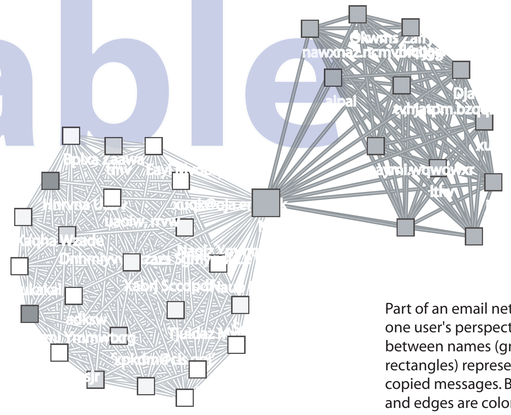
JUNG: the Java Universal Networks/Graph API

Danyel Fisher and Joshua O'Madadhain
http://jung.sourceforge.net {danyelf, jmadden}@ics.uci.edu

structural equivalence ● PageRank ● betweenness clustering ● shortest path ● centrality measures ● max flow ● HITS ● small world ● power law ● scale-free ● graph folding

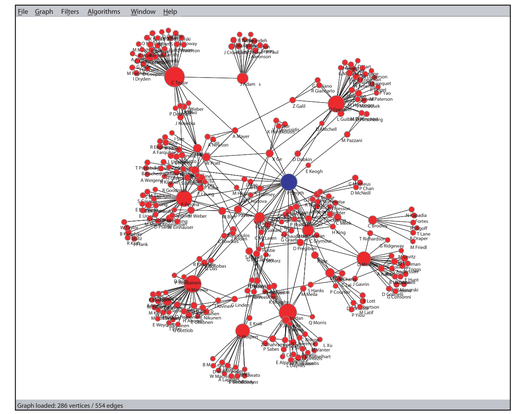
programmable

run common network analyses
write your own algorithms and tools
incorporate existing 3rd party libraries and code
automate complex analyses



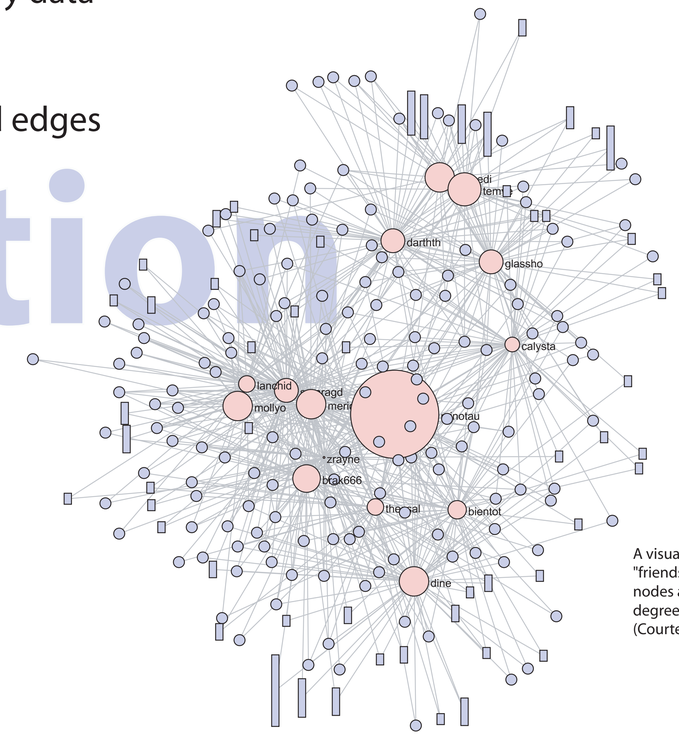
Part of an email network from one user's perspective. Edges between names (gray rectangles) represent carbon-copied messages. Both nodes and edges are colored by the most recent contact; lighter is more recent.

A screenshot from the KDD Netsight tool shows co-publication links around a central node (in blue). Larger nodes indicate greater PageRank.



flexible

annotate vertices, edges, and graphs with arbitrary data
read and write common file formats
build graphs, trees, hypergraphs, k-partite graphs
with directed and undirected, parallel, weighted edges

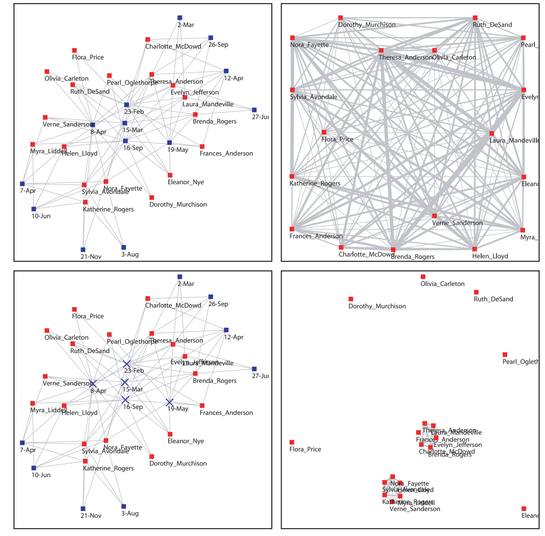


A visualization of the LiveJournal "friends" network. Pink sample nodes are sized by the ratio of in-degree to out-degree.
(Courtesy S. Abrams)

The well-known "Southern Women" dataset shows a bipartite graph of (blue) parties and (red) women who attended them.

On the left is the bipartite graph. On the right is a graph that connects women who attended the same parties. Note that all women are connected to each other.

By interactively removing some parties (x), we see a very different connection graph: two tight clusters.

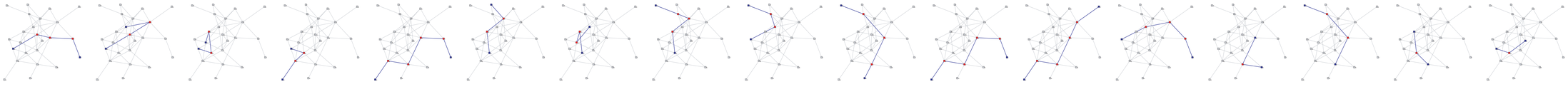


visualization

build interactive tools
easily configurable renderer
layouts: spring-embedder, Kamada-Kawaii,
or roll your own

library

open source, available under a BSD license
make networks a component of any project
join an active user and developer community



Various shortest paths (in blue and red) on a randomly-generated unweighted, undirected graph (in gray).

Danyel Fisher is an Informatics PhD candidate with an interest in computer-supported collaborative work; Joshua O'Madadhain is a PhD student in Artificial Intelligence with an interest in machine learning.

Both use social network analysis in their research.

JUNG was co-created with Scott White and Yan-Biao Boey.

JUNG is supported in part by the National Science Foundation under Grant Nos. IIS-0083489 and IIS-0133749 and by the Knowledge Discovery and Dissemination (KD-D) Program.