Network Workbench

A Workbench for Network Scientists

BACKGROUND

The Network Workbench (NWB) project develops a large-scale network analysis, modeling, and visualization cyberinfrastructure for biomedical, social science, and physics research. Users of the NWB tool can perform network analysis, modeling, and visualization with the most effective algorithms and a wide variety of reference datasets.

MENU DRIVEN INTERFACE

The NWB tool supports network/graph load, view, and save operations. Its diverse preprocessing, analysis, modeling, and visualization algorithms seamlessly interoperate via automatic data conversion behind the scenes. To guide users' choices, only algorithms that can be performed on the currently selected dataset (possibly after conversion) are selectable. All data entry forms provide default values, information on acceptable value ranges, instantaneous feedback if a value is out of range, and further help.

WORKLOG TRACKING

Load, save, algorithms applied, algorithm parameters, and other operations are all logged sequentially. The log cites the original authors of the algorithm, the developers, the integrators, a reference, and the URL to the reference if available, as well as an URL to the algorithm description at the NWB community wiki. The log is displayed in the console window, and is saved to files. Error logs will be saved in separate files and can be sent in for bug reports.

DATA MANAGEMENT

The current release of the NWB tool can load, process, and save various network file formats including NWB (*.nwb), GraphML (*.xml or *graphml), XGMML (*.xml), Pajek (*.net), Pajek (*.mat), TreeML (*.xml), and two-column edge lists (*.edge). It also supports viewing and saving plain text files (*.txt) generated by algorithms. Several data converters have been developed to conduct the transformation between diverse data formats. This facilitates the pipeline of data modeling, analysis, and visualization despite differences in dataset format and algorithm input format. For example, data in Pajek.net files can be transformed into the NWB file format first and then transformed into the Prefuse Graph object model to feed into several visualization algorithms.

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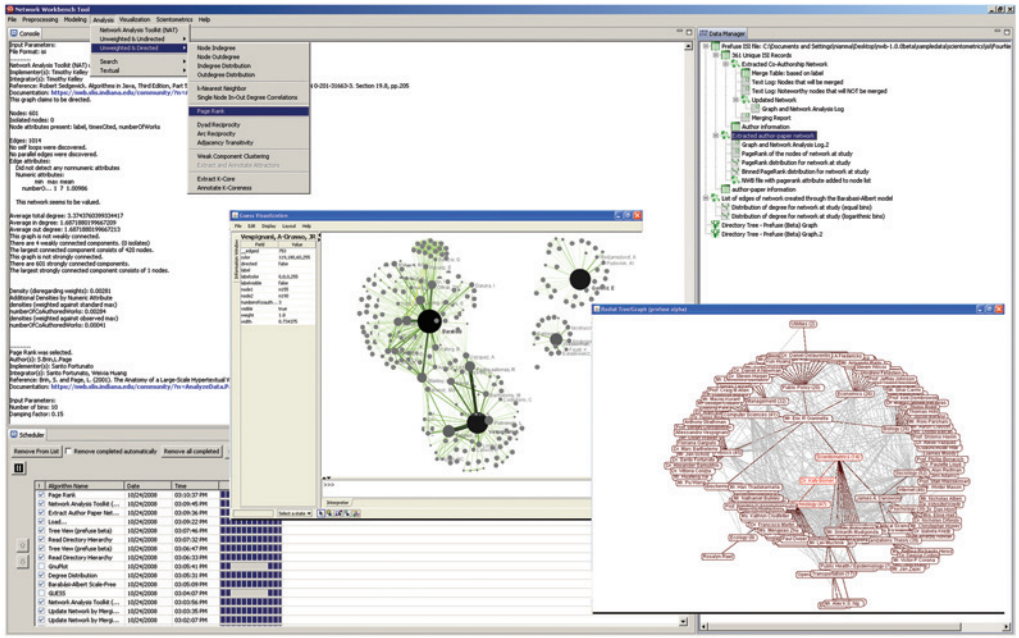

VISIT: http://nwb.slis.indiana.edu
https://nwb.slis.indiana.edu/community
http://www.cishell.org

DOWNLOAD: NWB Tool
http://nwb.slis.indiana.edu/download.html

ACKNOWLEDGMENTS

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ALGORITHM INTEGRATION

The NWB tool is an algorithm integration framework that supports the easy addition and dissemination of existing and newly created algorithms. The NWB tool uses the Cyberinfrastructure Shell (CIShell), an OSGI-based software architecture, to facilitate the easy plug and play of diverse algorithms. CIShell is written in Java but supports algorithms written in other programming languages, such as C/C++, Perl, and FORTRAN. In practice, a pre-compiled algorithm needs to be wrapped as a plug-in that implements basic interfaces defined in the CIShell Core APIs. To ease the integration of algorithms and datasets, Eclipse wizard-driven templates are provided that acquire information from the algorithm writer and generate the appropriate files and resources. Templates are available to integrate arbitrary file-based datasets, compiled executable code, Java libraries, and Java algorithms. The Java template requires only one method to be filled in – the execute method for the actual algorithm. Simple user interfaces can be created in template wizard – all user interface and framework integration code is generated automatically. Integration of executable binaries typically does not require writing even one line of new code. The NWB tool can integrate whole tools as well as algorithms. For instance, a Gnuplot plug-in has been integrated into Network Workbench to provide 2D and 3D plotting capabilities.

VISUALIZATION

The NWB tool's visualization algorithms are drawn from a variety of visualization libraries and support many common layouts, such as Fruchterman-Reingold. Many of the visualization algorithms built on the prefuse beta library support mapping arbitrary node and edge metadata to colors, shapes, and sizes, and automatically generate a legend for the resulting visualization. Several of the visualization algorithms are able to scale to thousands of nodes. The Network Workbench tool also includes GUESS, a powerful and flexible network visualization tool.

GET INVOLVED

Join Mailing Lists: http://nwb.slis.indiana.edu/mailing.html

- nwb-announce@googlegroups.com - News/Updates
- nwb-helpdesk@googlegroups.com - Post Questions
- nwb-dev@googlegroups.com - Development Info

New Information on the back →

Graphic Design by Elisha Hardy

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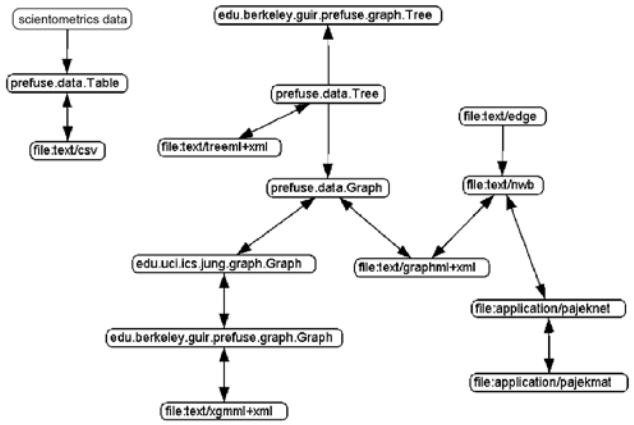
NEW FEATURES

- **Expanded Scientometrics Functionality** - The Network Workbench tool provides significant functionality for scientometricians, including the ability to analyze, clean, and create networks derived from scholarly data sources, such as ISI, Scopus, the NSF grant database, BibTeX and Endnote reference formats.
- **New Preprocessing Algorithms** - New algorithms for trimming networks by attribute values, normalizing text, and slicing tables by time period.
- **Discrete Network Dynamics (DND)** - A cutting-edge algorithm used in creating and analyzing discrete dynamic network models. Originally developed for analyzing biological systems, but can be applied to other domains as well.
- **Improved Export Capability** - Three visualization algorithms with the annotation capability can now export to PostScript (.eps), and Gnuplot can now export to PDF.
- **More Comprehensive Documentation** - The majority of algorithms included in Network Workbench are now documented on the NWB Community Wiki (http://nwb.slis.indiana.edu/community/?n=Main.HomePage)
- Plus many more improvements

SUPPORTED FILE FORMATS

- GraphML (*.xml or *.graphml)
- XGMML (*.xml)
- Pajek .NET (*.net)
- Pajek .Matrix (*.mat)
- NWB (*.nwb)
- TreeML (*.xml)
- Edge list (*.edge)
- CSV (*.csv)
- ISI (*.isi)
- Scopus (*.scopus)
- NSF (*.nsf)
- Endnote (*.enw)
- Bibtex (*.bib)

CORE CONVERSION GRAPH



SUPPORTED ALGORITHMS & MODULES

	LANGUAGE
LOAD	
Load and Clean ISI File	Java
Directory Hierarchy Reader	Java
Merge Node and Edge Files	Java
PREPROCESSING	
Extract Top Nodes	Java
Extract Nodes Above or Below Value	Java
Delete High Degree Nodes	Java
Delete Random Nodes	Java
Delete Isolates	Java
Extract Top Edges	Java
Extract Edges Above or Below Value	Java
Remove Self Loops	Java
Trim by Degree	Java
Pathfinder Network Scaling	Java
Snowball Sampling	Java
Node Sampling	Java
Edge Sampling	Java
Symmetrize	Java
Dichotomize	Java
Multipartite Joining	Java
Normalize Text	Java
Slice Table by Time	Java
MODELING	
Random Graph	FORTRAN
Watts-Strogatz Small World	FORTRAN
Barabási-Albert Scale-Free	FORTRAN
CAN	Java
Chord	Java
Hypergrid	Java
PRU	Java
TARL	Java
Discrete Network Dynamics (DND)	Java
ANALYSIS	
Network Analysis Toolkit (NAT)	Java
Node Degree	FORTRAN
Degree Distribution	FORTRAN
Undirected k-Nearest Neighbor	FORTRAN
Watts-Strogatz Clustering Coefficient	FORTRAN
Watts-Strogatz Clustering Coefficient Versus Degree	FORTRAN
Diameter	FORTRAN
Average Shortest Path	FORTRAN
Shortest Path Distribution	FORTRAN
Node Betweenness Centrality	FORTRAN
Connected Components	FORTRAN
Weak Component Clustering	Java
Node Indegree	FORTRAN
Node Outdegree	FORTRAN
Indegree Distribution	FORTRAN
Outdegree Distribution	FORTRAN
Directed k-Nearest Neighbor	FORTRAN
Single Node In-Out Degree Correlations	FORTRAN
Page Rank	FORTRAN
Dyad Reciprocity	C
Arc Reciprocity	C
Adjacency Transitivity	C
Extract and Annotate Attractors	Java
Extract K-Core	Java
Annotate K-Coreness	Java
CAN Search	Java
Chord Search	Java
k Random-Walk Search	Java
Random Breadth First Search	Java
Burst Detection	Java
SEARCH	
CAN Search	Java
Chord Search	Java
k Random-Walk Search	Java
Random Breadth First Search	Java
VISUALIZATION	
GUESS	Jython/Java
Gnuplot	
DrL (VxOrd)	C++/Java
Specified (prefuse beta)	Java
Circular (JUNG)	Java
Radial Tree / Graph (prefuse alpha)	Java
Radial Tree / Graph with Annotation (prefuse beta)	Java
Tree Map (prefuse beta)	Java
Tree View (prefuse beta)	Java
Balloon Graph (prefuse alpha)	Java
Force Directed with Annotation (prefuse beta)	Java
Kamada-Kawai (JUNG)	Java
Fruchterman-Rheingold (JUNG)	Java
Fruchterman-Rheingold with Annotation (prefuse beta)	Java
Spring (JUNG)	Java
Small World (prefuse alpha)	Java
Parallel Coordinations (demo)	Java
LaNet	ocaml
SCIENTOMETRICS	
Remove ISI Duplicate Records	Java
Remove Rows with Multitudinous Fields	Java
Detect Duplicate Nodes	Java
Update Network by Merging Nodes	Java
Extract Directed Network	Java
Extract Paper Citation Network	Java
Extract Author Paper Network	Java
Extract Co-Occurrence Network	Java
Extract Word Co-Occurrence Network	Java
Extract Co-Author Network	Java
Extract Reference Co-Occurrence Network	Java
Extract Document Co-Citation Network	Java
Extract Co-Citation Similarity Network	Java
OTHER PLUG-INS	
Scheduler Tester	Java
Converter Tester	Java
Preferences	Java
Split Graph to Node and Edge Files	Java

Please cite the project as follows: NWB Team. (2006). Network Workbench Tool. Indiana University, Northeastern University, and University of Michigan, http://nwb.slis.indiana.edu