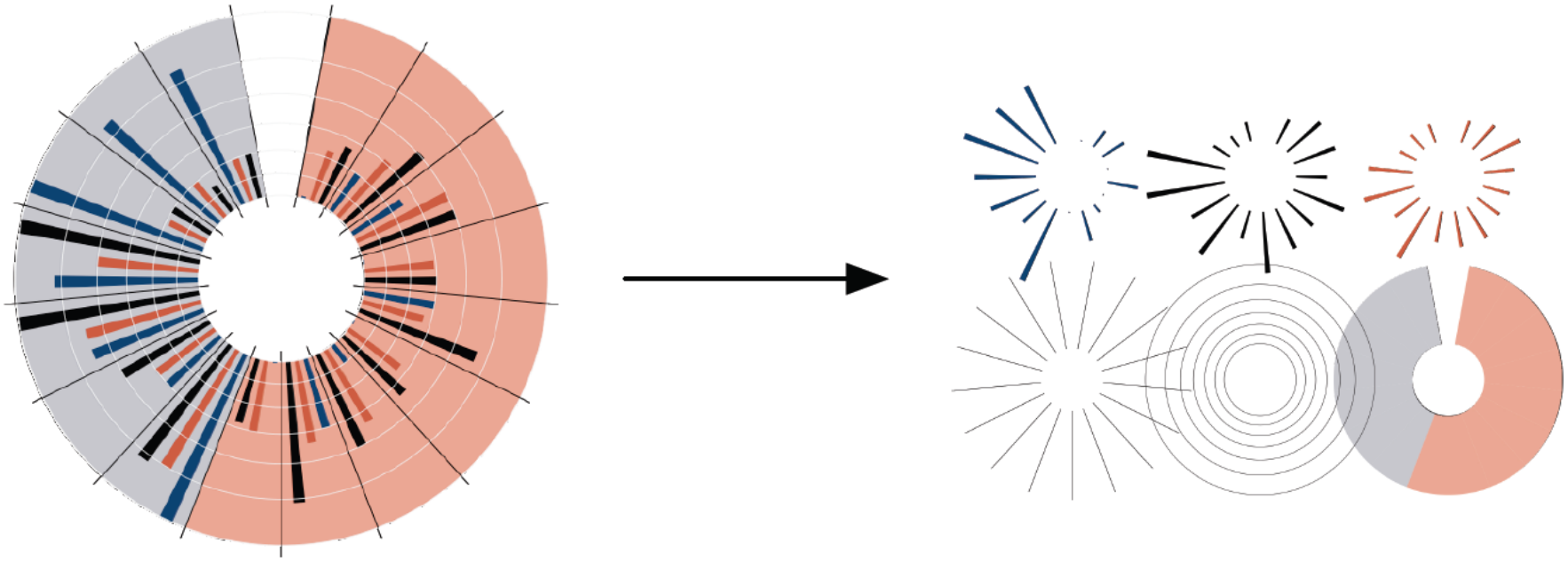
Prefuse (http://prefuse.org)

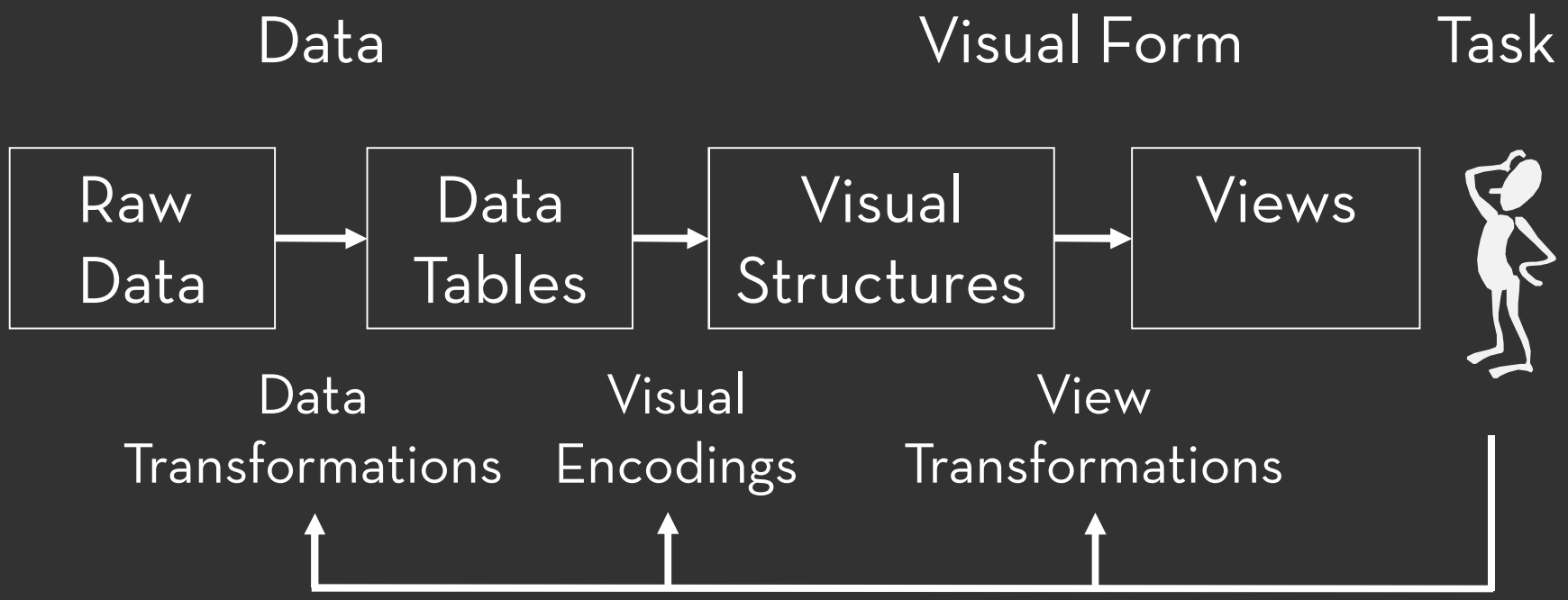


Flare (http://flare.prefuse.org)

Protovis: A Graphical Toolkit for Visualization

http://protovis.org/

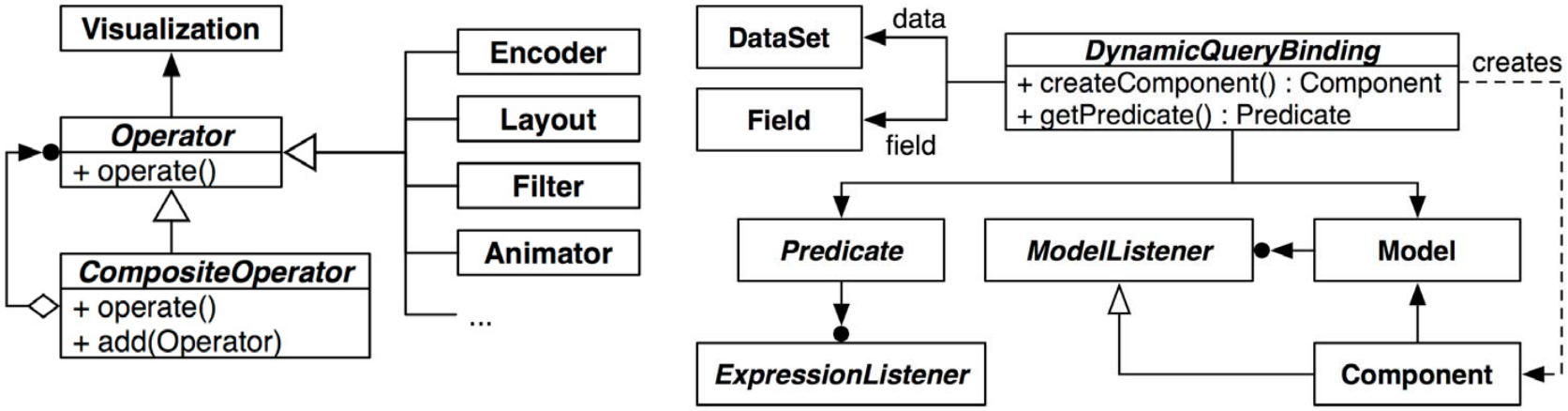


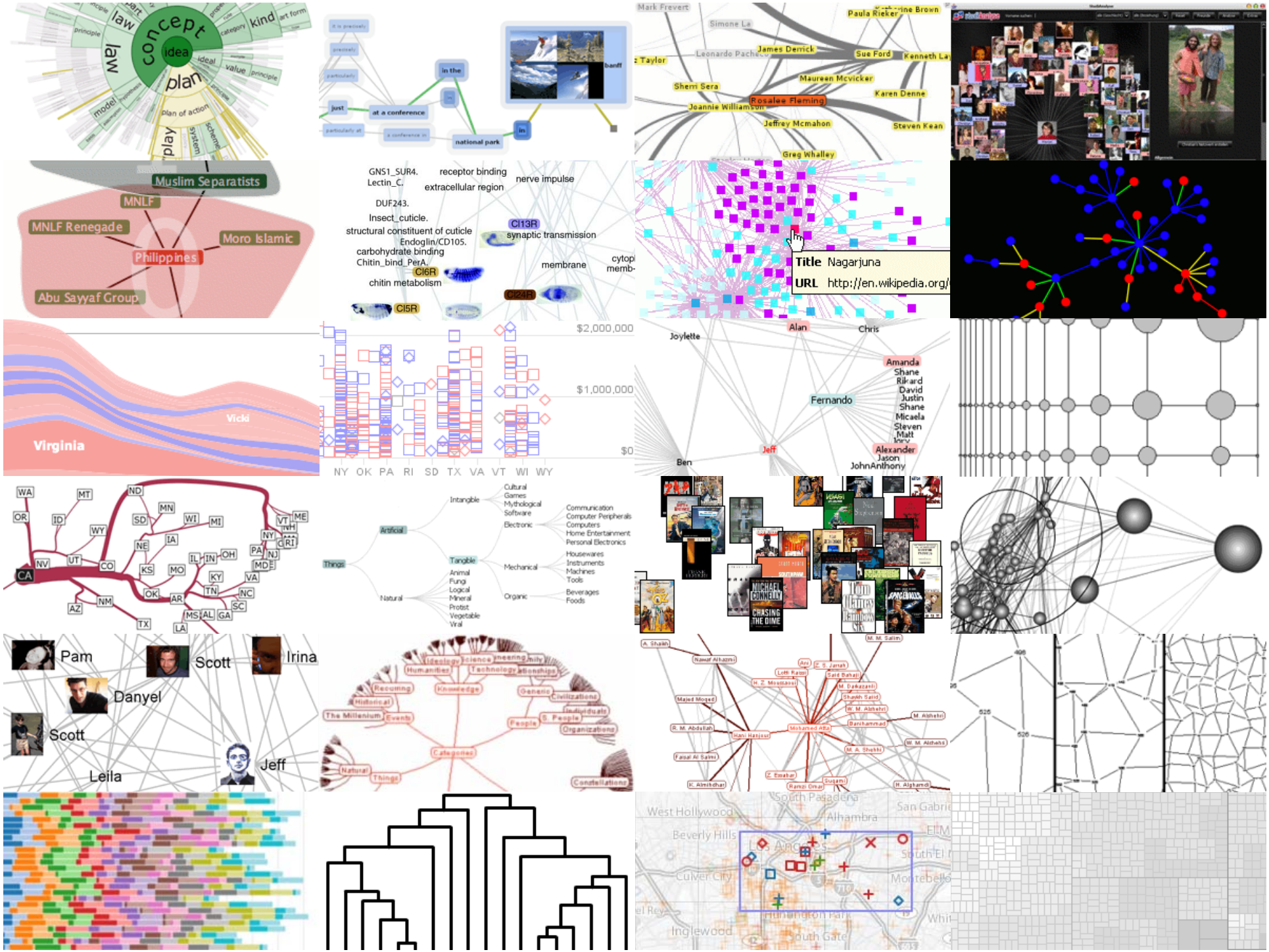

Data
Visual Form
Task
Raw Data
Data Tables
Visual Structures
Views
Data Transformations
Visual Encodings
View Transformations

Usage and Uptake

Open Source projects 150,000+ downloads
Used by students, researchers, corporations
Google, IBM, Wash Post, BBC, Slate, Wired, ...

Design Patterns for software architectures




concept
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MNLF Renegade
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Abu Sayyaf Group
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extracellular region
nerve impulse
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Endoglin/CD105.
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Chitin_bind_PerA.
chitin metabolism
Cl13R
synaptic transmission
membrane
Cl6R
Cl5R
Cl24R
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URL http://en.wikipedia.org/
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NY OK PA RI SD TX VA VT WI WY
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Mechanical
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Computer Peripherals
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Personal Electronics
Housewares
Instruments
Machines
Tools
Beverages
Foods
Pam
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Irina
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Scott
Leila
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Ideology
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The Millenium
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People
Organizations
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Things
Constellations
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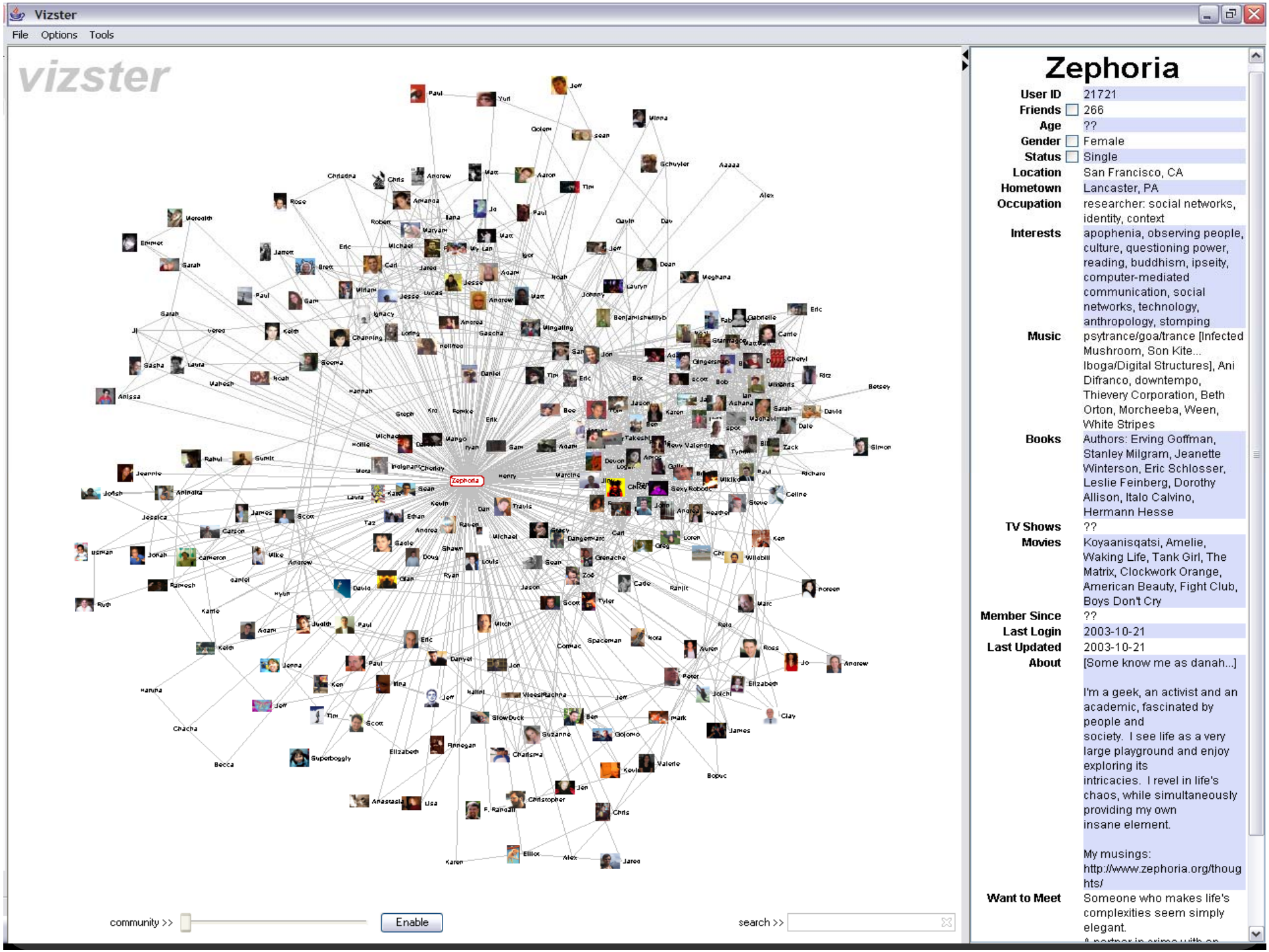
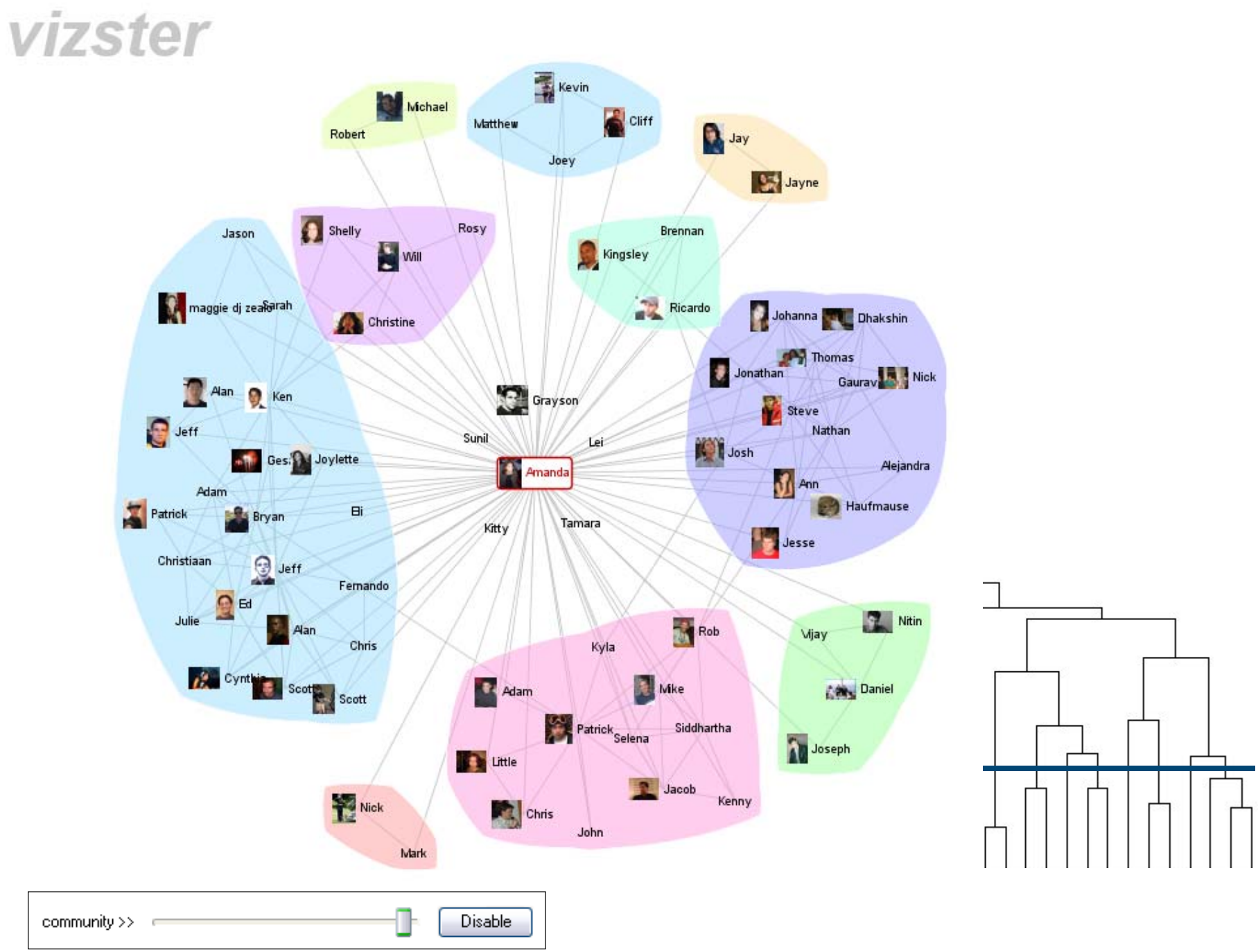
Hani Hanjour
West Hollywood
Beverly Hills
Culver City
Inglewood
Alhambra
South Pasadena
Huntington Park
South Gate

Social Visualization


Vizster
File
Options
Tools
vizster
Zephoria
community >>
Enable
search >>
Zephoria
User ID 21721
Friends 266
Age ??
Gender Female
Status Single
Location San Francisco, CA
Hometown Lancaster, PA
Occupation researcher: social networks, identity, context
Interests apophenia, observing people, culture, questioning power, reading, buddhism, ipseity, computer-mediated communication, social networks, technology, anthropology, stomping
Music psytrance/goa/trance [Infected Mushroom, Son Kite... Iboga/Digital Structures], Ani Difranco, downtempo, Thievery Corporation, Beth Orton, Morcheeba, Ween, White Stripes
Books Authors: Erving Goffman, Stanley Milgram, Jeanette Winterson, Eric Schlosser, Leslie Feinberg, Dorothy Allison, Italo Calvino, Hermann Hesse
TV Shows ??
Movies Koyaanisqatsi, Amelie, Waking Life, Tank Girl, The Matrix, Clockwork Orange, American Beauty, Fight Club, Boys Don't Cry
Member Since ??
Last Login 2003-10-21
Last Updated 2003-10-21
About [Some know me as danah...]
I'm a geek, an activist and an academic, fascinated by people and society. I see life as a very large playground and enjoy exploring its intricacies. I revel in life's chaos, while simultaneously providing my own insane element.
My musings: http://www.zephoria.org/thoughts/
Want to Meet Someone who makes life's complexities seem simply elegant.


vizster
Michael
Robert
Kevin
Matthew
Cliff
Joey
Jay
Jayne
Jason
Shelly
Rosy
Will
Christine
Brennan
Kingsley
Ricardo
maggie dj zealo
Sarah
Johanna
Dhakshin
Thomas
Jonathan
Gaurav
Nick
Alan
Ken
Grayson
Steve
Jeff
Nathan
Sunil
Lei
Josh
Joylette
Amanda
Alejandra
Adam
Ann
Patrick
Bryan
Eli
Haufmause
Kitty
Tamara
Jesse
Christiaan
Jeff
Fernando
Ed
Julie
Alan
Chris
Rob
Nitin
Vijay
Kyla
Cynthia
Scott
Scott
Adam
Mike
Daniel
Patrick
Selena
Siddhartha
Joseph
Little
Jacob
Kenny
Nick
Chris
John
Mark
community >>
Disable

sense.us

A Web Application for Collaborative Visualization of Demographic Data

sense.us > social data visualization - Mozilla Firefox

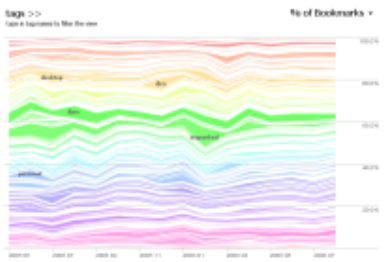
File Edit View History Bookmarks Tools Help

http://sense.us/

Google

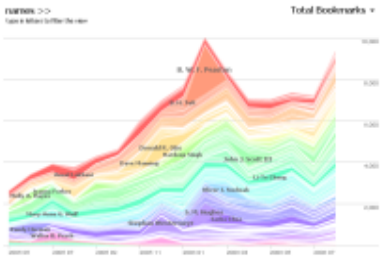
sense.us

Log in to add comments! ibm e-mail pass login help



Dogear Tags

Dogear Tag Usage, May 2005 to August 2006
source: IBM Dogear
10 comments



Dogear People

Dogear Bookmarking by Person, May 2005 to August 2006
source: IBM Dogear
1 comment

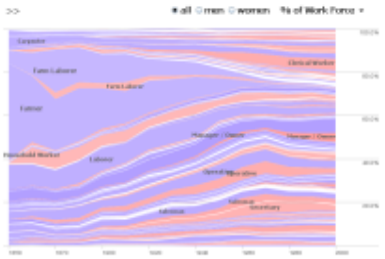
sense.us - social data visualization

sense.us is a prototype system for collaborative visualization.
- See the data. See what people have to say about it.
- Dive into the data and share your explorations.

The site requires **Java 1.5+** and either **Firefox** or **Internet Explorer**.
Use your **IBM W3/BluePages e-mail and password** to login.
Use at least **1024x768** resolution for the best experience.

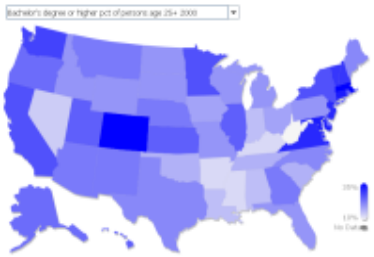
Check out the **user's guide** and **privacy policy** before getting started.

Having problems using Firefox with Java 1.4? Some users using Firefox and Java 1.4 have found that comments aren't loading properly. If you run into this problem, consider upgrading to Java 1.5 (**Windows**, **Linux**) or using Internet Explorer (on Windows systems). Sorry for any inconvenience!



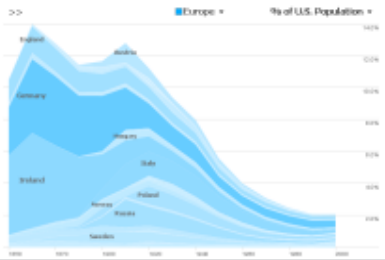
Job Voyager

Reported Occupations of U.S. Labor Force, 1850-2000
source: http://ipums.org
139 comments



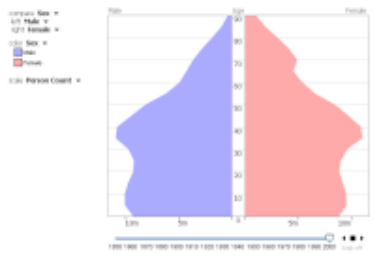
U.S. Census State Map

State Map of 2000-2005 Census Data
source: U.S. Census Bureau
16 comments



Birthplace Voyager

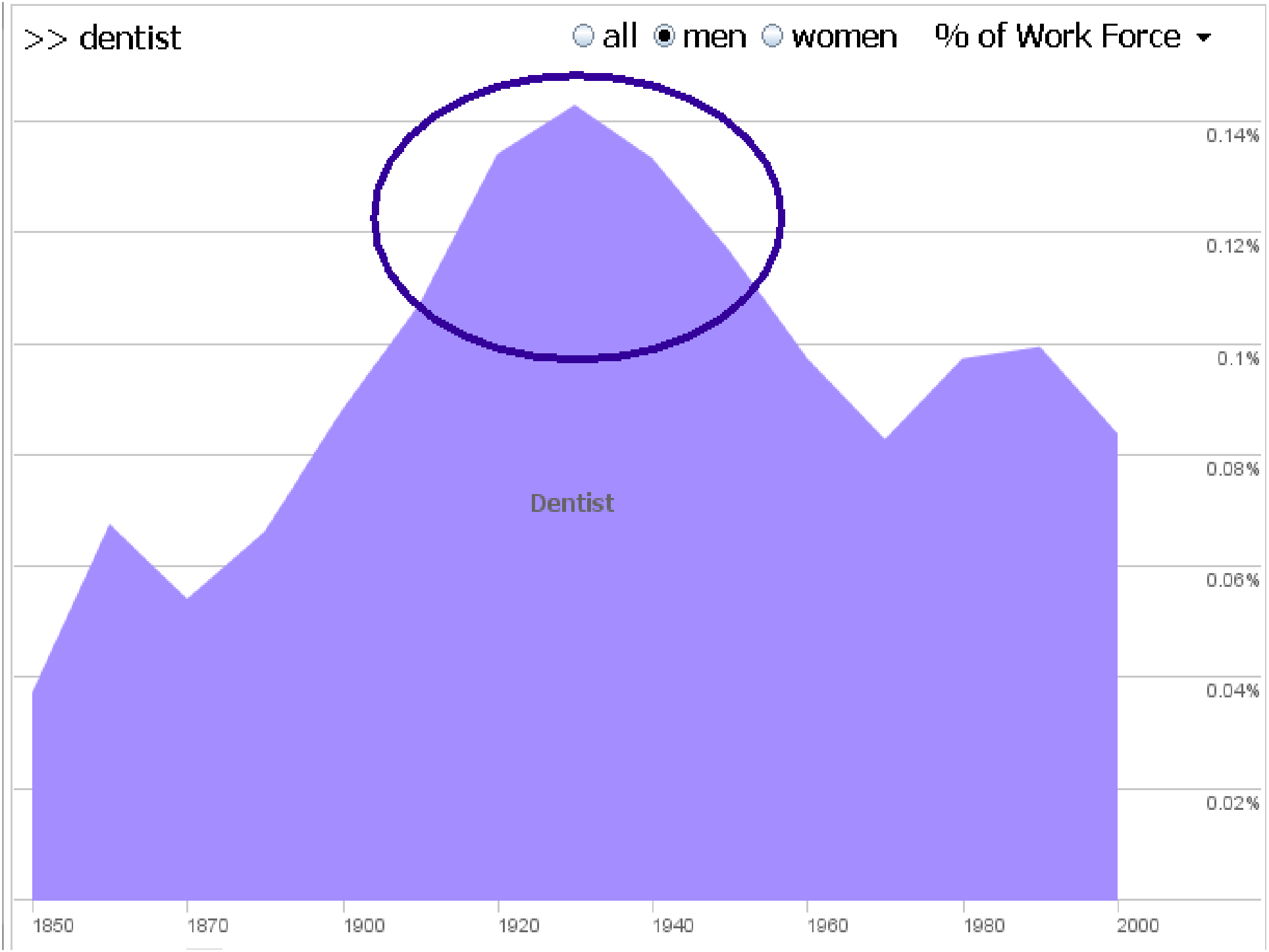
Reported Birthplace of U.S. Residents, 1850-2000
source: http://ipums.org
10 comments



Population Pyramid

U.S. Population Demographics, 1850-2000
source: http://ipums.org
7 comments

Done


>> dentist
all
men
women
% of Work Force
0.14%
0.12%
0.1%
0.08%
0.06%
0.04%
0.02%
Dentist
1850
1870
1900
1920
1940
1960
1980
2000

>> dentist
all
men
women
% of Work Force
Fluoride starts around here?
0.14%
0.12%
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Dentist
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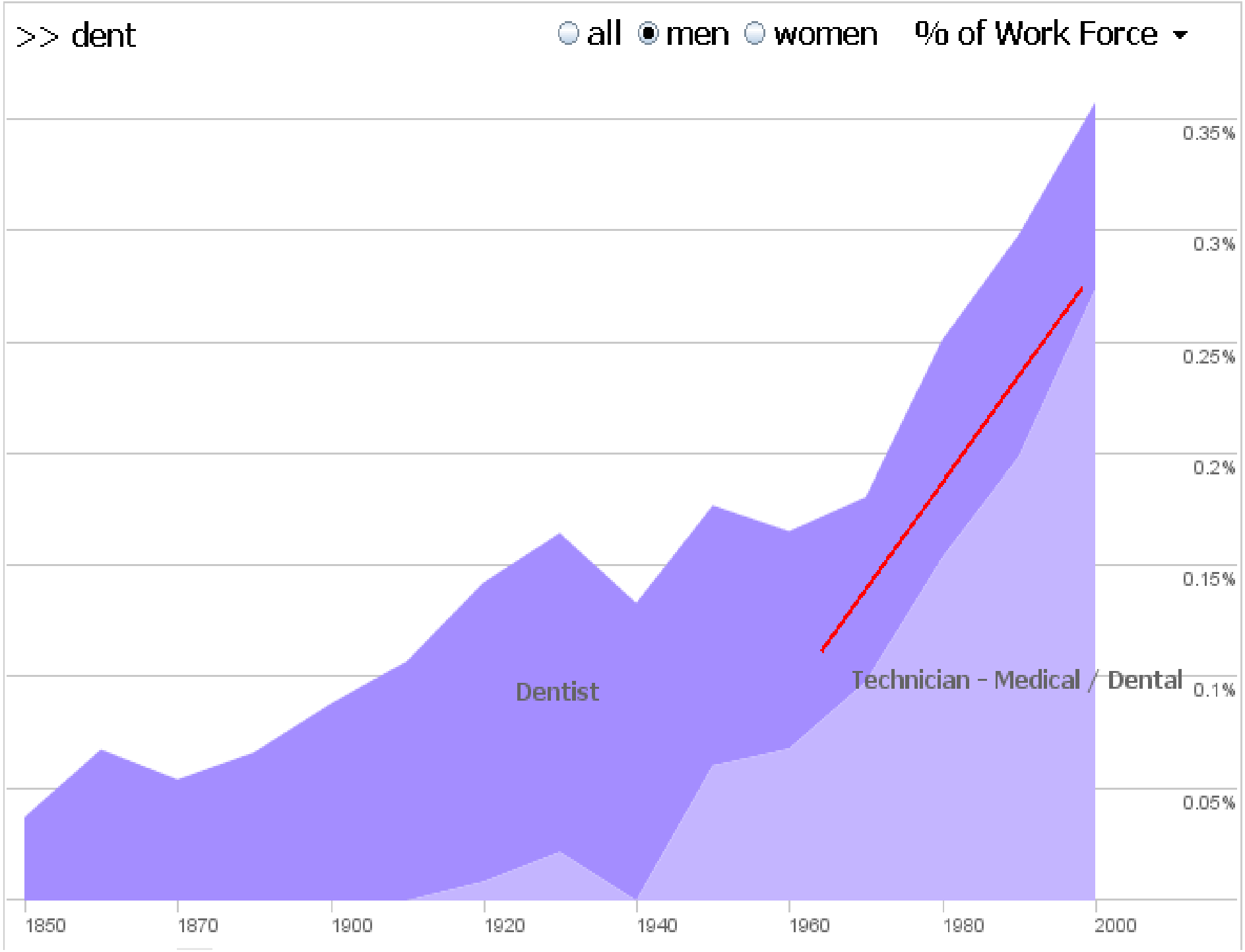
2000


>> dent
all
men
women
% of Work Force
0.35%
0.3%
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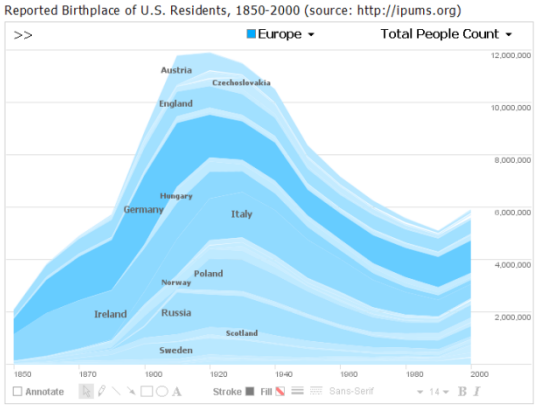
0.2%
0.15%
0.1%
0.05%
Dentist
Technician - Medical / Dental
1850
1870
1900
1920
1940
1960
1980
2000

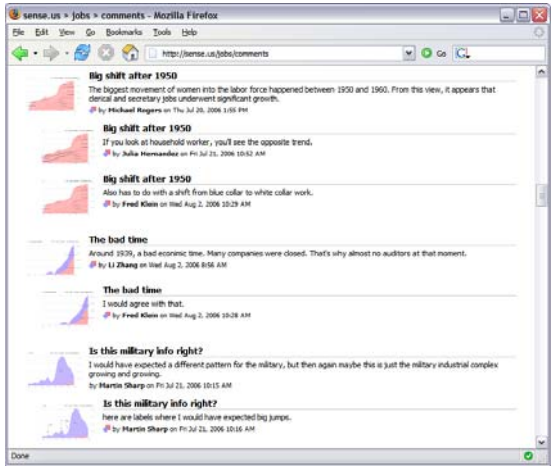
Voyagers and Voyeurs

Complementary faces of analysis

Voyager – focus on visualized data
Active engagement with the data
Serendipitous comment discovery



Voyeur – focus on comment listings
Investigate others' explorations
Find people and topics of interest
Catalyze new explorations



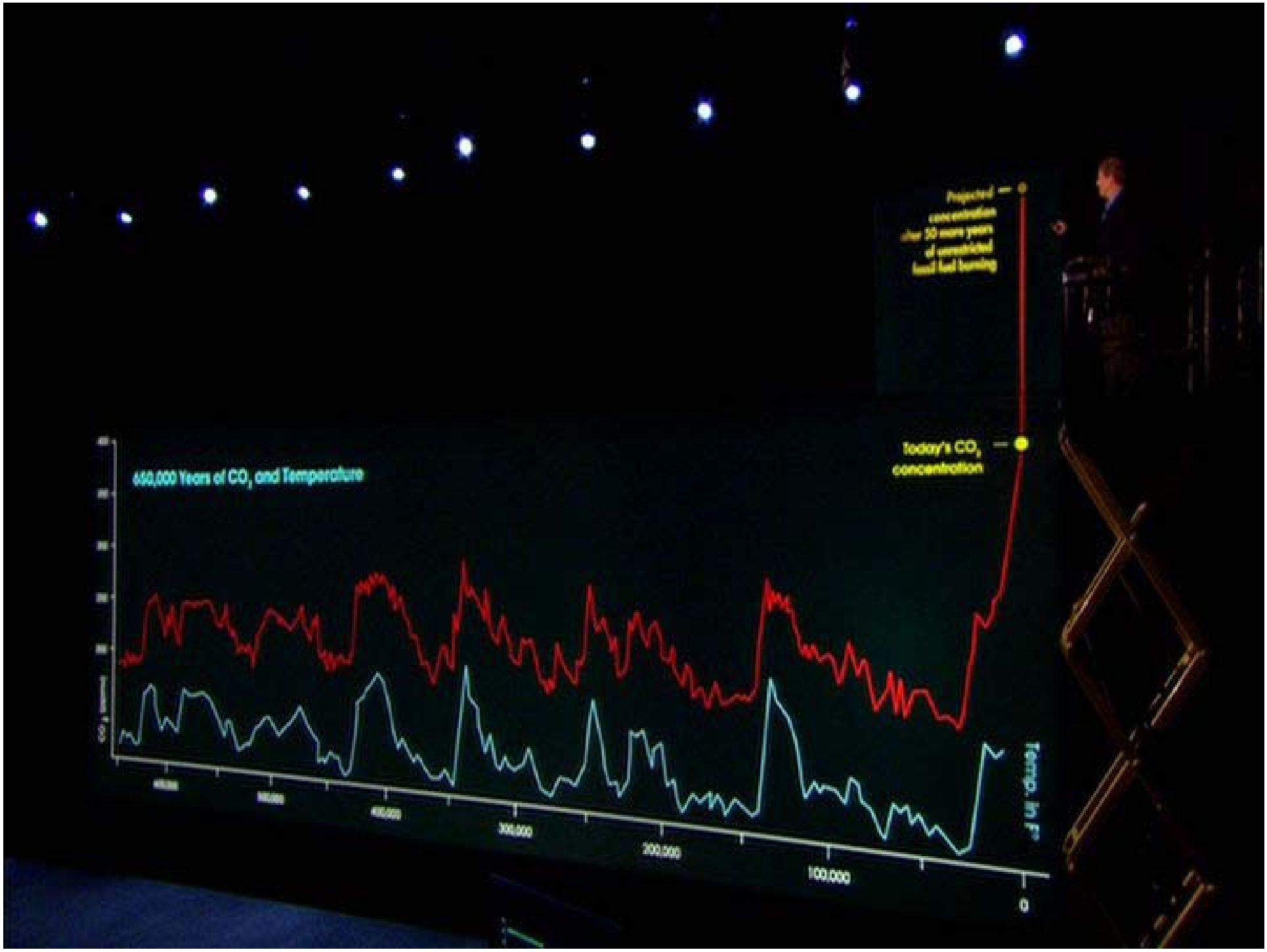
Opportunities?

The intersection of visualization, social computing & television.

TIME WARNER CABLE
TV Listings
9:24pm
TV Guide
Home Improvement
185 NIK
9-9:30p
Repeat, "Quest for Fire", At their vacation site in northern Michigan, Tim informs the...
Today
9:00p
9:30p
10:00p
185 NIK
Home Improvement
Home Improvement
George Lopez
186 DIS
A Goofy Movie
Wizards of Waverly Place
Wizards of Waverly Place
187 TOON
Jack Frost
Steen
188 BOOM
Super Friends
SWAT Kats: Radical...
Thundarr the Barbarian
BOSE
QuietComfort 2 Headphones
REDUCE NOISE. ENJOY MUSIC.
FREE shipping. Click here.

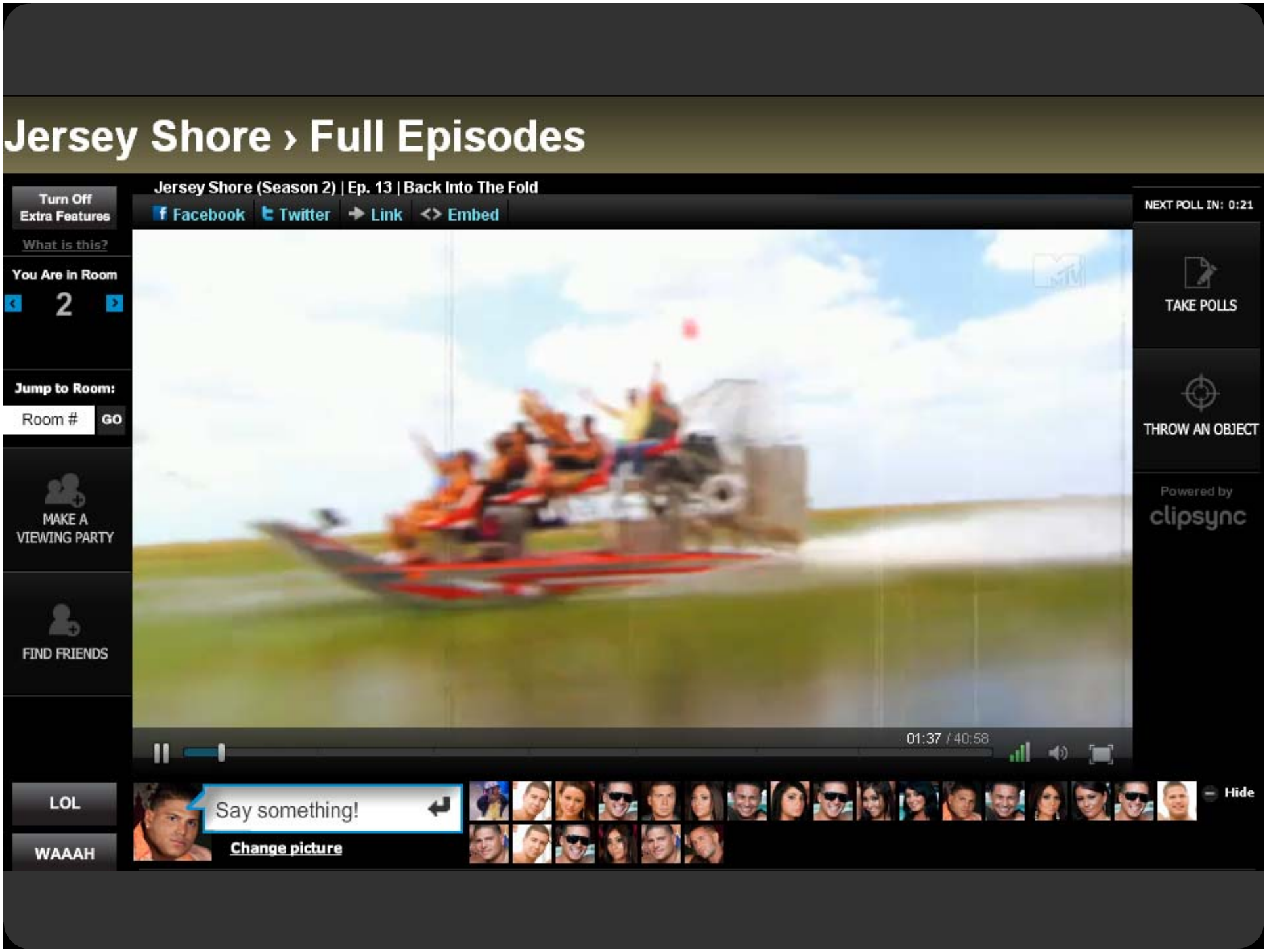
Can interactive visualization aid content browsing & search?

OR THE NOMINATION: "WHAT IF?"
C PRIMARY STRATEGY
REPUBLICAN PRIMARY STRATEGY
TO WIN: 2025
CLINTON 1481
OBAMA 1610
PENNSYLVANIA
188 TOTAL DELEGATES
CNN · AMERICA VOTES 2008


650,000 Years of CO_2 and Temperature
Today's CO_2 concentration
400,000
300,000
200,000
100,000
0

Can viewers directly interact with content presented to them?

QUESTION
CNN
WOULD YOU FAVOR CONTROLLING HEALTH CARE COSTS OVER EXPANDING COVERAGE?
LIVE
UNCOMMITTED OHIO VOTERS
MEN
WOMEN
DEBATE NIGHT IN AMERICA


Jersey Shore › Full Episodes
Turn Off Extra Features
What is this?
You Are in Room
2
Jump to Room:
Room #
GO
MAKE A VIEWING PARTY
FIND FRIENDS
Jersey Shore (Season 2) | Ep. 13 | Back Into The Fold
Facebook
Twitter
Link
Embed
01:37 / 40:58
NEXT POLL IN: 0:21
TAKE POLLS
THROW AN OBJECT
Powered by
clipsync
LOL
WAAAH
Say something!
Change picture
Hide

$ 600
DANIEL

Can viewers interact in real time to enhance their experience?

How can users find, join, and create meaningful social groups?

Welcome to **Lostpedia**

The Lost Encyclopedia

A Place That You All Made Together

Currently 7,163 articles dedicated to abc's hit TV show *Lost*

Lostpedia Frappr Map · Media Coverage · Categories · **All Portals**

SPOILER WARNING

Lostpedia is a reference guide to the entire series of *Lost*. First-time viewers should be aware that some content in articles may refer to episodes and events they are yet to see.

- The Lostpedia spoiler policy has been retired.
- Theories: Before posting a theory, please read our theory policy.

Latest News

NBC Picks Up J.J. Abrams' Emerson/O'Quinn Show

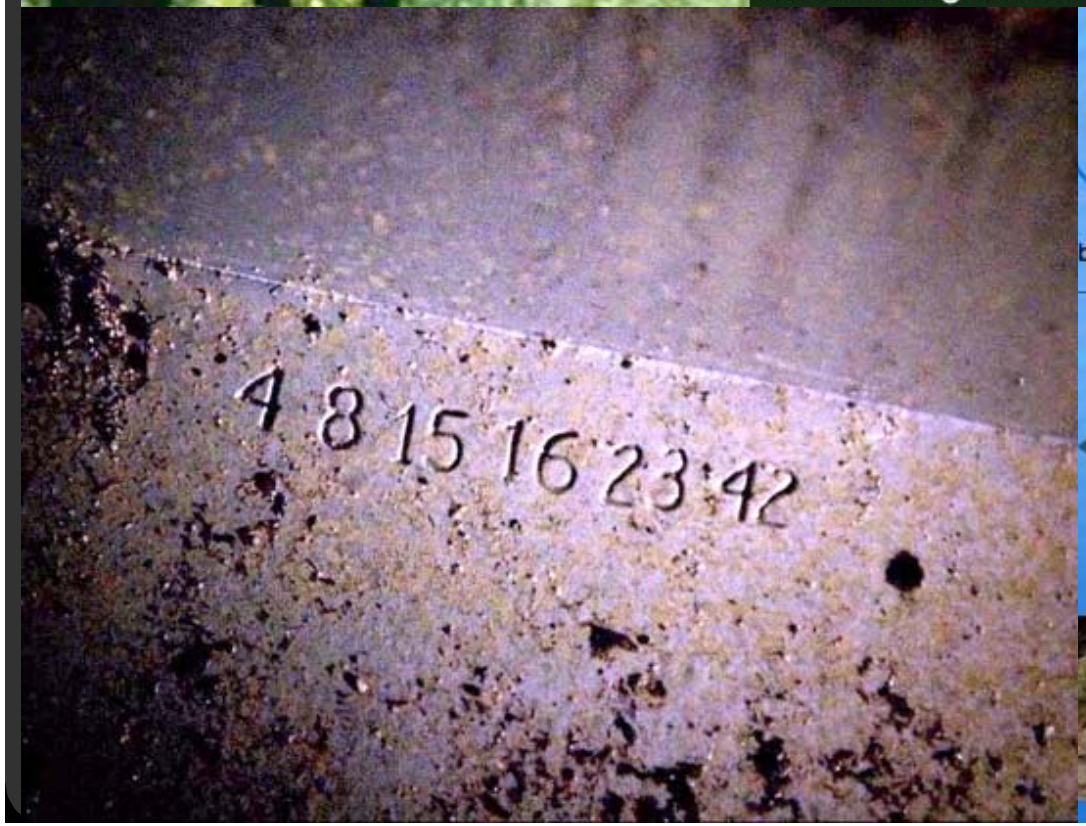
Crit Obara, *TVOvermind*

NBC has picked up another Abrams project and given it a pilot commitment. That's right, it's the much talked about show that features ex-castaways Terry O'Quinn and Michael Emerson. The show has been described as a comedic drama, was said to have the working title Odd Jobs and will feature the two men as former black ops agents. The report states that Josh Appelbaum and Andre Nemec (Alias) are writers and executive producers and Abrams and Bryan Burk are also executive producers. Read More...

Featured Article

Katherine Anne Austen, more commonly known as **Kate**, was one of the survivors from the crash of Oceanic Flight 815. Before the crash, Kate spent years fleeing law after killing her abusive father and burning the body. To achieve her goals, she would commit several other crimes including bank robbery, assault

adesblog.com


4 8 15 16 23 42

beach, sunset first night is to west-southwest, some low direct light but also fades behind a ridge
tail crash
french premier camp
5 mile (or more) hike across island
hatch 2
pit camp
raftees
others?
Zeke
golf
hatch
beach camp
caves
antenna?
danielles
cable
crater
cockpit
black rock
beech
unpassable outcropping
smoke
monster sightings (Walkabout?) (2nd "to left" on beach, Pilot 1) (Antenna? Danielle's antenna recording: "It's right outside")
alex
Outcropping forced tailies inland; possibly same rock formation that fusies come to and then cut inland to the river Exodus pt1
0 1 2 3 4 5

Can viewers augment, share, and remix their favorite stories?

Improved content search & browsing

Use visualization for more fluid program browsing
Browse by recommendation, similarity, and more
Access more than television shows: web, photos, etc
More deeply interface television and the web?
Perceptual studies: optimize presentation at a distance

Social television

Share favorites, recommendations, and see popularity
Integrate with existing social networks (e.g., Facebook)
Elicit real-time responses: sentiment, voting, game play
Discuss, annotate, link & remix: *recombinant content*