

EVA: Extraction, Visualization and Analysis of the Telecommunications and Media Ownership Network

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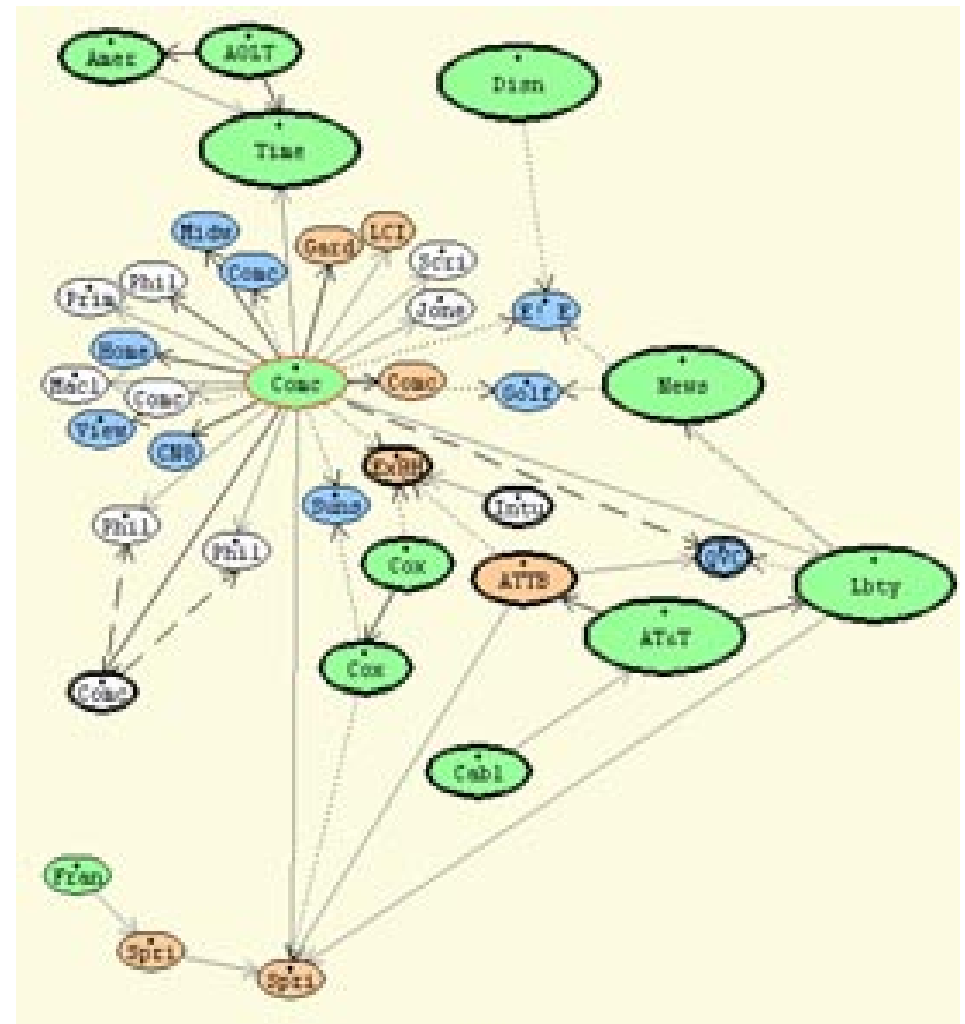
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<http://denali.berkeley.edu/eva/>

Ownership Network

- Directed social network:
 - Nodes: firms
 - Edges: equity possession
- Flow of capital, information, and control
- Industrial organization
 - horizontal merger
 - vertical integration



Portion of telecom ownership network

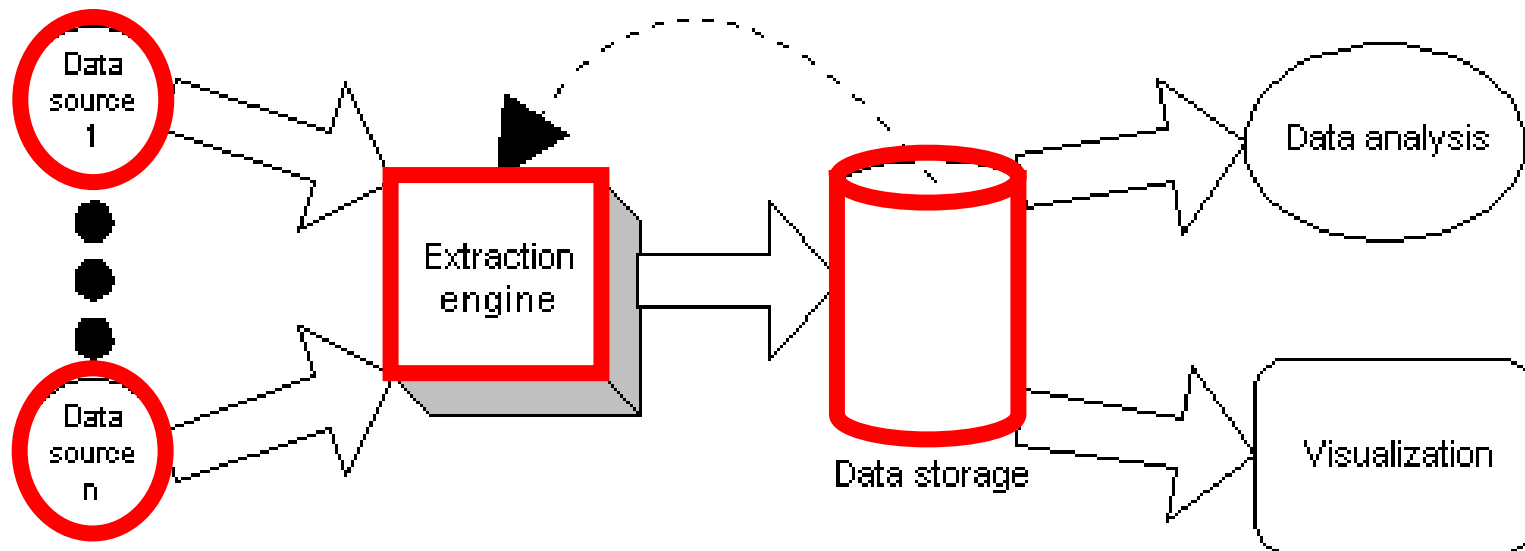
Corporate Transparency

- Essential for public discourse concerning anti-trust, regulation, investor confidence
- SEC requires full disclosure of mergers, acquisitions and other relationships...
- ... but companies have little incentive to do so (until now)
- Research challenge:
 - automated construction of telecom/media/IT ownership network dataset from publicly accessible documents

EVA System

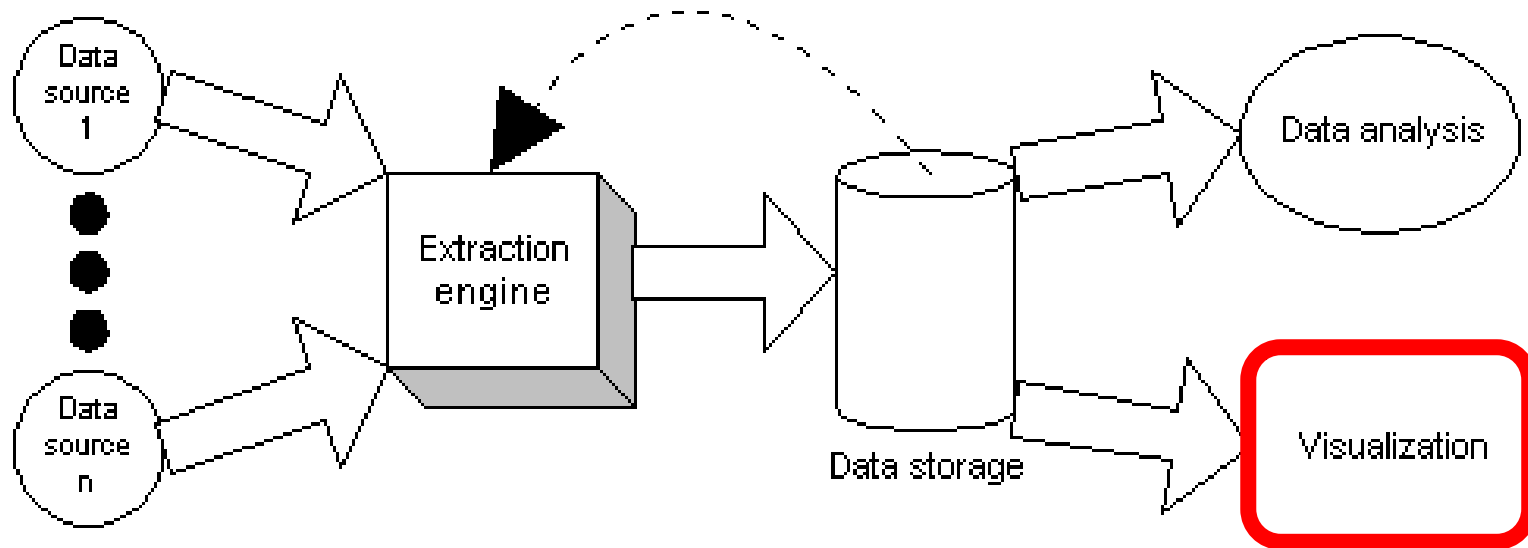
■ Information Extraction

- Data Sources:
 - U.S. SEC 10-K documents (Corporate Annual Reports)
 - Industry Standard Deal Tracker Database
 - Columbia Journalism Review "Who owns what"
- Dataset: 8,343 companies, 6,726 relationships



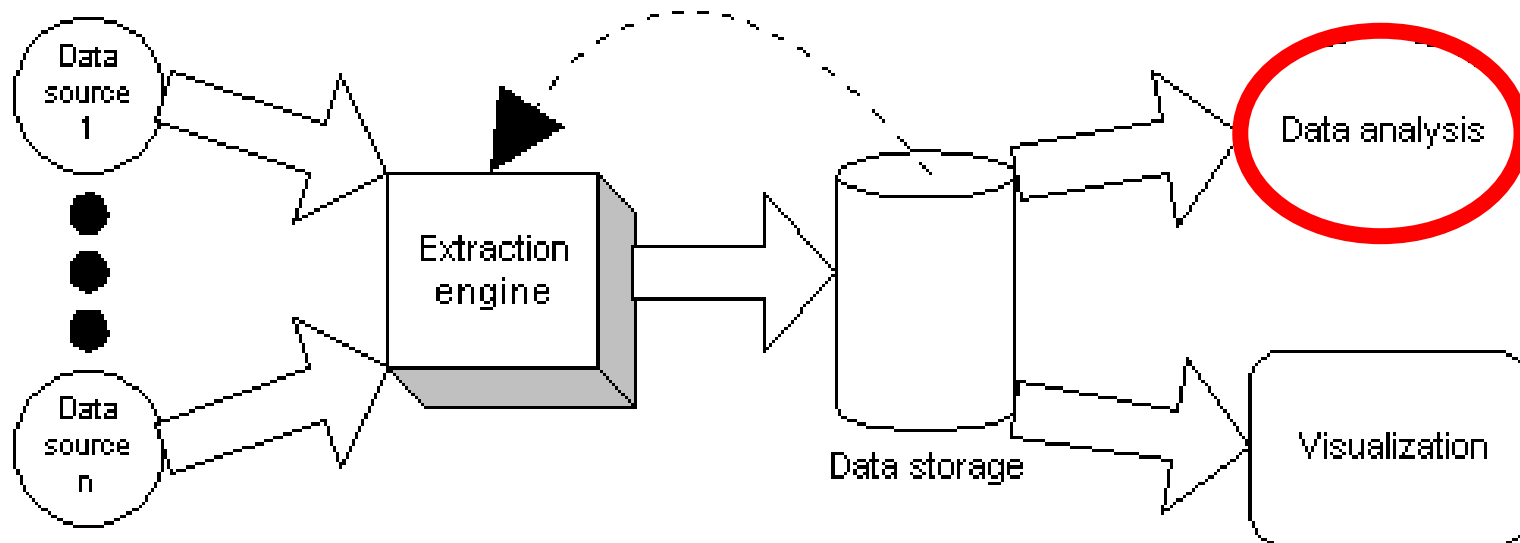
EVA System

- Information Extraction
- Information Visualization

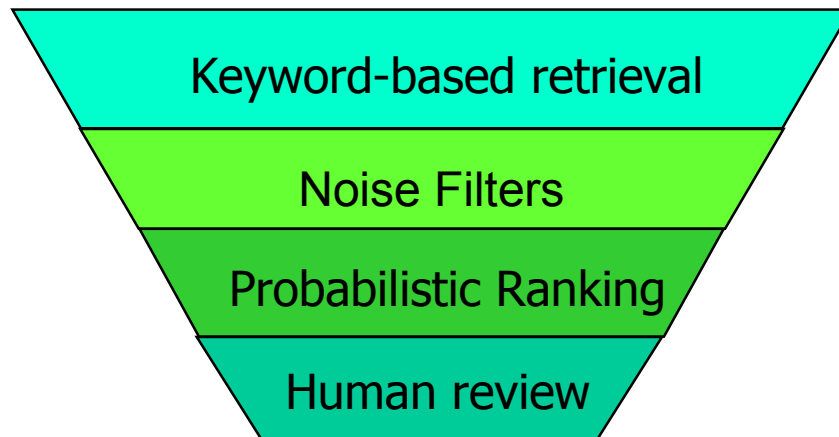
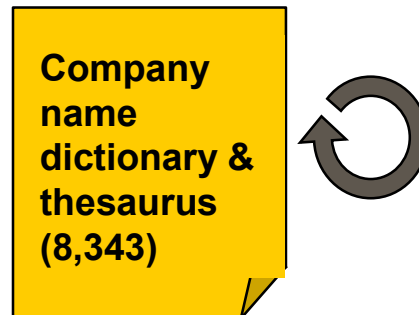
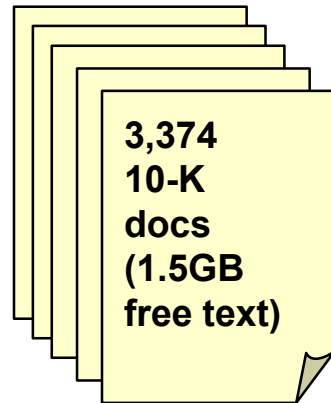


EVA System

- Information Extraction
- Information Visualization
- Network Analysis



Extraction from SEC 10-Ks



| | <u>Precision</u> |
|--------------------|------------------|
| 364,581 paragraphs | (<5%) |
| 14,759 paragraphs | (20%) |
| 3,249 paragraphs | (55.4%)* |
| 652 relationships | (100%) |

* State-of-art IE systems achieve 50-70% precision for entity event finding.

Tough Case #1: Ambiguity

- SEC 10-K document filed by Aether Systems Inc, for year ending Dec 31 2000:

"In connection with the **acquisitions** of **Cerulean**, **Sinope**, **RTS** and **Motient**, the Company has accrued \$29,800 as of December 31, 2000 for the remaining portion of the purchase price..."

- Later in the same document:

"... On November 30, 2000, we **acquired Motient's** retail transportation business unit for \$49.2 million in cash..."

Tough Case #2: Directionality

- SEC 10-K document filed by Nextel Communications, for year ending Dec 31 1998:

"... we **acquired** all of **Motorola**'s 800 MHz SMR licenses in the continental United States in exchange for 41.7 million shares of class A common stock and 17.8 million shares of nonvoting class B common stock."

- Who acquired whom?

Visualization

allow floating nodes to self-arrange

clear all data from screen

delete selected node and its parents

show legend

highlight color of selected node

show search window

date controls

show search window

2001

Set

Arrange

Clear

Delete

Highlight Sector

Legend

About TreVis

Submit an ownership

Name
Comcast

Sector
Diversified (multiple sectors)

Description
large cable operator, offering broadband services including digital cable and high-speed cable modem Internet access

Owners
• Comcast 100%

Holdings
• CNB 100%
• Comcast 100%
• Comcast Digital TV 100%
• [Comcast MHCPC Holdings 2%](#)
• Comcast SportsNet 47%
• Comcast-Spectacor 100%
• [E! Entertainment Television 40%](#)
• [Excite@Home 40%](#)
• Garden State Cablevision 5%
• Home Team Sports 50%
• [Jones Intercable 50%](#)
• [LCL 50%](#)
• Liberty Media 100%
• [Maclean Hunter 2%](#)
• [Midwest Sports Channel 2%](#)
• [Philadelphia 76ers 2%](#)
• [Philadelphia Flyers 2%](#)
• Philadelphia Phantoms 100%
• [Prime Communications 2%](#)
• [QVC 2%](#)
• [Scripps Cable 2%](#)
• Sprint Spectrum 100%
• [Sunshine Network 2%](#)
• The Golf Channel 57%

Displaying 38 companies for 2001

Search

companies

comcast

all sources

search

Comcast

Comcast Cellular

Comcast Digital TV

Comcast MHCPC Holdings

Comcast SportsNet

Comcast UK Cable Partners

Comcast-Spectacor

<< add

Java Applet Window

link to original source

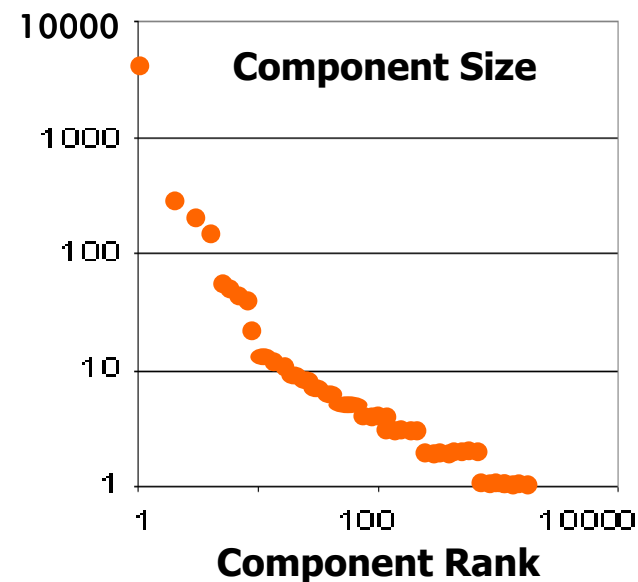
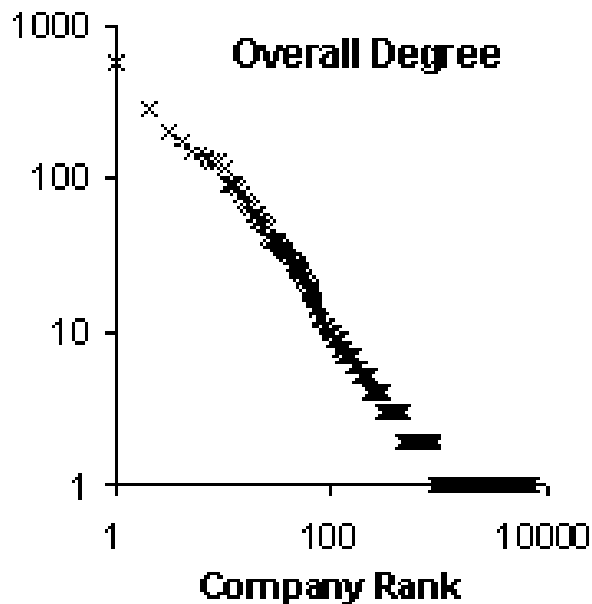
metadata panel

display panel

search window

Network Analysis: Key Findings

- 6,726 relationships between 7,253 companies
 - additional 1,090 companies with no relationships
- Node degree and component size both follow power law distribution:
 - Top ten companies are parents for 24% of relationships
 - Largest component: 4400+ firms (53.6% of network)



Network Analysis: Key Findings

- The largest bi-component contains 234 companies and includes many competitors
 - AT&T, MCI WorldCom
 - British Telecom, Deutsche Telecom
 - AOL-Time Warner, Comcast
 - Bertelsmann, Yahoo!
 - CBS, NBC, Disney (ABC)
 - Cisco, Intel, Microsoft, Sony
- Various network prominence metrics:
 - Degree: Clear Channel Communications, Liberty Publishing
 - "Freeman" Betweenness: Liberty Media, Time Warner
 - Depth/Radius: Comcast
 - Cutpoints: Clear Channel, Time Warner
 - Cliques: Liberty Media, AT&T
 - Ego: Liberty Media, Comcast

Conclusion

- EVA uses:
 - Information extraction and visualization techniques to gather and present corporate ownership relationships from heterogeneous data sources
 - Social network analysis techniques to identify prominent firms and reveal industry structure
- EVA helps:
 - Regulators, policy researchers, investors, and general public by bringing greater transparency to public disclosure of corporate inter-relationships