The NWB Tool Basic Tutorial: Getting Started

Goals

This tutorial introduces the NWB tool. You will learn how to perform the following:

- Load a network
- View a network
- Save out a network in different file formats
- Understand the basic properties of a network using the Network Analysis Toolkit (NAT)

1. Load a Network into the NWB Tool

After downloading the NWB Tool for your specific operating system from

http://nwb.slis.indiana.edu/download.html and installing it, launch the NWB tool. You should see a window that looks like Figure 1:

🐵 Network Workbench Tool			
File Preprocessing Modeling Analysis Visualization Scien	ntometrics Help		
Console Console displays data operations Welcome to the Netwo visualization of small, n algorithm input parameters,	the preprocessing, modeling, analysis, an	b b b b b b b b b b b b b b b b b b b	1111 Data Manager
selection, & acknowledgements as well as error reporting. III5-0513650 award. The primary investigators are Dr. Katy bon Schnell, Dr. Alessandro Vespignani, Dr. Stanley Wasserman, ar The NWB tool was developed by Weixia Huang, Russell Duhon, Balcan, Mariano Beiró, Bruce Herr, Santo Fortunato, Ben Marki Ramawat, César Hidalgo, Ramya Sabbineni, Vivek Thakres, Son Vespignani, and Katy Börner. It uses the Cyberinfrastructure S Cyberinfrastructure for Network Science Center (http://cns.s Please cite as follows: NWB Team. (2006). Network Workbench Tool. Indiana Universi http://nwb.slis.indiana.edu Scheduler lists what algorithms you used and displays algorithm	Data Manager keeps track of all datasets that are available for algorithmic visualization or manipulation.		
Remove From List progress.	e all completed Complete Comp		

Figure 1: NWB Tool Main Window

To load a network, simply select File \rightarrow Load... in the main menu and select a network file either from sample datasets provided by the NWB tool at *NWB_Installation_Directory*/sampledata/network/filename (see Figure 2) or from your own collection.

The NWB tool supports loading the following file formats for networks:

- GraphML (*.xml or *.graphml)
- XGMML (*.xml)
- Pajek .NET (*.net)
- Pajek .Matrix (*.mat)

- NWB (*.nwb)
- TreeML (*.xml)
- Edge list (*.edge)

We also support a variety of other formats for working with scientific publication data. The <u>NWB Community Wiki</u> has more information on each of these data formats in <u>the Data Formats section</u>.

Select a File					? 🗙
Look in:	🚞 network		~ () 🌶 🖻 🖽	•
My Recent Documents Desktop My Documents	bio TARL metscille-confer florentine.nwb conversionGrap Copy of friendster friendster.grap friendster.graphml. terror.graphml. terror.xgmml.xx	h.graphml.xml ter.graphml.xml hml.xml ml.xml xml xml			
My Computer					
	File name:	florentine.nwb		~	Open
My Network	Files of type:	**		~	Cancel

Figure 2: Load a sample network dataset

2. View a Network/Graph

Once the network is loaded, it shows up in the Data Manager window (see Figure 3) and can always be viewed in plain text using the -View- or -View With...- features in order to check the data contents. This is especially useful when you use datasets that you are not familiar with. While viewing the dataset, you can determine whether the network is directed or undirected, weighted or unweighted, the size of the network, etc. *Hint*: Datasets shown in the Data Manager window can be associated with the following icons:

🖏 Network

🎬 Tree

Table or csv file

Matrix data (Pajek .mat)

- Plot plain text file that can be plotted using gnuplot
 - Text other text file

There are two ways to view a highlighted dataset displayed in the Data Manager window:

1. Click File \rightarrow View... or File \rightarrow View With...

2. Right-click the mouse, then from the drop-down menu click View... or View With...

🚟 Network Workbench Tool						X
File Preprocessing Modeling Analysis S	earch Visualization	Tools Conver	rsion Help			
Console			- 8	1010 Data Manager	-	
Welcome to the Network Workbench (NWB) tool that supports the preprocessing, modeling, analysis, And visualization of small, medium, and large networks.				C:\apps\nwb-0.9.0\sampledata\network\florentine.nw	ь	
The Network Workbench project is supported in part by the NSF IIS-0513650 award. The primary investigators are Dr. Katy Börner, Dr. Albert-László Barabási, Dr. Santiago Schnell, Dr. Alessandro Vespignani, Dr. Stanley Wasserman, Dr. Eric A. Wernert, and Dr. Craig Stewart.						
The NWB tool was developed by Weixia (Bonnie) Huang, Dr. Santo Fortunato, Bruce Herr, Russell Duhon, Timothy Kelley, Micah Walter Linnemeier, Durgu Baican, Heng (Michael) Zhang, Mariano Beiró, Megha Ramawak, Ben Marines, M Felix Terkhorn, Cesar A. Hidalgo R., Dr. Soma Sanyal, Ann McCranie, Ramya Sabbineri, Wrek S. Thaires, Dr. Alessandro Vespignani, and Dr. Katy Börner. It builds on the Cyberinfrastructure Shell (http://cishell.org) developed at the Information Visualization Laboratory (http://ivl.slis.indiana.edu) and the Cyberinfrastructure for Network Science Center, both at Indiana University. For more information on the Network Workbench project, see http://wb.slis.indiana.edu and https://nwb.slis.indiana.edu/community/.						
Loaded: C:\apps\nwb-0.9.0\sampledata\network\florentine.nwb						
Scheduler						
Remove From List Remove completed automatically Remove all completed						
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û ∠Load	01/21/2008	03:52:13 PM				
÷						

Figure 3: Display of loaded network in the Data Manager window

If the selected dataset in the Data Manager window is a file, File \rightarrow View... will open the default text editor/viewer application of your system directly and display the file, while File \rightarrow View With... provides three options, see Figure 4.

Application	on Viewer Type	X
P	lease choose an application viewer to read this file.	
View file as	HTML Document	- 0
	HTML Document	
	Microsoft Word Document	ncel
L	Text Document	
	Microsoft Office Excel Comma Separated Values File	

Figure 4: View With... Options

If the selected dataset shown in the Data Manager window is not a file but an in-memory Java object (which is like a file, only not currently saved to a file), both View... and View With... first generate a pop-up window to ask the user to choose a file format (similar to the Save window in Figure 5). After the user picks a desired file format and clicks the "Select" button, the tool will create a file with the specified format in a temporary directory and then display the created file.

3. Save a Network

The NWB tool can save a network to various file formats. Similar to the View and View With... features, there are two ways to save a highlighted dataset in the Data Manager window.

1. Click File \rightarrow Save...

2. Right-click the mouse then from the drop-down menu, select Save.

For a network dataset, both saving mechanisms will lead users to a pop-up window shown in Figure 5.

Users can pick any desired output file format that the tool supports regardless of the currently selected dataset's format shown in the Data Manager.

Networks can be saved in the following file formats in the NWB tool:

- Pajek .MAT (*.mat)
- XGMML (*.xml)
- GraphML (*.xml or *.graphml)
- Pajek .NET (*.net)
- NWB (*.nwb)

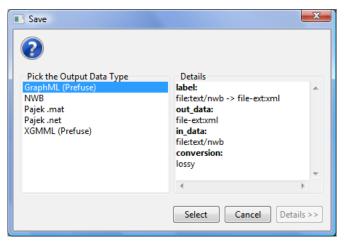


Figure 5: Save a network in the desired file format

To learn more about data converters and the data conversion service that supports the automated transformation among various network formats, please refer to the Data Converter Section in the NWB User Manual.

4. Understanding the Basics of a Network/Graph

Using Tools \rightarrow Network Analysis Toolkit (NAT), the user can view the basic information about the highlighted dataset in the Data Manager window. This is useful especially when you are not familiar with the network datasets you are working with. While running NAT, you can get a quick overview of the network as follows:

- Whether the network is directed or undirected
- Number of nodes
- Number of isolated nodes
- A list of node attributes
- Number of edges
- Whether the network has self loops, if so, lists all self loops
- Whether the network has parallel edges, if so, lists all parallel edges
- A list of edge attributes
- Whether the graph is weakly connected
- Number of weakly connected components
- Number of nodes in the largest connected component
- Graph density

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This tutorial was compiled by Bryan J. Hook, Weixia (Bonnie) Huang, and Katy Börner. For comments, questions or suggestions, please post to the <u>nwb-helpdesk@googlegroups.com</u> mailing list.