



Application Module

Social Network Analysis and Qualitative Data Analysis 2023

NVivo KUMU UCINET dan NetDraw



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NVivo | Kumu | UCINET and NetDraw

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Photos by the authors Screenshots taken from: NVivo 14 for Windows https://www.kumu.io UCINET 6.742 version

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Foreword

IPB University and CIFOR held training sessions entitled "The 1st Training Series of TRADE Hub Indonesia on Social Network Analysis and Qualitative Analysis" on 7 and 14 November 2020. This TRADE Hub Indonesia training was part of a series aimed at supporting TRADE Hub efforts to increase the relevance of, and promote the application of research, and help policymakers at all levels to develop and apply relevant policies and regulations more effectively. Target participants in the training series were not only TRADE Hub researchers in Indonesia, but also young researchers from universities and other institutions. The TRADE Hub Indonesia Training Series was expected to become a learning platform for stakeholders in Indonesia (policymakers, financial institutions and the private sector), and for students, academics, young researchers and practitioners with knowledge and skills to create robust research products, improve decision-making processes, and formulate and implement effective sciencebased policies.

The first training series focused on research methodologies and techniques based on the realization that researchers have important knowledge and skills to create robust research products in the topic of sustainable development, which is always complex, and had become even more so in the midst of the pandemic. Material from the training has now been compiled into book form to improve accessibility to this knowledge product.

The authors

NVivo



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Training materials

https://ipb.link/tradehub-nvivo



1. Preparing and installing NVivo (trial version)

NVivo¹ is a computer-based software package developed by Lumivero (formerly QSR International). It is a qualitative data analysis package, commonly used by academics worldwide, that helps researchers to prepare, analyse and find important points in non-numerical and unstructured qualitative data such as interview results, the outcomes of surveys with open-ended questions, journal articles, and social media and website content. The software is available through an annual or lifetime license and must be installed before use. NVivo offers a free license to install for a 14-day trial period without the need to register any payment information. An email address can only be used for registration for a one-time trial period.

Minimum system requirements for installing NVivo on your computer are as follows:

Minimum system requirements	Recommended system requirements
• 2.0 GHz dual-core processor (64-bit)	3.0 GHz quad-core processor
• 4 GB of RAM	• 8 GB of RAM or more
1680 x 1050 screen resolution	• 1920 x 1080 screen resolution or higher
Microsoft Windows 8.1	Microsoft Windows 8.1 or a more recent
• A minimum of 5 GB of storage space	version
on your hard disk	A minimum of 8 GB of storage space on your hard disk
	An internet connection
	• Internet Explorer 11, Google Chrome 44 or later

The steps involved in installing the trial version of NVivo on your computer are detailed below. And internet connection and time are required to download and install NVivo on your computer. The three steps shown below are explained in detail in the following pages.



¹ https://lumivero.com/products/nvivo/

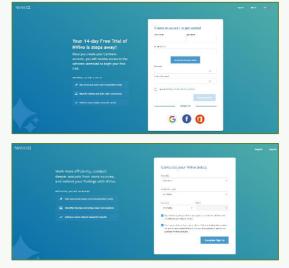


 Open the link below through your web browser and select "FREE TRIAL". Scroll down to NVivo and select "GET STARTED".



https://lumivero.com/resources/free-trial/

2. First, to create an NVivo account you will be asked to fill in the required information. On completion you will be asked to log in to the Lumivero Dashboard. You will be directed to create an NVivo account first and complete the requested information. Once successful, you will be asked to log in again to the Lumivero Dashboard.



 After entering the Dashboard, "click Download NVivo for Windows", or "Other version" for MacOS users.



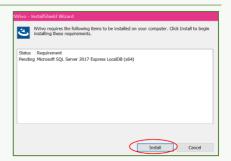
 Once downloaded successfully, the installer will be located at the bottom of your browser or in the downloads folder on your computer. Click "Open file" to open the installer.



5. Click "Yes" (This dialogue box does not always appear, but is likely to do so if you are using Windows). Select the language for the installation process, then click "OK". Another dialogue box will appear stating that the settings for installation are being prepared.



 During the installation process, NVivo will list other software that needs to be installed. The list will vary from computer to computer. Click "Install" to continue the process.





 Once the necessary requirements have been installed on your computer, you will be ready to install NVivo. To do so, Click "Next".



 Please read the license agreement, click "I accept the terms in the license agreement", then click "Next".

This End-User License Agreement ("EULA") is a legal agreement between you, the customer, and QSR International, LLC of 35 Corporate Drive, Burlington, Massachusetts, United States of America ("OSR") for use of he Software that accompanies this EULA as described in clause 1 below. An amendment or addendum to this EULA may accompany the Software.		ense Agreement for QSR Software CAD CAREFULLY	î
	ou, the customer, Burlington, Massac he Software that a	and QSR International, LLC of 35 Corporate Drive, husetts, United States of America ("QSR") for use of ccompanies this EULA as described in clause 1 below.	
YOU AGREE TO BE BOUND BY THE TERMS OF THIS EULA BY			

9. A dialogue box will appear showing the folder where the software files will be stored. Click "Next".

	Options the destination folder and optional desktop shortcut
Ø	Install W/wo to: Cl/Program Files(QSR)W/wo) Change
	Create a desktop shortout
nstallShie	d <back next=""> Carcel</back>

 Another dialogue box will ask you which NCapture browser extension add-ons you wish to install. NCapture will be useful for downloading big data from websites, the Google search engine, Yahoo, etc. Check NCapture and click "Next".

<mark>i</mark> ₿ NVivo ×
Supplementary Add-ons
Select the supplementary add-ons you would like to install
NCapture is a web browser extension that enables you to gather material from the web for import into NVivo.
NCapture for Internet Explorer
SCapture for Chrome
InstallShield
< Back Next > Cancel

11. After that, a dialogue box will tell you the program is ready for installation. Click "Install".

 Another dialogue box will show you the status of the installation process. Please wait until the process is complete. This will usually take around 5–10 minutes.

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17	Please wait while the minutes.	NVivo Installer installs NVivo. 7	'his may take se	veral		
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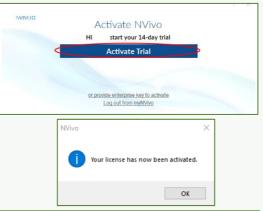
 Once the process is complete, check "Launch NVivo" and click "Finish". Please wait until NVivo opens.

👸 NVivo		×
	NVIVO	NVivo Installer Completed
		NV/vo has been successfully installed on your computer. Click Finish to close the installer.
		Launch NVIvo
		< Back Einish Cancel

 When NVivo opens for the first time, click "Log into myNVivo". Enter your myNVivo account email and password, then click "Log in".



 After successfully logging in, you will be asked to activate your trial license. Click "Activate Trial". A dialogue box will tell you your trial license is active. Click "OK".





16. You will be asked to fill in your user profile. Fill in your name and initials, and select the language for the user interface (English recommended). Check "Participate in the Customer Experience Improvement Program" if you are willing to participate in NVivo customer surveys. Doing so is not obligatory. Click "OK".

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 Your NVivo trial version is now ready to use for the next 14 days.



2. Qualitative data analysis workflow

Qualitative research is an iterative process of exploring and analysing data (Figure 1). This process starts with importing data, then exploring the data to observe whether it has any emerging or recurring patterns. This process is followed by "coding", or labelling and organizing data to identify themes and relationships. The coding process can be deductive or inductive. A deductive process involves building a codebook or coding guide before the analysis begins (Table 1). For exploratory research, codebooks can be created based on data. This is known as an inductive process (Yi 2018). The next step involves reflecting on the data and coding results, and then visualizing the data.



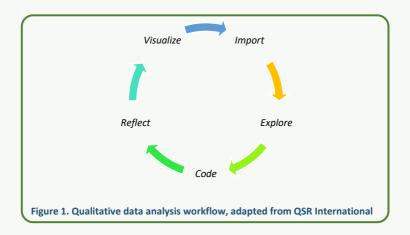


Table 1. Example of a codebook

Code	Description	Example
Fill in the code type	Fill in the description to explain the <i>code</i> in the first column.	Fill in the sample data that shows why it falls into the <i>code</i> category (first column).
Example:	Example:	Example:
"definition"	Respondents or texts refer to how the concept of peatland restoration is interpreted or conceptualized. This definition can include both social and ecological aspects of restoration, such as hydrological and vegetation conditions.	Restoration is restoring the ecosystem to its pre-damaged condition. We know we'll never get there, but at least we've tried.

3. NVivo at a glance

NVivo is a paid software package for analysing qualitative data. It allows teams (up to five people) to work together to analyse data through the <u>Collaboration Cloud</u>² feature. The software allows researchers and practitioners to analyse data effectively and efficiently. Data and analysis results can be visualized in word clouds, tree maps, and other forms. NVivo licenses can be purchased individually or collectively through institutions. The NVivo learning centre can be accessed <u>here</u>.³

² <u>https://lumivero.com/products/collaboration-cloud/</u>

³ <u>https://lumivero.com/resources/academy/</u>

4. Preparing data⁴

Prepare the data you want to analyse in one folder. Data that NVivo can process can include:

• Documents and memos

Documents and memos can be in the form of interview transcriptions, field notes, journal articles, reports and other documents in Microsoft Word (.doc, .docx), Rich Text File (.rtf), Text File (.txt), or Portable Document Format (PDF) formats.

• Datasets

Datasets are structured data organized by rows and columns. They can be survey data in the form of spreadsheets (.xls, .xlsx) or metadata from social media data collected through NCapture.⁵

Multimedia

NVivo can also be used to import multimedia, such as audio, video and image files obtained from focus group discussions (FGDs), observations, etc. Formats compatible with NVivo are: MOV, MP4, AVI, M4A, MP3, WAV, .gif, .jpeg, .png, and .tiff.

• Bibliographies

If you have done a literature review using EndNote, you can import data in the form of EndNote (XML) files into NVivo.

⁴ <u>https://help-nv.qsrinternational.com/20/mac/Content/files/files.htm</u>

⁵ NCapture is an NVivo browser extension add-on available for Google Chrome and Internet Explorer web browsers. It is used to extract data from social media

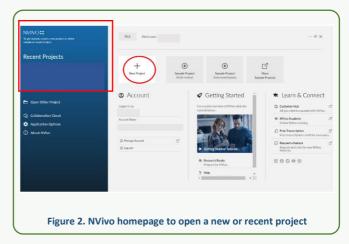
5. Getting started with NVivo

5.1. Creating a new project or opening a recent project

When you open NVivo, select New Project to create a new project, or Recent

Projects to open one you have recently been working on (Figure 2). This page also provides access to the learning centre and support resources.

When you select **New Project**, NVivo will redirect you to a new page for you to give your project a name (Figure 3). You will also be prompted to choose a location for saving the



file. Select Next then Create Project.

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				Project Saving			
Projects created i	n this version of NVivo cannot be	opened in previous versions		Autosave the project? (If Yes,	Undo is disabled)	O Yes	No
Project title				Display save reminders every	15 🗘 minutes	Yes	O No
File name			Browse	Project Recovery			
Description					e project recovery files as short-te Iso save backups manually)	rm backups. File cr	eation is triggered by
	Keep a log of user actions			Create recovery files	Every thirty minutes	~	
For text analysis of your	data, select the text content langua	ge that (most of) your data	files will be.	Store the most recent	1 🗘 recovery files		
Text content language	English (US)		v	Recovery file location	C:\Users\Sonya\Documents	NVivo Recovery	Browse
		Cancel	Next			Back	Create Project

If you want to open a previously saved NVivo file (.nvpx or .nvp), double-click on it and NVivo will open it automatically (Figure 4).

5.2. Importing data

Once you have created a new project, you will be redirected to the NVivo main page. To start importing data, select **Import** (Figure 4), and the file explorer dialogue box will pop up.

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Select the desired file(s), then click **Open**. In the next dialogue box click **Import** (Figure 5). In this section we will study interview data (in .doc format) and literature (in PDF format). These documents can be downloaded from this <u>link</u>.⁶

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⁶ <u>https://ipb.link/tradehub-nvivo</u>

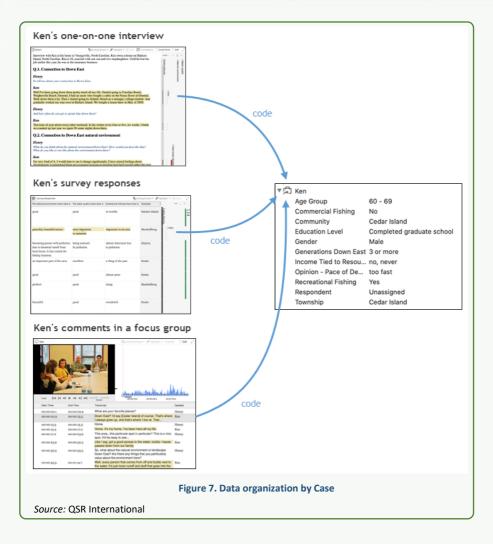
5.3. Organizing data

Imported data can be organized by **Case Classification** or **File Classification**. These features can be found in the **Home** menu (Figure 6). The 'case' represents a unit of observation. For example, a research project may contain cases for people, locations, organizations or entities.

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An example of data organization by **Case** is shown in Figure 7, where a respondent named Ken had been involved in interviews, surveys and group discussions. In this example a dedicated Case has been created and assigned the name "Ken".





Organizing data through the **File Classification** option is to group documents by file extension type. For interviews and literature, for instance, select **File Classification** on the **Home** menu, then click **New File Classification**. Next, complete the information in the dialogue box by naming the desired classification class, then click **OK**. Repeat this step when you create a new classification class. In the following example where two classification classes – "interview" and "literature" – are created, this step is repeated (Figure 8).



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Next, go back to **Files** from the left of the screen to begin categorizing files. Rightclick on a file and select **Classification**, then select "interview" or "literature" (Figure 9). Colour options are available with a right-click and selecting **Color**. The results of created classification classes are then available in the **File Classifications** menu on the left side of the screen (Figure 10).





5.4. Coding

5.4.1. Creating codes

Through the **Files** tab, open a file that has been classified under "interview", click on it and read it thoroughly. After that, determine what codes will be created from the data. To create new code, highlight the part of the text you want to code. Then right-click and select the **Code Selection** option. A dialogue box will appear for you to create a new code. Click **Create New Top-Level Code**, and name the new code. Next, click **Code** then **Selection to New Code** (Figure 11). You can also select the **Code** option from the menu bar at the top of the screen to make it faster. Click **Code Selection**.



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After creating a new code, you can fill in the **Code Properties**, which include name, description and colour specifications. Click **Codes** in the menu on the left of the screen. Right-click on the code that has been created then click **Code Properties**. A dialogue box will appear where you can add a description and colour the code (Figure 12).

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5.4.2. Parent and child codes

You can also create '**child codes**', which are more specific classifications under their more general 'parent codes'. An example being:

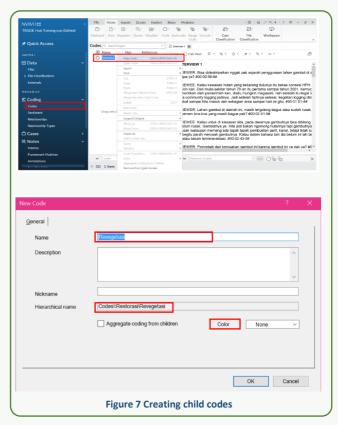
Restoration

- Revegetation
- Rewetting
- Revitalization

To create a child code, click on the **Codes** tab and select an already created parent code. Right-click on the parent code and select **New Codes**. A dialogue box will pop up for you to name, complete details of, and colour the child code.

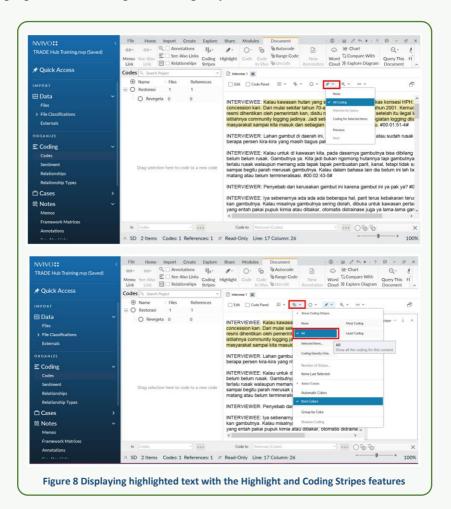
You can check the code hierarchy by looking at the "Hierarchical name" box, which will show the parent code first before the child code. When ready, click "OK" to complete (Figure 13).

- à Parent code
 - à Child code
 - à Child code
 - à Child code



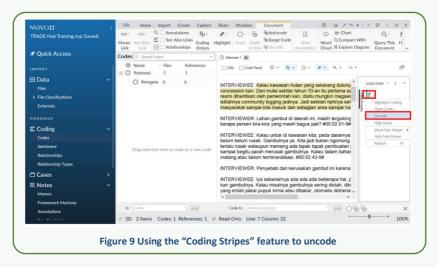
5.4.3. Highlighting pre-coded data

To show which parts of an interview have been coded, you can select the **Highlight** and/or **Coding Stripes** feature. The **Highlight** feature will highlight text that has already been coded, while the **Coding Stripes** feature will show the code type (Figure 14). To facilitate the analysis process, activate these two features by selecting **Highlight** then **All Coding**, and **Coding Stripes** then **All**.



5.4.4. 'Uncoding'

The **Coding Stripes** feature also allows you to 'uncode' or remove codes from parts of the text. To do this, right-click on the code, then select **Uncode** (Figure 15).



5.4.5. Exporting codebooks from coding results

Codes that have been created using NVivo can be converted and exported into codebooks (.docx). This process can be done by selecting the **Share** tab then selecting the **Export** and **Export Codebook** options (Figure 16).

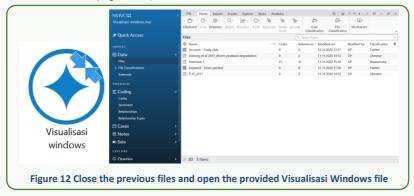
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NVivo will generate a new file in Microsoft Word format (.docx) containing code names, descriptions, files and references (Figure 17).

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5.5. Visualizing data

Data visualization in NVivo can help you identify emerging and recurring themes in the early stages of analysis. It also helps in reflection and presentation processes. A wide variety of visualizations can be created in NVivo, either automatically or manually (e.g., drawing concept maps). This section covers visualizations generated automatically from NVivo. Please close the previous files and open the Visualisasi Windows.nvp file, which can also be downloaded from this <u>link</u>, to learn about visualization features (Figure 18).



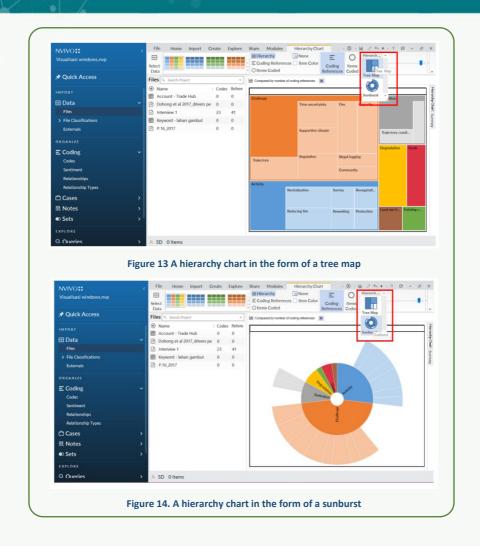
5.5.1. Hierarchy charts

Hierarchy charts visualize code groupings and are used to view proportions of themes relating to each other in the data. Select **Explore** then **Hierarchy Chart**. A dialogue box will appear. Click "Amount of coding for – codes" then "Next". Then check **Compare – All codes** and **Coded to – All files, Externals & Memos**, and click **Finish** (Figure 19).

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Once the chart is displayed you can choose either a **tree map** (Figure 20) or **Sunburst** (Figure 21) visualization.





5.5.2. Word frequency

'Word clouds' visualize words appearing most frequently in codes, files and cases. They are ideal for the early stages of research, particularly exploratory research, for quickly seeing emerging or repeating patterns. Under the **Explore** tab (Figure 22), select **Word Frequency**. Then select the number of display words and minimum length desired. Next, under the **Grouping** tab select **With stemmed words**. To create a word cloud from the coding results, click **Selected Items** for a dialogue box to appear.



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In the dialogue box (Figure 23), check **Automatically select subfolders** and **Automatically select descendant codes**. Then check the codes to choose which ones you want to display. After that click **OK**.

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	O Goals		11.11.2020 17:09	11.11.2020 17:09
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When you return to the NVivo main page, click **Run Query** and NVivo will display a summary together with a word cloud (Figure 24).

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If unimportant words like "which", "this" or "that" enter your word cloud, click **Summary**, right-click on the unwanted word and select **Add to Stop Word List** so NVivo will no longer include it in the word cloud and top word list. After that, click **Run Query** again to display the final word cloud (Figure 25).

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You can change the appearance of the word cloud by selecting the settings from the top of the screen below the **Word Frequency Query** menu (Figure 26).

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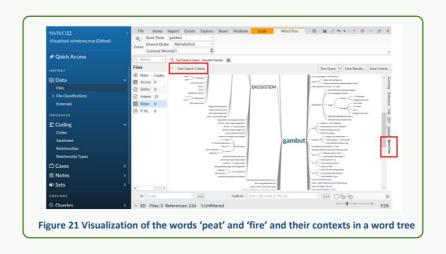
5.5.3. Searching text

Text search visualizations are depicted through word trees. This type of visualization shows specified or selected words and the contexts in which they are used in interviews or literature. For this visualization, select **Text Search** then click **Selected Items** to specify whether you want to see context in codes, files or cases. Then enter the word "fire" and select **Special** on the right. Then, select **AND** and enter the word "peat". After that select **Include Stemmed Words** then **Run Query** (Figures 27 and 28).

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		Using the text search		

To bring up the word tree, close the **Text Search Criteria** tab, then click the **Word Tree** tab at the right of the screen (Figure 29).



5.5.4. Diagrams

Diagrams visualize comparisons between codes, files and cases. Under the **Explore** tab select **Diagrams**, click **Compare Codes** and select the codes to be compared – for example, "activity" and "challenge" – then select **OK** (Figure 30).



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To bring up a comparison diagram, check **Children** in menu under the **Comparison Diagram** tab (Figure 31).

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6. NCapture

NCapture is a free web browser extension for Chrome that allows you to collect web content for import into NVivo. Support for NCapture for Internet Explorer was discontinued in 2020, but you can still install the latest version if needed. Most web pages can be captured as PDFs. You can also capture multiple pages from Facebook, Twitter and YouTube as datasets, videos and figures. An NCapture file (.nvcx) contains the content you retrieved as well as the URL, capture time, and any additional information such as description, memo and encoding you specified at the time of retrieval. Some captures from social media sites generate a lot of files after being imported into NVivo. For example, Facebook content can contain NVivo and Figure datasets.

Viewing social media data - You must authorize NCapture when retrieving from Facebook or Twitter for the first time.

NCapture authorization - Depending on your version of NVivo, some types of captured content cannot be imported into your project.

6.1. Installing Ncapture in Chrome

If you have installed NVivo, NCapture may have been installed on your computer as part of the NVivo installation. Otherwise, you can install it manually. You will need Chrome 44 (or later) to use NCapture for Chrome.

- 1. Open **NCapture for Chrome** in the Chrome Web Store.
- Click the Add to Chrome button and confirm in the dialogue box. NCapture will then be added to Chrome, with an icon in the toolbar.

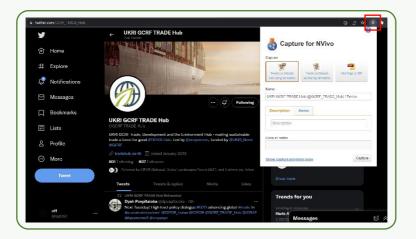
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You do not need to install NVivo to use NCapture. For example, you can still ask a research assistant who does not have NVivo to install NCapture and collect Tweets. They can then send NCapture (.nvcx) files to you to import into your NVivo project.

6.2. Capturing content with NCapture

You can import social media content from Facebook, Twitter and YouTube that you have collected with NCapture.

- 1. In your browser, open the content you want to capture.
- 2. Click the **NCapture** button at the top of your browser.



- 3. Select the document result type. Depending on the type of content you are viewing, you may see different capture options.
- 4. Review and rename files.
- 5. You can enter a short description or memo:
 - a. Description becomes one of the file properties in NVivo.
 - b. Memos you enter become linked memos when files are imported.
- 6. Optionally, enter one or more codes ("nodes" in previous versions of NVivo) to encode the contents. When you import content into NVivo, the entire file is encoded into this.
 - a. If you enter a code that does not exist in your project or mistype its name a new code is generated.
 - b. If coding into an existing code, enter a hierarchical code name for example, "trade"\"palm".
- 7. Click **Capture**. The retrieved content is saved as an NCapture (.nvcx) file that you can import into your NVivo project.

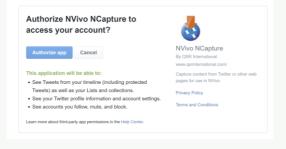
6.3. Social media account authorization (Twitter)

A dataset is created containing Tweets you have captured. Any hyperlinks in the Tweet will be noted. If the Tweet includes a link to a media file, the media file is not imported into your project, but you can access it from the hyperlink.

If the Tweet is a search result on Twitter, you can click the link in the **Search Terms** column in the dataset to perform a new search on Twitter.

By default, user information such as gender or location will be imported along with Tweets. If this is not relevant to your research, you can change this behaviour in the project properties.

Before obtaining data, the account must first be authorized.



7. Further reading

Yi E. 2018. Themes don't just emerge – Coding the qualitative data.

https://medium.com/@projectux/themes-dont-just-emerge-coding-the-qualitativedata-95aff874fdce (11 November 2020)

QSR International. NVivo for Mac – Getting started guide. <u>http://download.gsrinternational.com/Document/NVivo11forMac/11.1.0/NVivo-for-Mac-Getting-Started-Guide.pdf</u> (11 November 2020)

Jackson K and Bazeley P. 2019. Qualitative data analysis with NVivo. Sage.

KUMU



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Training materials

ipb.link/tradehub-kumu





1. Kumu account registration tutorial

Kumu (<u>https://www.kumu.io/</u>) is a website-based software package created by Jeff and Ryan Mohr in the United States in 2011. It can be used for visualization of stakeholder mapping, systems mapping, social network mapping, community asset mapping and concept mapping. Kumu offers advantages in enabling users to provide attractive visualizations for complex data, and to create visual databases. Kumu also has several automated analysis features, for example, for metric calculations in social network analysis, community detection and clustering. In addition, Kumu has a feature to create online presentations that make it easy for you to share the results of your research. Basically, Kumu is a free platform, but your data will be publicly available. If you want to make your data available personally, you can choose a paid service.

Here are the steps to register a Kumu account:

1.1. Kumu registration

- Open the Kumu website through your browser https://www.kumu.io/
- 2. Enter the JOIN FOR FREE menu in the upper right hand corner.



 Fill in the data needed for registration. This registration page can also be accessed directly at the following link <u>https://www.kumu.io/register</u>



First and last name Your first and test name Email address Your email address Choose a username Choose a username Choose a password Choose a password Choose a password Winawa III chuncken Uma You Pay, D Bike to receive Kumu's m We do nd have your email and you can use You are These paper a part mediated	
	C AFTCHA Ny Thema
Create By signing up, you agree to Kumu's	your free account

First and last name

First name and last name, example: Miftah Rahman

Email address

Your email address, example: miftahrahman@email.com

Choose a username

Choose the username you want to use, you can use numbers 0–9 and/or letters a–z and hyphens (-). Examples of usernames are miftahrahman, miftahr20, miftah-rahman

Choose a password

Enter the password you will use. You will need to use this password each time you log in to your account on the Kumu website.

If you want to receive a monthly newsletter from Kumu, you can check "Yes, I'd like to receive Kumu's monthly newsletter". You do not need to check it if you do not want to receive the newsletter.

After you have filled in all the data, click "I'm not robot" for verification and **Create** your free account.

4. Your account has been successfully created if the following **DASHBOARD** page appears.

KUMU GALLERY DOCS HELP		NEW PROJECT	DASHBOARD	SETTINGS	۵. ۲
Projects Workspaces	Welcome! Get started by creating your first project.				
	NEW PROJECT				



- 5. You can learn more about Kumu features at Learn the essentials https://docs.kumu.io/
- 6. Open the Kumu website through your browser https://www.kumu.io/ and click SIGN IN.



7. On the sign in page, fill in your username or email address and the password you used to register, then click **Sign in**.



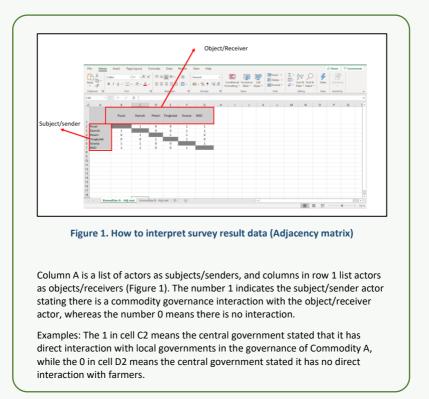
8. After signing in successfully, you will be connected to the dashboard page of your Kumu account.



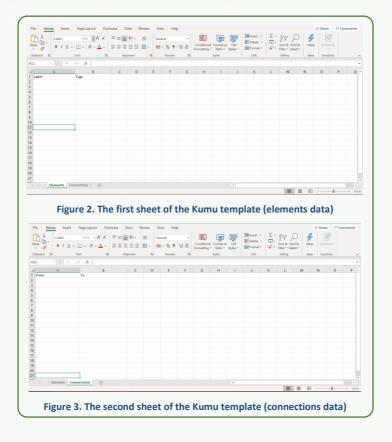
KUMU GALLERY DOCS HELP		NEW PROJECT DASH	HBOARD SETTINGS 🎇 -
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	Welcome! Get started by creating your first p	roject.	
Zero to Kumu in 3 simple	e steps:		
Step 1. Explore what's possible			
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Step 2. Learn the essentials			
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Step 3. Experiment within a fre	reate a sandbox project, hack away on II, and then delete II when y		
Step 3. Experiment within a fre The best way to learn is by getting your hands dirly. Cr CREATE A EANBOOK PROJECT Got questions?	reate a sandbox project, hack away on II, and then delete II when y		

2. Interpreting basic data and preparing for social network analysis with Kumu

- 1. The TRADE Hub_7Nov20_Data KUMU_A and TRADE Hub_7Nov20_Templat KUMU Excel files can be downloaded <u>here</u>.
- The TRADE excel file Hub_7Nov20_Data KUMU_A contains a matrix of data from social network surveys to actors who have been identified as having a role in the governance of Commodity A. Data is in the form of an adjacency matrix.



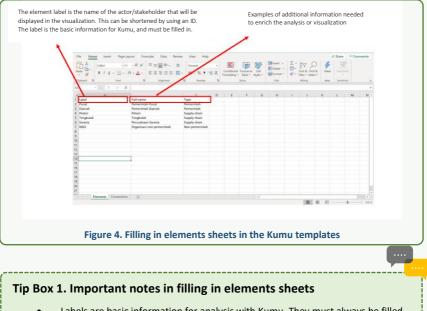
 As the survey data will be analysed with Kumu, adjustments are made to the Kumu template file (TRADE Hub_7Nov20_Template KUMU). The Kumu template contains two sheets; the first for entering data elements (Figure 2) and the second for data connections (Figure 3).



3. Filling in elements sheets

Elements in Kumu are actors/stakeholders that constitute the focus of analysis, and can be individuals or organizations. The elements sheets contain lists of actors/stakeholders constituting the basic data. If needed, to enrich the analysis or visualization of an element, detailed data – such as name, type, description, tag, organization, etc. can be added in subsequent columns. In Kumu, element attributes are called fields.

Fill in the element sheets containing lists of actors according to the data. The example in Figure 4 below is for Commodity A. To shorten names, IDs can also be used.



- Labels are basic information for analysis with Kumu. They must always be filled in and located in the first column (column A in Excel). The label is the name of the actor/stakeholder that will be displayed on the Kumu visualization map.
- Fields such as label, type etc. should always be present in the first row.
- There should be no column breaks or empty rows.

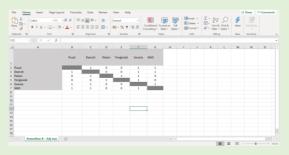
4. Filling in connections sheets

Connections in Kumu are interaction relationships between actors/stakeholders that constitute the focus of analysis. The connections sheets contain social network data in the form of an *edgelist matrix*. As survey data takes the form of an *adjacency matrix*, it needs to be converted to an *edgelist matrix*. Please refer to Tip Box 2 for how to convert matrices using a web-based matrix expander.

Tip Box 2. Two quick ways to convert an *adjacency matrix* to an *edgelist matrix*:

1. Through the website https://matrix-expander.netlify.app/

a) Set up an *adjacency matrix* in an Excel file as shown below. Actor/stakeholder/element/label names should not contain spaces, and make sure the data position starts in the top row and the first column.



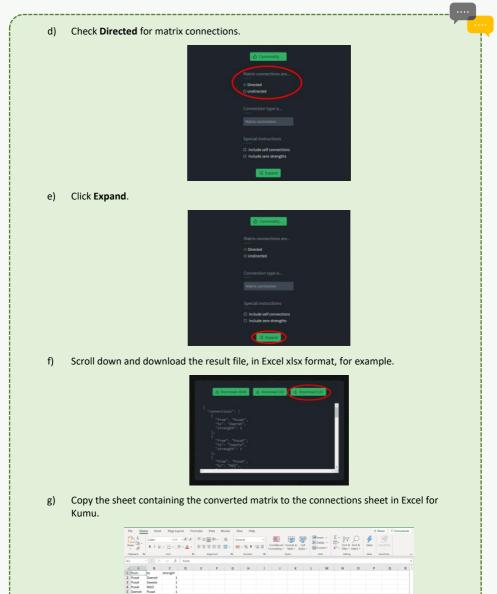
b) Go to the website https://matrix-expander.netlify.app/

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c) Click start or drag the cursor down, then upload the Excel file by clicking **Upload matrix**. The *upload box* will turn green once your file has been uploaded successfully.

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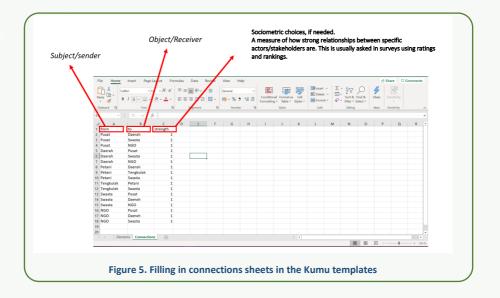


Figure 5 shows an example of filling in a connections sheet for a Kumu template. The sheet lists all data on relationships/interactions between actors/stakeholders. Data in column A under the heading **from** is the subject/sender, while data in column B under the heading **to** is the object/receiver. Strength is usually the value of sociometric choices, which usually indicates a measure of how specific the relationship between an actor/stakeholder is. Sociometric choices data are usually obtained at the time of surveys through rating or ranking questions. If needed, to enrich the analysis or visualization of an element, detailed data – such as name, type, description, tag, organization, etc. can be added in subsequent columns. Connection attributes are called fields in Kumu.

- 5. Analysing social network data with Kumu (via Excel file imports)
- 5.1. Logging in to your Kumu account
- Open the Kumu website at <u>https://www.kumu.io/</u> through your browser and click the SIGN IN menu.



2. On this page, fill in your username or email address and the password you used to register, then click **Sign in**.



5.2. Creating new projects on Kumu

1. After signing in you will be connected to the **Dashboard** page of your Kumu account. Click **New Project**.

KUMU GALLERY DOCS HELP		NEW PROJECT DASHEGAND SETTINGS
Projects Workspaces		
Welc	come! Get started by creating your fir	st project.
	NEW PROJECT	
Zero to Kumu in 3 simple ste	ps:	
Step 1. Explore what's possible		
Find out how others have used Kumu by exploring existing public	ic projects.	
Hewkell Foundations systems map of the US Democracy Child Canopy's stateholder and project network Kumurs own data visualization of the Celebrity Ice Bucket		
Step 2. Learn the essentials		
At docs.xumu.io you'll find a slep-by-slep guide to getting started	d with Kumu, along with advanced guides to all the	great features available within Kumu.
Step 3. Experiment within a free, pul	blic project	
The best way to learn is by getting your hands dirly. Create a sa	ndbox project, hack away on II, and then delete II w	hen you're donel
Got questions?		
Send an email to support/akumu.to or reach out to us on Slack.		
	Kumu Gallery Docs Help	
Figure 8. T	he Dashboard p	age in Kumu

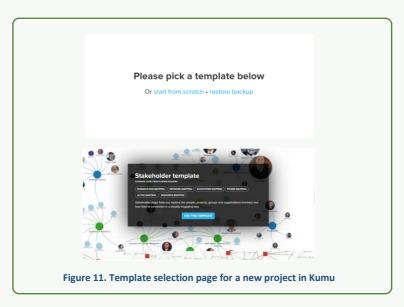
2. Fill in project information in the **Project name** and **Project description** fields. Check **Public** in the pricing plan selection.

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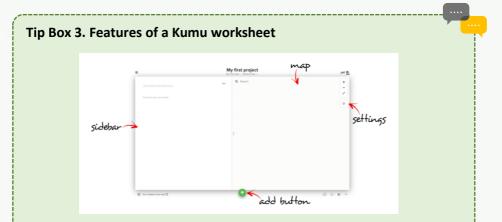
3. Click Create project in workspace to open a worksheet.

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Workspace		
~		
Project name		
TRADE Hub Training		
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Project description		
Add description (optional)		
Public (\$0/month) Anyone can see this project. You che	oose who can contribute.	
O Private (\$9/month) You choose who can see and contri	ibute to this project.	
Create project in workspace		

4. On the pick a template page, slide the cursor down and select a stakeholder template by clicking on it, then click USE THIS TEMPLATE to go to the Kumu worksheet. Please refer to Tip Box 3 for features in Kumu worksheets.





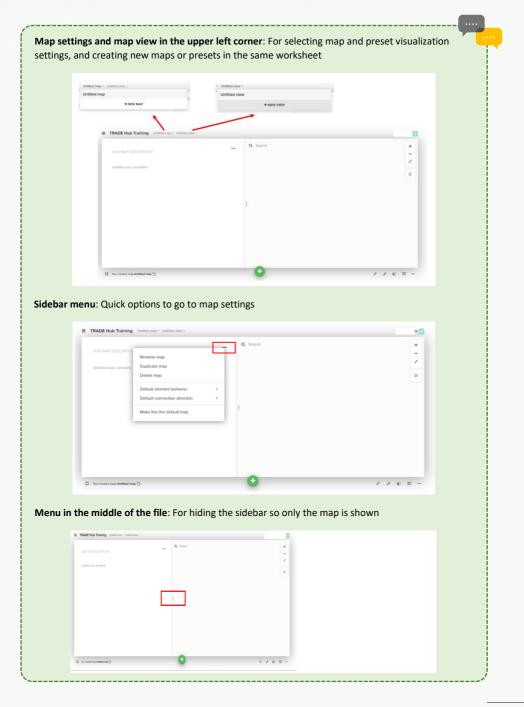


The Add button: For adding data to the map (element, connection, loop, sketch, import)



The menu in the upper left corner: Shows the main settings

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Wizard menu: Serves as a help menu, displaying guides and answers to FAQs

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Settings menu in the lower left corner: Displays general settings

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- 6. Importing data from Excel documents to Kumu, and basic visualization settings
- 1. You can import data from a pre-prepared Excel file by clicking the Add button then Import.

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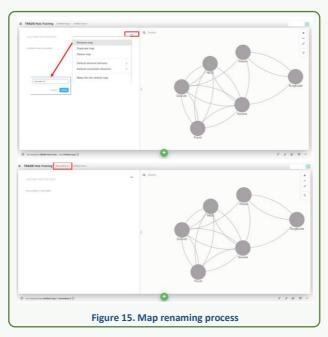
2. To import a file to Kumu, under the **Import** menu, click **Choose File**, select a file, then click **Import spreadsheet** to upload the file.

Import XLSX or CSV file	#	Import XLSX or CSV file	
Choose File No file chosen		Choose File TRADE Hub training 07tt20_template kumu_sdkA.xks	
Link map to public Google Sheet		Link map to public Google Sheet	
https://docs.google.com/spreadsheets/d/YOUR SHEET-ID-HERE/edit		https://docs.google.com/spreads/heets/d?YDUR-SHEET4D-HERE/edit	
Link map to private Google Sheet		Link map to private Google Sheet	
https://docs.google.com/speedsheets/drYOUR-SHEET-ID-HERE/edit		https://docs.google.com/spreudsheets/d/YOUR-SHEET-ID-HERE/edit	
Cance	I Import spreadsheet	Cancel	gort specialsho
Advanced		Advanced	
Import JSON file		Import JSON file	
Choose File No file chosen		Choose File No file chosen	
Link map to remote JSON		Unk map to remote JSON	
https://www.piu.com/poth/to/bioeprint.puon		https://iocampie.com/path/to/bluoprint.juon	
	Cancel Import./SON	Cance	E Import JSD

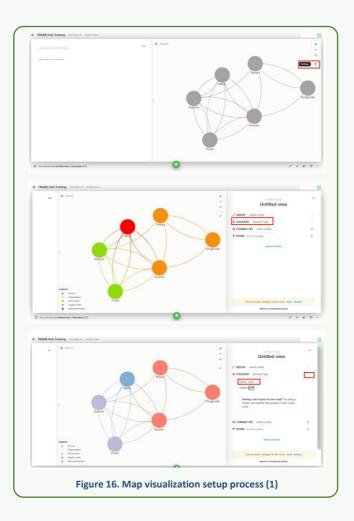
3. During the import process, Kumu will automatically review the data for errors. If no errors are found, continue the data import by clicking **Save Import**.

	Import revie Nece world No errors f	ound.
Label	Full-name	Туре
1 Paset	Pemerintah Pusat	Pemerintah
2 Daerah	Pemerintah Daerah	Pemerintah
3 Petani	Petani	Supply-chain
4 Tengkulak	Tengkulak	Supply-chain
5 Swasta	Perusahaan Swasta	Supply-chain
6 NGO	Organisasi non-pemerintah	Non-pemerintah
Please review each sheet and correct any errors before	antinag	Try ages - Town may
Figure 14	Error checking during th	ne data import process

 Once the data import is complete, Kumu will automatically display a map of the social network. Click the menu on the sidebar to rename the map, then click Submit.

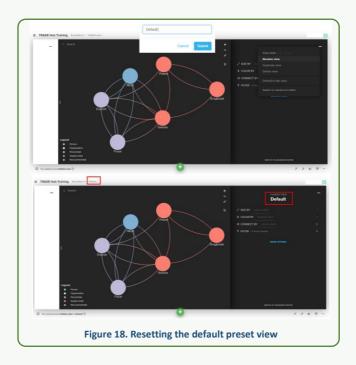


5. You can adjust the map's visualization settings by clicking the Settings, then COLOR BY and selecting Element Type. Click the expand selection toggle on the far right of the COLOR BY row and select the desired colour set. Change Theme to dark to provide better contrast, then click SAVE to save the settings.



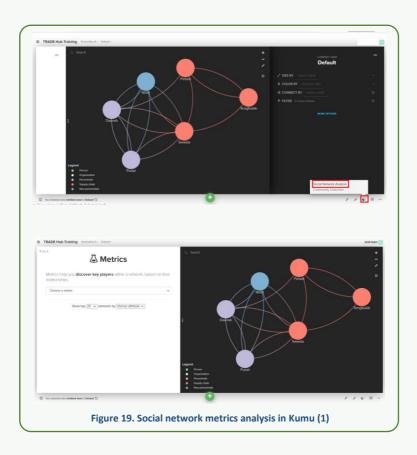


 Save the map visualization as the default preset view and rename it "Default" by clicking the settings menu in the upper right corner of the screen, selecting Rename view, and clicking Submit.



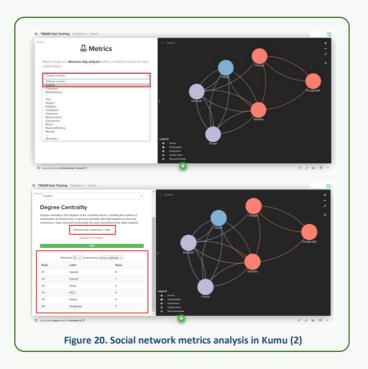
7. Centrality analyses

1. You can perform a centrality analysis by clicking the **Cube** icon in the lower right corner, selecting **Social Network Analysis** and moving your cursor to the sidebar.

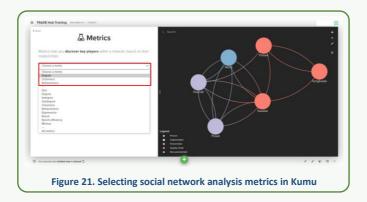




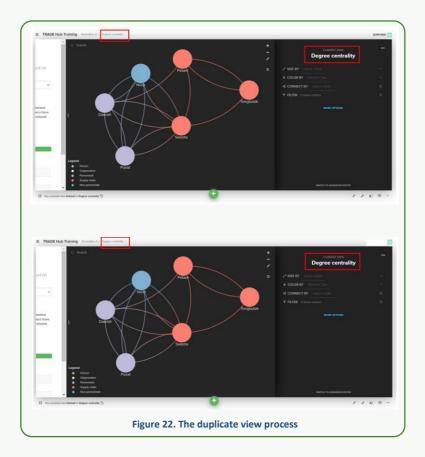
 Click Choose a metric, for example, Degree, then click "Discover the connectors / hubs to run automatic calculations. Then copy the resulting degree centrality calculation table to another document.



3. Repeat steps 1 and 2 to calculate the other metrics, namely closeness and betweenness centrality.

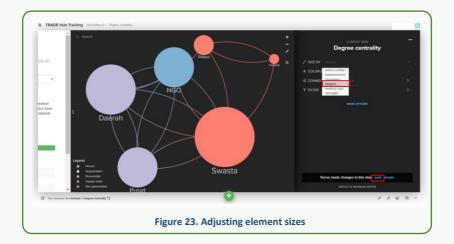


- 8. Setting visualizations of centrality analysis results to aid interpretation
- After the three centralities have been analysed, click Settings then the left corner menu under Settings, and select Duplicate view to create different views with the same basic settings. Change the name to "Degree centrality" and click Submit.

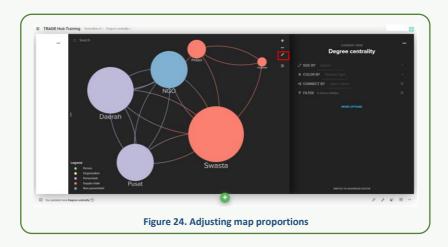


2. Once the view is saved with a new name, click SIZE BY in the settings and select degree. This will adjust the size of elements on the map to accord with their degree centrality values. Click SAVE.

This visualization makes element size representative of degree centrality value.

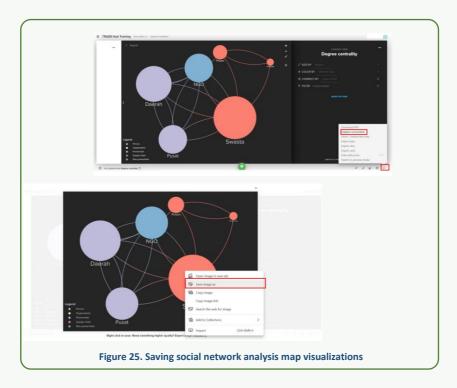


3. Click **Zoom to fit** to ensure appropriate proportions for the map view.



4. To save the map view as a Figure file, click the **More** menu in the lower right corner, select **Capture screenshot**, then right-click and click **Save image as**.

You can also save the map view as a .pdf file by clicking the **More** menu and selecting **Download PDF**.

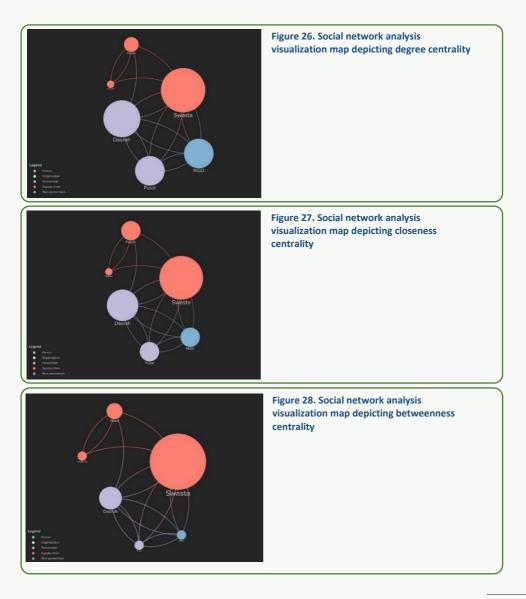


5. Repeat steps 1–4 for closeness and betweenness centrality results.



9. Examples of visualization and interpretation of social network analysis results using Kumu

Examples of social network analysis visualizations for actors involved in the governance of Commodity A are shown below.



Degree	e centrality		Closer	ness centralit	<i>y</i>
Rank	Label	Value	Rank	Label	Value
#1	Swasta	8	#1	Swasta	1
#2	Daerah	7	#2	Daerah	0.900
#3	<u>Pusat</u>	6	#3	Pusat	0.800
#4	<u>NGO</u>	6	#4	Retani	0.800
#5	Petani	4	#5	<u>NGO</u>	0.800
#6	Tenakulak	3	#6	Tenakulak	0.700

Table 1. Degree, closeness and betweenness centrality calculation results

The social network analysis results examples identify private companies as highly important actors in the network as they act as local connectors, spreaders/sensers, and brokers/bottlenecks. All actors in the network have good connectivity, except farmers and brokers. All actors have sufficient proximity in the dissemination of information within the network. Private companies, local governments and farmers are key actors in the successful flow of information in the network.

Tip Box 4: Guide to interpreting degree, closeness and betweenness centrality values

Metric	Interpretation
Degree centrality	Identify the local connector/hub Shows the number of relationships that an element has. In general, elements with high degree scores are well connected within the network, but are not necessarily the highest in the wider network.
Closeness centrality	Identify the spreader/senser Shows the distance of one element to another. Indicates the proximity of an element to other elements in the network. In general, elements with a high closeness value can spread information into the network more easily and have a high tendency to be able to know what is happening in the network.
Betweenness centrality	Identify brokers/bottlenecks Measures the number of times an element is between relationships between two other elements. In general, elements with a high betweenness value have more control over the flow of information and act as key links in the network. A high betweenness value also indicates that the element can be a point that supports the failure of information flow in the network.

Further information on setting up visualizations and other features in Kumu can be accessed via the following link: <u>https://docs.kumu.io/</u>.

UCINET and NetDraw



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Training materials

ipb.link/tradehub-ucinet

1. UCINET and NetDraw installation tutorial

UCINET is a social network data processing program created by United Statesbased software company Analytic Technologies. The program was developed by Lin Freeman, Martin Everett and Steve Borgatti, and was first released as UCINET version 4.0 in 1992. At the



time of writing, the most recent iteration of UCINET is version 6.742. UCINET can be downloaded for free from a page provided by Analytic Technologies at https://sites.google.com/site/ucinetsoftware/download. The page also provides tutorials on using this software.

Select the latest version of the UCINET program from the **Versions** bar at the top of the page, and click **Download**. When the setup dialogue box appears, click **Save File** to download the UCINET execution file.

Opening Setup32UCI6717.exe		×
You have chosen to open:		
Setup32UCI6717.exe		
which is: exe File		
from: https://www.analytictech.net		
Would you like to save this file?		
	Save File	Cancel

Once the download is complete, click the UCINET document to perform the installation. Click the **Immediate Installation** button. When the next dialogue box appears, select **Yes**.

Analytic Technologies UCINET 6.717 Setup		×
Welcome to Analytic Technologies <u>UCINET 6.717</u> setup. This version was released on 16 October 2020. Copyright © 2020 Analytic Technologies		
Immediate Installation More Information		
More Information		



The Setup dialogue box will pop up as below. Please read the terms and conditions, if you agree to the installation process, select **Yes, I do**. The installation process will take a few minutes to complete.

Irish law goods a excluded Conver apply. A virtue of General: version agreeme an untru or neglig	nd in contracts for the st d, to the extent such e sely, such conditions a Accordingly nothing in the Sections 12, 13, 14 or This Agreement is gov of this agreement shall ent between us and you the statement or repress	conditions and warranties may supply of services. Such cond xdusion, in the context of this nd warranties, insofar as they his Agreement shall prejudices of 5 of the Irish Sale of Goods. verned by the laws of the Repu apply to Software acquired in a gree that ANALYTC TECHN entation made by it, its agents relied upon entering this Agree veldenchi.	itions and warranties are transaction, is lawful un may not be lawfully exc any rights that you may Act 1893 (as amended). ublic of Ireland. The loca the EU. This Agreement IOLOGIES will not have a or anyone else (whethe	e hereby ider Irish law. duded, shall enjoy by al language t is the entire any liability for er innocently
	AGREEMENT			

Once installation process is complete, the following notification will appear. Click **Thanks!**.

This version wa	alytic Technologies s released on 16 (120 Analytic Techn			
Copyright © 20	120 Analytic Techn	ologies		
	UCINET 6.7	17 has been successfully installe	ed on your system	
		Thanks!		

To manage the storage of documents generated by the UCINET program, select **Set Default Folder** from the menu that appears when you click the storage icon in the lower right corner. Select your desired storage folder to ensure all UCINET analysis result documents are stored in the same folder.

d UCINET 6 for Windows Version 6.716 [64-Bit]		×
File Data Transform Tools Network Visualize Options Help	 	
📔 🔤 🎚 🔪 D CU 😡 🎇		
How to cite UCINET:		
Borgatti, S.P., Everett, M.G. and Freeman, L.C. 2002. Ucinet 6 for Windows: Software for Social Network Analysis. Harvard, MA: Analytic Technologies.		
A tutorial by Bob Hanneman & Mark Riddle is available here: http://faculty.ucr.edu/~hanneman/nettest/.		
See also this great book:		
Borgatti, S.P., Everett, M.G. and Johnson, J.C. 2013. Analyzing Social Networks. Sage Publications.		
C:UsersWPDocumentsUCINET data		3

The free UCINET download is a 60-day trial version with no registration number. Paid versions with registration numbers are also available for purchase. For information on prices and available versions, click on the **Purchasing** bar at the top of the page. The only difference between the trial and paid versions of UCINET is their period of validity.

As NetDraw has become an integral part of the UCINET program, it does not require a separate installation.

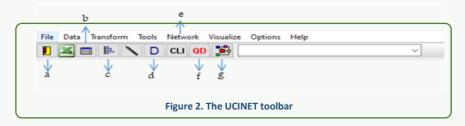
2. Features and tools in UCINET and NetDraw

2.1. UCINET worksheets

UCINET is an easy-to-use social network data processing program. Once you have successfully installed the program, you can click the UCINET icon to bring up the display shown below.

UCINETS for Windows Version 6./17(32-84) Ele Data Transform Tools Network Visualize Options Help		
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fors to site LCHET		
Bergstä, S.P., Event, M.G. and Freeman, L.C. 2002. Const Distributions: Sola Harvard, Mcc Archite Technologies.	see tor Social Metwork Analysis. Creators of UCINET	
A luforal op Exb Hanneman's Mark Fiede is evalable here. Hitp://teouty.uox.edu/*	TransmanutineBe M.	
See blo dris great book:	UCINET tutorial and book on Social Network Analysis	
Bergali, S.P., Event, M.B. and Johnson, J.C. 2013. And Joing Social Networks. S	lage Publications.	
This copy of LCINE I to regulated to Trial Deer		
Are	a to display commands or analyses performed on data	
Are	a to display commands or analyses performed on data	
Are	a to display commands or analyses performed on data	~ 🛱

The most commonly used menu in conducting network analyses is the **Network** menu, which allows analyses of whole and ego networks. The UCINET worksheet **toolbar** shown below makes it easier for users to input and process data.



- a. Exit: To exit UCINET
- b. Matrix editor: For inputting data on attributes for each actor in a network
- **c. DL editor**: For inputting data on relationships between actors produced by researchers. Data inputting can be done directly in the DL editor box, or copied and pasted from Microsoft Excel.



- d. Open datasets: For opening files saved in dataset format.
- e. Network: For displaying different social network analyses
- f. Quickstart: For opening dataset files and displaying them in the form of sociograms
- g. NetDraw: For displaying NetDraw software spreadsheets

2.2. NetDraw worksheets

NetDraw is a program for displaying social network data analysis results in the form of sociograms. Developed by Borgatti, NetDraw is integrated with the UCINET program. You can open a NetDraw worksheet by clicking the 🛛 icon in UCINET.

G G G A ∰ Ø Z r G ∮ ¶	C See Peer Sel MC Ego Hode The Toolbar	Pels Nodes Belations
	Brings up UCINET filenames displayed in sociogram form	
	Displays the names of actors on the network	
	Area for displaying sociograms	
		Dr. Up D Al F
	Number of relationships that exist in the network	O AND @ OF Ø SeffLoops D Urk with Width 100 ties.
	5	

The most frequently used menus in NetDraw are the **File**, **Analysis** and **Properties** menus. The use of these menus is explained in sub-chapters below.

NetDraw provides a toolbar that allows users to modify the appearance of sociograms.



Icons on the NetDraw toolbar function to:

- a. Open UCINET network dataset: For opening relationship files saved in UCINET dataset format
- **b. Open UCINET attribute dataset**: For opening actor attribute files saved in UCINET dataset format
- c. Resize to fill area: For adjusting the size of sociograms to the size of the NetDraw page
- **d.** Move all points: Provides a menu for rotating a figure, zooming in and out, adjusting the position of a figure to the NetDraw page, and changing the network view
- e. Zoom in Zoom out: For zooming in and out of a sociogram figure
- f. Kawai: Functions to display different forms of figures.



3. Inputting relationship data

UCINET use is generally divided into three types: Data entry (inputting); network data analysis; and creating sociometric figures using NetDraw. At this stage the data obtained is entered in numerical form (usually in nominal or ordinal measurement scales). Data entry can be done through facilities in UCINET, or using other software such as Microsoft Excel and copying into UCINET. Files analysed by this software will be saved as datasets. An important consideration when inputting data into UCINET is the data format used. The three most widely used formats are Full Matrix, Nodelist, and Edgelist. The direction of data must also be considered in the data entry process, as in relationships there are actors who act as subjects (active) and others who act as objects (passive).

3.1. Full Matrix

This format is created in the form of a rectangular matrix in which actors are positioned in rows and columns. Actors are paired with others based on their relationships. The number 0 indicates no relationship, while the number 1 indicates the existence of a relationship. Actors acting as subjects are positioned in rows, while those acting as objects are placed in columns. This binary format for relationship data is widely used to perform various network analyses in UCINET.

4		l →∔← Di	81.			Objec	t/Passiv	e						
	Jana	Ivan	Petr	Marek	Ondrej	Roman	Jan	Milan	Lubomir	Petr	Ivo	Roman	Tomas	Data format:
ana	0	1	1	1	1	1	1	1	1	1	1	1	1	Matrix (incl. attributes, 2-mode, etc) v
van	1	0	1	1	1	1	1	1	0	1	0	1	0	Spreadsheet headers
etr	1	1	0	1	1	1	1	1	0	1	0	1	0	Col headings
larek	1	1	1	0	1	1	1	1	0	1	0	1	0	
Indrej	1	1	1	1	0	1	1	1	0	1	0	0	0	Row headings
oman	1	1	1	1	1	0	1	1	0	1	0	0	0	Dupicate ties
an	1	1	1	1	1	1	0	1	0	1	0	0	0	Sum/count up
llan	1	1	1	1	1	1	1	0	0	1	0	1	0	
ubomir	1	0	0	0	0	0	0	0	0	1	0	0	0	() Ignore
etr	1	1	1	1	1	1	1	1	1	0	1	1	1	Output Options
01	1	0	0	0	0	0	0	0	0	1	0	1	0	Recode missing to 0
oman	1	1	1	1	0	0	0	1	0	1	1	0	1	Force symmetry
omas	1	0	0	0	0	0	0	0	0	1	0	1	0	
	L													Force anti-symmetry
↓ Subjec	t/Active								relations farelation					

3.1.1. Nodelist

This format is created by creating a list of actors (nodes) and their relationships. The names of actors and their relationships with other actors are written horizontally. The advantage of using this format is that the possibility of actors being left out or overlooked during data entry can be avoided. Consequently, this format is often used if there are large numbers of actors. The downside to this format is that it cannot display values for relationships.

🖸 DL Ed	itor - Impor	t Text Data vi	a Spreadsh	eet Interface										- 🗆 X
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Jana	Ivan	Petr	Marek	Ondrei	Roman	Jan	Mian	Lubomir	Petr	Ivo	Roman	Tomas	^	Data format:
Ivan	Jana	Petr	Marek	Ondrej	Roman	Jan	Milan	Petr	Roman					Nodelst1 (ego alter1 alter2) V
Petr	Jana	Ivan	Marek	Ondrej	Roman	Jan	Milan	Petr	Roman					
Marek	Jana	Ivan	Petr	Ondrej	Roman	Jan	Milan	Petr	Roman					Spreadsheet headers
Ondrej	Jana	Ivan	Petr	Marek	Roman	Jan	Milan	Petr						Col headings
Roman	Jana	Ivan	Petr	Marek	Ondrej	Jan	Milan	Petr						Row headings
Jan	Jana	Ivan	Petr	Marek	Ondrej	Roman	Mian	Petr						Duplicate ties
Mlan	Jana	Ivan	Petr	Marek	Ondrej	Roman	Jan	Petr	Roman					Sum/count up
Lubomir	Jana	Petr												
Petr	Jana	Ivan	Petr	Marek	Ondrej	Roman	Jan	Milan	Lubomir	Ivo	Roman	Tomas		○ Ignore
Ivo	Jana	Petr	Roman											Output Options
Roman	Jana	Ivan	Petr	Marek	Milan	Petr	Ivo	Tomas						Recode missing to 0
Tomas	Jana	Petr	Roman											Force symmetry
<													>	Force anti-symmetry

Actors playing roles as subjects are placed in the first column, while those playing roles as objects are placed in the second and subsequent columns. The disadvantage of this format is that values of relationships between actors cannot be displayed.

3.2. Edgelist

This format is similar to Nodelist, the difference being that actors' names and relationships with other individuals are written vertically (one per row). The advantage of using this format is that we can list large numbers of actors and display relationship values. Actors playing roles as subjects are listed in the first column, while those playing roles as objects are listed in the second column. This format only lists related actors, so if data is in nominal scale form, only the number 1 will be displayed. Numbers with ordinal scales, like those in Figure 7, show the strength of relationships between actors.



etr etr etr etr tarek tarek tarek tarek tarek tarek tarek tarek tarek tarek tarek tarek tarek tarek tarek tarek tarek	Jan Milan Petr Roman Jana Ivan Petr Roman Jan Milan Petr Roman Jana Ivan Petr Marek	1	Relationship data relationships betv	this ordinal data shows the closer ereen actors	ness or strength of	Coble format: Edgeleti ego alter [rokket]) Seraziliteet headers Coh headings Row headings Row headings Declocate bes Sun(cont up Gyrore Output Options Proce symmetry Proce symmetry Plost abhabetoaly
ubject/#	Active		Object/Passive			

Once familiar with the formats used in UCINET, you can choose the one most applicable to your needs for the data entry process. Inputting data in UCINET starts by clicking the **DL Editor** (**I**) icon on the toolbar, after which the DL Editor spreadsheet will appear (Figure 8). The data entry process can be carried out either by copying data from Excel using Ctrl + C in the Excel file and Ctrl + V in the DL Editor spreadsheet, or clicking **Paste** under the **Edit** menu. Select the appropriate data format in the **Data Format** field on the right side of the spreadsheet. If the data being entered is in matrix form, you should select the matrix data format in the same field.

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	sform Tools Network Visualize Options Help	
	🗈 🔪 D CLI OD 🏂 Recent Commands:	
How to cite UCINET		
Borgatti, S.P., Ever Harvard, MA: Anal	rett, M.G. and Freeman, L.C. 2002. Ucinet 6 for Windows: Software for Social Network Analysis.	
	nneman & Mark Riddle is available here: http://faculty.ucr.edu/~hanneman/nettext/.	
See also this great b		
Borgatti 🔂 DL B	Editor - Import Text Data via Spreadsheet Interface	
This copy File Ed	lit View	
G (Сору	
· · · · ·	Paste	Data format:
	Resize grid >	Edgelist1 ego alter [value])
	Delete rows	Spreadsheet headers
	Delete columns	Collheadings
		Row headings
		Dupicate ties
_		Sum/count up
		OIgnore
		Output Options
		Recode missing to 0

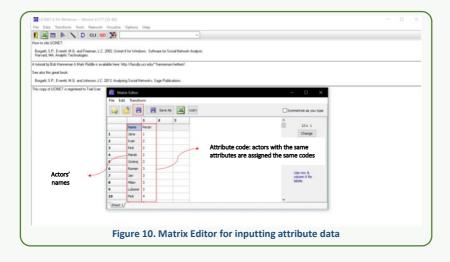
Once all data has been entered, click the sicon to finalize data entry. Save the entered data by clicking the **File** menu and selecting **Save UCINET Dataset**, or by clicking the sicon and selecting the desired storage folder. To check the data entered is correct and the UCINET format it has been saved in, select the **Open Dataset** (D) icon to display the data in text form (Figure 9).

nput	dataset:									E	ige]	.ist	(D:\Lila\Edgelist					
		1	2			_	6	-	8	9	10							
		TV	τv	Ja	Ja	ъ Lu		/ Mi										
		an	0	n														
						mi	k	n	ej		n	s						
						r												
1	Ivan	0	0	1	5	0	6	2	1	9	4	0						
2	Ivo	ø	ø	ø	2	ø	ø	0	ø	1	1	ø						
3	Jan	1	0	0	2	0	1	2	1	3	1	0						
4	Jana	5	2	2	0	1	4	3	2	13	6	1						
	Lubomir	0	0	0	1	0	0	0	0	1	0	0						
6 7	Marek Milan	6 2	0	1	4	0	0	2	1	9	4	0						
8	Ondrej	1	0	2	3	0	2	1	1	4	2	0						
9	Petr	9	1	â	13	1	9	â	2	6	9	1						
10	Roman	4	1	1	6	ē	4	2	1	9	0	1						
11	Tomas	0	0	0	1	0	0	0	0	1	1	0						
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														Ln 1, Col 1	100%	Windows (CRLF)	UTF-16 LE	

3.2.1. Entering actor attribute data

UCINET can also be used to analyse relationships between actors by attribute, such as age, gender, position, regional origin, etc. Attribute data entry begins by typing actors' names in the first column and their attributes in the next column. Each attribute must be coded as UCINET can only process data in numeric form. To enter actor attributes, click the **Matrix Editor** ((**m**) icon, and enter the attribute data into the available fields. Actor attributes can either be typed directly in the **Matrix Editor**, or copied and pasted from Excel. If the data comes from an Excel file, click the **Matrix Editor**, and find the file to analyse. Data copied from the Excel file can be entered by clicking the **Edit** menu and selecting **Paste**, or by using Ctrl + C and Ctrl + V commands. Once data entry is complete, click the **Matrix teditor**.





3.2.2. Data transformation

A number of network analysis calculations require certain data requirements. For example, the calculation of network density requires dichotomous/binary data. If the data we have is ordinal/ranking data, a process is necessary to transform the data to match conditions required by the calculation. UCINET provides a menu to transform valued (ranking) data into binary data.

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me copy of C	Make Interaction Term for Regression		
	Make structural effects for QAP regressions		
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	Matrix Operations	>	
	Normalize	Ctrl+Alt+N	
	Recode		
	Replace missing values		
	Reverse	Ctrl+Alt+V	
	Rewine		
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	Transpose	Cori-T	
	Graph Theoretic	>	
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	Build tie change matrices		
	Give non-responders missing rows		
			2

Under the **Transform** menu, select **Dichotomize** for a dialogue box to appear (Figure 12). Next, enter data values in the **Input dataset (X)** field and select the storage location in the **Output dataset (Y)** field.

Files	
Input dataset (X):	✓ <u>Q</u> K
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Output dataset (Y):	
	···· ? Help
Dichotomization rule	Diagonals of output (Y) matrix:
Dialocomization full	Set to zero
If x(i,j) Greater Than V value 0	O Set to missing
	○ Set to "then" value
then $y(i,j) = 1$ else $y(i,j) = 0$	Set to "else" value
	O Follow dichotomization rule

4. Whole network analyses

Whole network analyses discussed in this section are structural analyses of network density, centrality (the positions of actors in relation to others), and cliques.

4.1. Network density

Network density is the ratio between the number of bonds present (actual) and the number of bonds that arise when all actors in the network relate to each other (potential). For such analyses, data must be binary (0 and 1) showing the presence or absence of relationships between actors. We can perform a network density analysis by clicking the **Network** menu and selecting **Whole network & cohesion**, **Density** and **Density Overall** (Figure 13).

When the dialogue box appears, enter the file for analysis in the **Network Dataset:** field and select a storage folder for analysis results in the **Output densities:** field (Figure 14).



	Dyadic measures Whole networks & cohesion		Multiple whole network measures	-		
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Files Network Dataset:	V OK
	 X Cancel
Output densites? -density	 ? Help
Options	
Utilize diagonal (reflexive ties) For valued data, treat zeros as missing values	

Figure 15 shows the results of a network density analysis in UCINET. The data shows an average network density of 0.641, or 64.1%, indicating the network having a relatively low density where many actors or members of the network have no relationships or are even unfamiliar to each other.

Input dataset:				Matrix	(D:\Lil	a\Matrix)
Output dataset:				Matrix	-density	(D:\Lila\Matrix-density)
	1	2	3	4	5	
Der	nsity No.		Std Dev	Avg Deg	Alpha	
	т	ies		ree		
1 Matrix	C 41	100		7 602	0.050	
I MALITIX		100	0.480	7.692	0.959	
1 rows, 5 columns	1 1 1 2 2 2 1					

4.2. Cliques

A clique is a grouping of actors in a network where all actors in the group interact with each other. To identify cliques in a network, click the **Network** menu and select **Subgroups**, then **Cliques**.

ow to cite UONET: Borgatti, S.P., Everett, M.G. and Fr	Dyadic measures Whole networks & cohesion Regions	>	
Harvard, MA: Analytic Technologie	Subgroups	>	Ciques
tutorial by Bob Hanneman & Maik E ee aloo bris great book: Begatti, S.P., Everett, M.G. and Jc his copy of UCNET is registered to	Ego Networks Centrality Group Centrality KopPlayer Core/Periphery Roles & Positions	> > >	N Clans - N- Norm - N- N
	Triad Census P1 Balance counter Compare densities Compare aggregate proximity matrices	>	Grave Neuman Louisin mithel Neuman Community Detection (NCD) F-Groups Marker: Clastering
	2-Mode networks CSS Trajectories Extras Tester	>	
	Multiple Measures	>	

When the dialogue box (Figure 17) appears, enter the file to be analysed in the **Input dataset:** field. In the second field, enter the minimum number of members per clique. If we choose three, then only cliques with three or more actors will be displayed. The next step is to select a storage location folder for each output.

Input dataset:	D:\Lila\Matrix.##h	✓ <u>о</u> к
Minimum size:	3	X <u>C</u> ancel
Analyze pattern of overlaps:	YES ~	<u>?</u> <u>Н</u> еlр
Diagram type:	Tree Diagram ~	Туре
(Output) Clique indicator matrix:	CliqueSets	O Strong
(Output) Co-membership matrix:	CliqueOverlap	● Weak
(Output) Partition indicator matrix:	CliquePart	
(Output) Clique proximities:	CliqueParticipation	

Analysis results in Figure 18 show five cliques comprising at least three actors existing in the network. Actors can be members of more than one clique. This analysis identifies Jana and Petr_Ne as actors having strong relationships with various actors since they are members of all five cliques. They also have potential to be liaisons between actors from different cliques.

Minimum Set Size:	3
Input dataset:	Full Matrix (D:\Lila\Full Matrix)
5 cliques found.	
s criques round.	
1: Jana Ivan	Petr_Tl Marek Ondrej Roman_Ban Jan Milan Petr_Ne
	Petr Tl Marek Milan Petr Ne Roman Jan
3: Jana Lubon	nir Petr_Ne
4: Jana Petr	Ne Ivo Roman_Jan
5: Jana Petr	Ne Roman_Jan Tomas
Jana	
	1.000 1.000 0.667 0.750 0.750
Petr_T1	1.000 1.000 0.667 0.750 0.750
Marek	1.000 1.000 0.667 0.750 0.750
Ondrej	1.000 0.857 0.667 0.500 0.500
	1.000 0.857 0.667 0.500 0.500
	1.000 0.857 0.667 0.500 0.500
	1.000 1.000 0.667 0.750 0.750
	0.222 0.286 1.000 0.500 0.500
	1.000 1.000 1.000 1.000 1.000
	0.222 0.429 0.667 1.000 0.750
Ivo	
Ivo Roman_Jan	0.667 1.000 0.667 1.000 1.000 0.222 0.429 0.667 0.750 1.000

DISPLAY Input dataset: CliqueOverlap (D:\Lil\CliqueOverlap Actor-by-Actor Clique Co-Membership Matrix 1 2 3 4 5 6 7 8 9 10 11 12 13 Ja Iv Pe Ma On Ro Ja Mi Lu Pe Iv Ro To na an tr re dr ma n la botr o ma ma ______T k ej n____ n mi__N n__ s ______ 8 r e Ja 5 1 2 0 3 1 Jana Ivan Petr_T1 Marek 2 0 1 0 2 0 1 Ondrej Roman_Ban 1 0 0 0 1 0 0 0 1. Diagonal matrix: shows how many times actors are members of cliques 1 0 0 2 0 1 0 Jan Milan 1 0 0 0 5 1 3 1 1 1 1 0 3 1 3 1 1 0 1 1 Lubomir Petr_Ne 2. Numbers outside the diagonal matrix show 10 how many times actors in rows and 11 Ivo columns are joined in the same cliques 12 Roman Jan Tomas Figure 19. Clique analysis results by actor

4.3. Degree centrality

The results of this analysis show the number of relationships between 'out degree' and 'in degree' actors. Actors with the highest degrees of centrality are popular actors in social networks as they have the highest numbers of relationships with other actors. To perform a degree centrality analysis in UCINET, click the **Network** menu, and select **Centrality**, then **Degree**.

Hanar ta cata UCINET	Dyadic measures Whole networks & cohesion			
Bogati, S.P., Everet, N.G. and Fr Harvard, MA: Analytic Technologie	Regions Subarrups	Multiple Measures	Chi+M	
A tutorial by Bob Hanneman & Mark F	Eao Networks	Degree		
See also this great book:	Centrality	Degree (legacy) Inverse-weighted degree		
Bogati, S.P., Event, M.G. and Jc This copy of UCINET is registered to	Group Centrality KeyPlayor Core/Periphery Roles & Positions	 Eigenvector centrality Eigenvector (old) Beta centrality (Bonacich power) PN Centrality 		
	Triad Census P1 Balance counter	Political Independence Index (PII) Hubbell/Katz Influence Hubs & Authorities		
	Compare densities Compare aggregate proximity matrices	Closeness measures Closeness (old)		
	2-Mode networks CSS Trajectories Extras	Beta Reach Centrality Reach centrality Information Centrality Information Centrality		
	Tester Multiple Measures	Freeman Betweenness Distance-Weighted Betweenness	2	
		Attribute-Weighted Betweenness Proximal Betweenness Flow Betweenness		
		Fragmentation Induced centrality Total Centrality decomposition		
C:WeensW S U StDecur	sentryUCINET data	2-Mode Centrality		

The command will bring up a dialogue box like the one in Figure 21. Next, enter the file to be analysed in the **Input Network:** field and select the output storage location in the desired folder.

Files			
Input Network:			
D:\Lila\Matrix.##h		***	🗸 <u>о</u> к
Output Degree scores:			X Cano
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D:\Lila\Czech Corrupti	on\Matrix-degcz		
-			
Network is	Output	Options	
Directed	Raw totals	Allow edge weights	
Undirected	Averages (normalized)	Wtd. Normalization	
Auto-detect		Exclude ties to self	

Analysis results in Figure 22 below show Jana and Petr_Ne having relationship values of 12 and degree centrality degree values of one, meaning both actors have relationships with all actors in the network. Therefore, Jana and Petr_Ne are central actors with potential to accelerate the dissemination of information or resources to other actors in the network.

Input	dataset:			Full Matrix (D:\Lila\Full Matrix
	t raw total	51		YES
Output	t averages	(normal:	ized):	YES
Allow	edge weigh	ts:		YES
Weight	ted normali	zation:		YES
Exclu	de diagonal	.:		YES
Degree	e Measures			
Defi e	e neasures			
		1	2	
		Degree	nDegre	
			e	
-				
1	Jana	12.000	1.000	
2	Ivan	9.000		
3	Petr_T1		0.750	
4	Marek		0.750	
5	Ondrej	8.000		
6	Roman_Ban Jan			
7		8.000		
8		2.000		
10			1.000	
11	Ivo	3.000		
	Roman_Jan	8,000		
13		3.000		

4.4. Betweenness centrality

Betweenness centrality analyses show actors' positions as intermediaries in relationships between other actors in a network. Actors who act as intermediaries are important members of a network as certain actors cannot connect with others without an intermediary. Analysis of betweenness centrality is important because it deals with the control and manipulation of information by actors who act as intermediaries. To perform a betweenness centrality analysis in UCINET, under the **Network** menu, select **Centrality**, then **Freeman Betweenness**, and **Node Betweenness**.

	twork Visualize Options Help				
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ow to cite UOMET:	Whole networks & cohesion				
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tutorial by Bob Hameman & Hall F	Ego Networks		Degree (legacy)		
ee also this great back:	Centrality	>	Inverse weighted degree		
Bogati, S.P., Eventt, M.G. and Jc	Group Centrality		Eigenvector centrality		
his capy of UCINET is registered to	KapPlayer		Eigenvector (ald)		
	Care/Periphery	>	Bets centrality (Bonacich power)		
	Roles & Positions		PN Centrality		
	Triad Census		Political Independence Index (PII)		
	PT		Hubbell/Katz Influence		
	Balance counter		Hubs & Authorities		
	Compare densities	- 2	Claseness measures		
	Compare aggregate proximity matrices		Claseman (old)		
	2-Mode networks		Beta Reach Centrality		
	CIS	- 2	Reach centrality		
	Tojectories		Information Centrality		
	Litras John	- 1	Info-centrality (obsolute)		
			Freeman Betweenness	>	Node Betweenness
	Multiple Measures		Distance-Weighted Betweenness		Herarchical Reduction
			Attribute-Weighted Betweenness Provimel Setweenness		Edge (line) Betweenness
			Freximal Setweenness		
			Fregmentation		
			Induced centrality		
	entsSJCINET data	_	Total Centrality decomposition		

Again, the next steps are selecting files for analysis and choosing the desired storage folder. Analysis results in Figure 24 below show seven actors having roles as intermediaries, with Jana and Petr_Ne being the most dominant. This means Jana and Petr_Ne are central actors with potential to control the network and manipulate information as communication to actors in the network must pass through both of them.

n-normalized centralization: : 121.500 1 2 Betweenness nBetweenness 1 Jana 11.500 17.424 10 Petr_Ne 11.500 17.424 12 Roman_Jan 3.000 4.545 2 Ivan 0.500 0.758 8 Milan 0.500 0.758 3 Petr Tl 0.500 0.758		nput dataset:		
Betweenness nBetweenness 1 Jana 11.500 17.424 10 Petr_Ne 11.500 17.424 12 Roman_Jan 3.000 4.545 2 Ivan 0.500 0.758 8 Milan 0.500 0.758	normalized cent	centralization: :	121.	500
1 Jana 11.500 17.424 10 Petr_Ne 11.500 17.424 12 Roman_Jan 3.000 4.545 2 Ivan 0.500 0.758 8 Milan 0.500 0.758		1	2	
10 Petr_Ne 11.500 17.424 12 Roman_Jan 3.000 4.545 2 Ivan 0.500 0.758 8 Milan 0.500 0.758		Betweenness n	Betweenness	
10 Petr_Ne 11.500 17.424 12 Roman_Jan 3.000 4.545 2 Ivan 0.500 0.758 8 Milan 0.500 0.758				
12 Roman_Jan 3.000 4.545 2 Ivan 0.500 0.758 8 Milan 0.500 0.758				
2 Tvan 0.500 0.758 8 Milan 0.500 0.758				
8 Milan 0.500 0.758				
	3 Petr_T1			
4 Marek 0.500 0.758				
5 Ondrej 0.000 0.000				
9 Lubomir 0.000 0.000				
7 Jan 0.000 0.000				
11 Ivo 0.000 0.000				
6 Roman_Ban 0.000 0.000 13 Tomas 0.000 0.000		an 0.000		

4.5. Eigenvector centrality

Eigenvector calculations determine how important other persons associated with actors are, as defined by the numbers of relationships they have. Unlike degree centrality, which counts how many actors (nodes) are associated with others, Eigenvector focuses on how popular nodes are networked with actors. To perform an Eigenvector centrality analysis in UCINET, click the **Network** menu and select **Centrality**, then **Eigenvector centrality**.



How to cite UCINE T:	Dyadic measures Whole networks & cohesion		
Borgati, S.P., Everett, M.G. and Fr Harvard, Mil: Analytic Technologie	Regions Subgroups	> Multiple Measures	CbH+M
A tutorial by Bob Hanneman & Mark F	Ego Networks	Degree Degree (legacy)	
See also this great book: Borgati, S.P., Evenet, M.G. and Jc	Centrality Group Centrality	> Inverse-weighted degree	
This copy of UCINET is registered to	KeyPlayer Core/Periphory Roles & Positions Tisad Census	Bigenvector centrality Eigenvector (eld) Beta centrality (Bonacich power) PN Centrality Political independence index (PI)	
	P1 Balance counter Compare densities	Hubbell/Katz Influence Hubs & Authorities Closeness measures	
	Compare aggregate proximity matrices 2-Mode networks CSS Trajectories Extras	Closeness (old) Beta Reach Centrality Reach centrality Information Centrality Information Centrality	
	Tester Multiple Meesures	Freeman Betweenness Distance-Weighted Betweenness Attribute-Weighted Betweenness Provinal Betweenness Flow Betweenness	5
		Fragmentation Induced centrality Total Centrality decomposition	
C:\Users\A S U S\Decu	ments/UCINET data	2-Mode Centrality	v 📾 1

Analysis results show Jana and Petr_Ne having higher Eigenvector values than other actors, meaning they have relationships with important people in the network. Based on all the centrality analyses, Jana and Petr_Ne are central actors as they both have many relationships, relate to important people in the network, and act as intermediaries.

Input dataset:	Full Matrix (D:\Lila\Full Matri
Eigenvectors of Full Matrix	
1	
Eigen	
vecto	
r	
1 Jana 0.349	
2 Ivan 0.319	
3 Petr_T1 0.319	
4 Marek 0.319	
5 Ondrej 0.293	
6 Roman_Ban 0.293	
7 Jan 0.293	
8 Milan 0.319	
9 Lubomir 0.080 10 Petr Ne 0.349	
10 Petr_Ne 0.349 11 Ivo 0.109	
12 Roman_Jan 0.251	
13 Tomas 0.109	
15 101103 0.109	
13 rows, 1 columns, 1 levels.	
is rows, i corumns, i levels.	

5. Ego network analyses

Ego network analyses focus on the positions of actors (egos) in relation to others (alters). The type of ego network analysis discussed in this section is a brokerage analysis.

5.1. Brokerage

Brokerage analyses are intended to identify which egos play roles as intermediaries (brokers) between alters, and the type of intermediary function those egos play. To perform a brokerage analysis, click the **Network** menu and select **Ego Networks**, then **G&F Brokerage roles**.

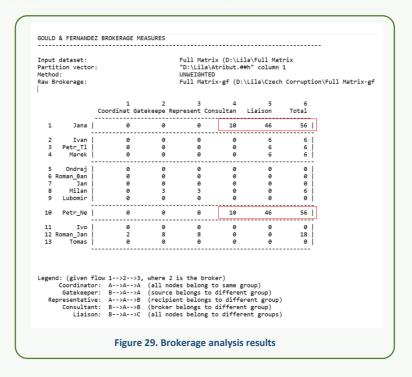
Network Visualize Options Help	
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A dialogue box will appear like the one in Figure 28. In the **Network dataset:** field, select files containing relationship information between actors (used in previous analyses). In the **Attribute data set:** field, select the actor attribute file saved in UCINET dataset format. In the three **Output** fields, select the desired folder(s) for saving the analysis results.

uld & Fernandez Brokera <u>c</u>	je		-	- 🗆
5				
Network dataset:				
D:\Lila\Matrix.##h				🗸 o
Attribute data set:		Column:		🗶 Çar
D:\Lila\Atribut.##h		Peran	~	- 2ce
(Output) Brokerage score	5:			? ⊞
D: \Lila \Czech Corruption	Matrix-gf			
(Output) Expected values	:			
Matrix-egf				
(Output) Normalized brok	trage scores:			
D: Jula Czech Corruption	-			
	Allow closed triads Treat smallest attribute value as missing	Alexcia		
	Figure 28. Brokerage analysis d	ialogue box	(

Brokerage analysis results in Figure 29 based on the attributes of each actor show the network being divided into five groups separated by dotted lines. The first group comprises only Jana, who is a former prime minister. The second group consists of Ivan, Petr_TI and Marek, who are party deputies. The third group comprises Ondrej, Roman_Ban, Jan, Milan and Lubomir who are intelligence agents. The fourth group is Petr_Ne, who is a government official, while the fifth group comprises Ivo, Roman_Jan and Tomas, who are godfathers.

Jana and Petr_Ne have the most connections with other actors, with both serving as consultants and liaisons. Consultants, namely Jana and Petr_Ne, are liaisons between nodes belonging to the same group. Jana, for example, is a liaison between Milan and Lubomir, both of whom are intelligence agents. Liaisons, namely Jana and Petr_Ne, are connectors between nodes belonging to different groups. Petr_Ne, for example, is a liaison between Ivo, who is a godfather and Marek, who is a party deputy.



6. Creating sociograms using NetDraw

Results of network analyses in UCINET can be visualized very easily in the form of sociograms showing relationships between actors in the network by using NetDraw. Click the Exercise icon in the UCINET toolbar to open the NetDraw page.

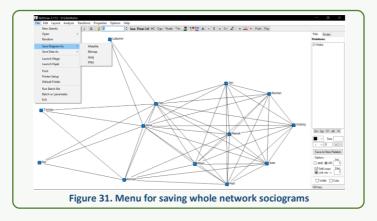
6.1. Whole network visualizations

Documents stored in UCINET datasets can be opened in NetDraw in different ways. Firstly, by clicking the **File** menu, and selecting **Open**, **Ucinet dataset**, then **Network**. Attribute data can also be opened under the **File** menu by selecting **Open**, then **Attribute data**, as long as relationship data (network) is opened beforehand. This attribute data will not be displayed in the NetDraw worksheet, but is used to adjust sociogram visualizations of analyses that use actor attributes. Another, easier option for opening relationship files is to click the a or a icons, while attribute files can be opened by clicking the icon.



Open Random		G 😴	🕻 Hore Peen Swit MC Ego "Node "Tie 🚦 🎌 🏭 A A S z S+ 🗾 -	
	>	Ucinet dataset >	Network	Relo Nodeo
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Save Diagram As Save Data As	>	Pajek text file > Vna text file >	Attribute data Coordinates	
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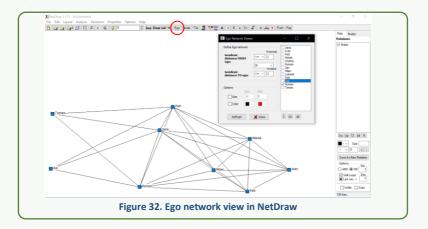
Once a sociogram appears in a worksheet, it can be saved in Metfile, Bitmap, jpeg, or PNG format. To save a sociogram, under the **File** menu, select **Save Diagram As** and choose the desired image file format.



6.2. Ego network visualizations

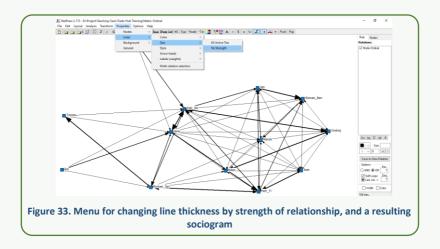
NetDraw can also display networks showing relationships between specified actors (egos) and other actors (alters). To display an ego network, click the **Ego** icon on the toolbar. A dialogue box will appear showing the names of actors in the network (Figure 32). If we want to select one of the actors in the network, check the box next to their name. NetDraw will only show all relations and actors related to that actor. The example sociogram shows the actor named Roman having eight alters.





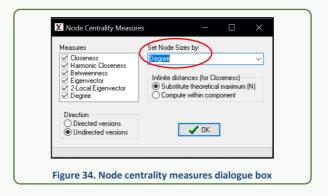
6.3. Changing the appearance of lines/edges/links that characterize relationships

The appearance of lines showing relationships between actors in sociograms can be altered for aesthetic purposes as well as to highlight certain aspects of the network. We can change the colour, size, style, directional shape and labelling of lines. Measures and labels are usually used to indicate the strength of ties between actors. For example, if we want to change the size/thickness of a line based on the strength of the relationship between actors, under the **Properties** menu, select **Lines**, **Size**, and then **Tie strength**. NetDraw will display networks with different line thicknesses according to the strengths of relationships between actor, as depicted in Figure 33.

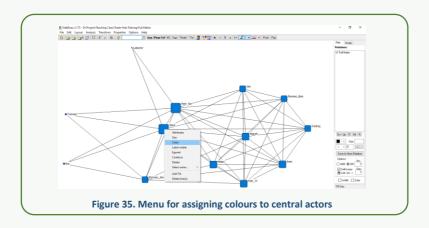


6.4. Changing the appearance of nodes (actors)

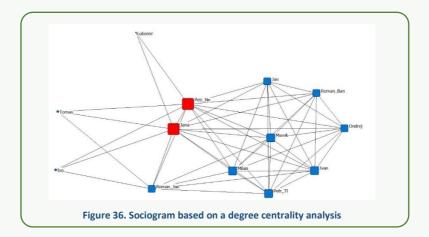
NetDraw can also change nodes according to user needs. For example, if we want the actor with the highest degree of centrality to be indicated by the largest node size, under the **Analysis** menu, select **Centrality Measures**. The command will generate a dialogue box like the one shown in Figure 34. In the **Set Node Sizes by:** field, select **Degree**, and click **OK**.



The analysis will generate node sizes according to the degree centrality values for each actor. In addition to being assigned the largest size, the central actor node can also be assigned a different colour to the other actors in the network. To do this, right-click on the *Jana* node, for example, click **Color**, select the desired colour, then click **OK**. The same can be done for the Petr_Ne node. Modifications to nodes based on degree centrality analyses will generate a network like the one in Figure 36.











Center for International Forestry Research (CIFOR)

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