

# Social Network Analysis

## Tools



# Course Outline

- Graph Theory and Social Networks
- Visualizing Social Networks
  - **Tools**
- Information Networks and the World Wide Web
- Game Theory
- Network Dynamics
- Applications of SNA in various domains

# Introduction

- There are many tools available for Visualization and SNA.
- Many tools can be used to calculate graph metrics
  - Many have features supporting Social Network Analysis
- Two Types:
  - Systems providing visualizations
  - Toolkits that can be used to build systems
- Some are Commercial systems (Many have free basic versions)

# Systems providing visualizations

- Pajek
- Gephi
- NodeXL
- TouchGraph
- *Many more!*

# Gephi

<http://gephi.org>



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[Home](#) [Features](#) [Plugins](#) [Users](#) [Developers](#) [Partners](#)

## The Open Graph Viz Platform

Gephi is a visualization and exploration **platform** for all kinds of networks and complex systems, dynamic and hierarchical graphs.

Runs on Windows, Linux and Mac OS X. Gephi is open-source and free.

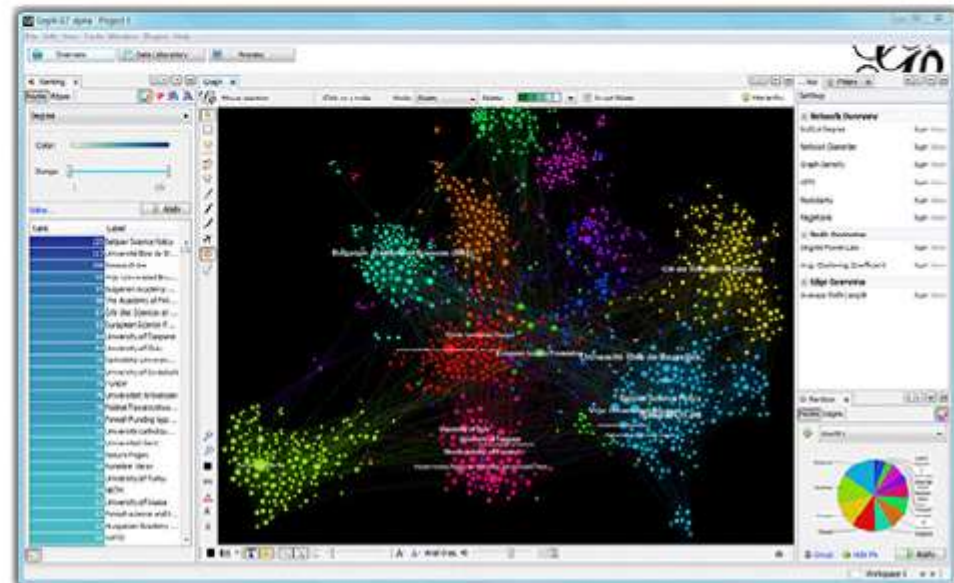
[Learn More on Gephi Platform »](#)



[Release Notes](#) | [System Requirements](#)

► [Features](#)  
► [Quick start](#)

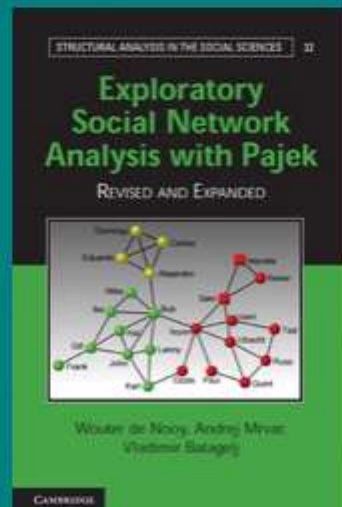
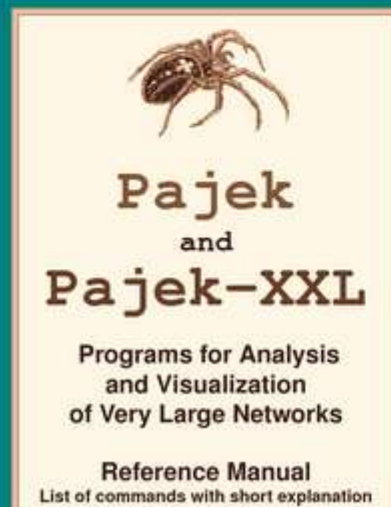
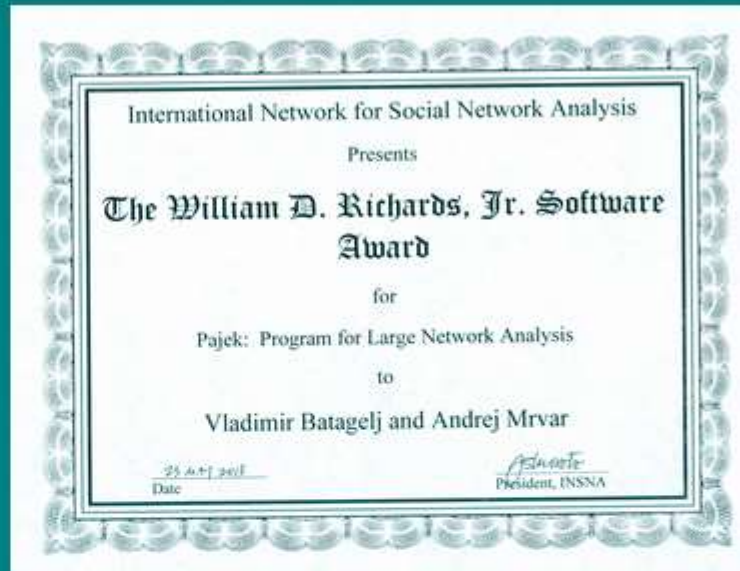
► [Screenshots](#)  
► [Videos](#)



# Pajek / Pajek-XXL versions 3.\*\* and 4.\*\*

Download - January 7, 2016

	<b>32 bit</b>	<b>64 bit</b>
<b>January 7, 2016</b>	<b><u>4.08</u></b>	<b><u>4.08</u></b>
<b>December 1, 2015</b>	<b><u>4.07</u></b>	<b><u>4.07</u></b>
<b>September 25, 2011</b>	<b><u>2.05</u></b>	<b><u>2.05</u></b>
<b><u>Pajek mailing list</u></b>	<b><u>Datasets</u></b>	

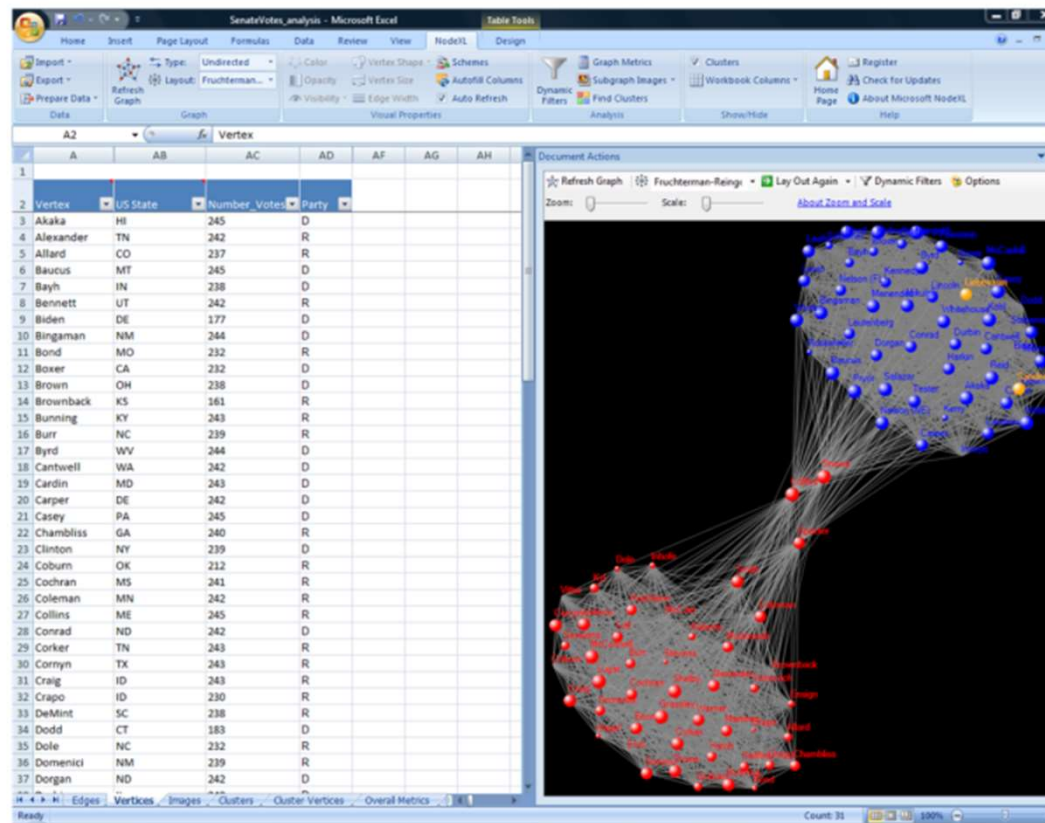




# NodeXL

NodeXL is a powerful and easy-to-use interactive network visualisation and analysis tool that leverages the widely available MS Excel application as the platform for representing generic graph data, performing advanced network analysis and visual exploration of networks. The tool supports multiple social network data providers that import graph data (nodes and edge lists) into the Excel spreadsheet.

The tool includes an Excel template for easy manipulation of graph data:



<https://www.microsoft.com/en-us/research/project/nodexl-network-overview-discovery-and-exploration-in-excel/>

# TouchGraph

- *TouchGraph* allows for the creation and navigation of interactive graphs.
- Commercial system
  - <http://www.touchgraph.com>
- Older free system for a set of interfaces for graph visualization using force-based layout and focus+context techniques
  - <http://sourceforge.net/projects/touchgraph/>



# Toolkits & Infrastructures

- Set of components or capabilities that allow others to put together visualization systems
- Coherent software architecture and set of programming components
- Data structure is a table
- Views: time series, parallel coordinates, scatterplots, node-link diagrams, treemaps
- Added capabilities in color management, labeling, dynamic queries, ...
- Advantage: Much more control
- Disadvantage: Learning curve

# Toolkits & Infrastructures

- **Cytoscape** (Java)
- **D3** (Javascript)
- **SNAP** (C++)
- **Network X** (Python)
- **Neo4J**

# Cytoscape

- **Cytoscape** is an open source software platform for **visualizing** molecular interaction networks and biological pathways and **integrating** these networks with annotations, gene expression profiles and other state data.
- Although Cytoscape was originally designed for biological research, now it is a general platform for complex network analysis and visualization.
- Cytoscape core distribution provides a basic set of features for data integration, analysis, and visualization.
- Additional features are available as **Apps** (formerly called *Plugins*).
  - Apps are available for network and molecular profiling analyses, new layouts, additional file format support, scripting, and connection with databases.
- They may be developed by anyone using the Cytoscape open API based on [Java™](#) technology
- <http://www.cytoscape.org/>

# D3: Data Driven Documents

- **D3.js** is a JavaScript library for manipulating documents based on data.
- **D3** helps you bring data to life using HTML, SVG, and CSS.
- D3's emphasis on web standards gives you the full capabilities of modern browsers without tying yourself to a proprietary framework, combining powerful visualization components and a data-driven approach to DOM manipulation.
- “Not just an infovis toolkit”
- <http://d3js.org/>

# SNAP



## SNAP for C++: Stanford Network Analysis Platform

Stanford **N**etwork **A**nalysis **P**latform (**SNAP**) is a general purpose network analysis and graph mining library. It is written in C++ and easily scales to massive networks with hundreds of millions of nodes, and billions of edges. It efficiently manipulates large graphs, calculates structural properties, generates regular and random graphs, and supports attributes on nodes and edges. SNAP is also available through the [NodeXL](#) which is a graphical front-end that integrates network analysis into Microsoft Office and Excel.



## Snap.py: SNAP for Python

Snap.py is a Python interface for SNAP. It provides performance benefits of SNAP, combined with flexibility of Python. Most of the SNAP C++ functionality is available via Snap.py in Python.

<http://snap.stanford.edu/>

# NetworkX

<https://networkx.github.io/>

## NetworkX

[NetworkX Home](#) | [Documentation](#) | [Download](#) | [Developer \(Github\)](#)


### High-productivity software for complex networks

NetworkX is a Python language software package for the creation, manipulation, and study of the structure, dynamics, and functions of complex networks.

[Documentation](#)  
*all documentation*

[Examples](#)  
*using the library*

[Reference](#)  
*all functions and methods*



### Features

- Python language data structures for graphs, digraphs, and multigraphs.
- Nodes can be "anything" (e.g. text, images, XML records)
- Edges can hold arbitrary data (e.g. weights, time-series)
- Generators for classic graphs, random graphs, and synthetic networks
- Standard graph algorithms
- Network structure and analysis measures
- Open source [BSD license](#)
- Well tested: more than 1800 unit tests, >90% code coverage
- Additional benefits from Python: fast prototyping, easy to teach, multi-platform

#### Versions

##### Latest Release


1.8.1 – 4 August 2013  
[downloads](#) | [docs](#) | [pdf](#)

##### Development

1.9dev  
[github](#) | [docs](#) | [pdf](#)  
[build](#) [parsing](#)  
[coverage](#) **99%**

##### Contact

[Mailing list](#)  
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[Developer guide](#)



# Neo4J

- **Native Database for Graphs**
- **Graph analytics**
- **Visualization**
- <https://neo4j.com/>



# Disclaimer

- There are many other tools and packages
- New tools are being developed