Contents

1. NodeXL Pro INSIGHTS 4
   1.1 What is NodeXL Pro INSIGHTS? 4
   1.2 What is NodeXL Pro? 5
   1.3 What is Power BI? 5

2. How to create a NodeXL Pro INSIGHTS report 7
   2.1 Requirements 7
   2.2 Create a NodeXL Pro Twitter dataset 9
   2.3 Set Export Options (optional, but recommended) 12
   2.4 Export to NodeXL Pro INSIGHTS 13
   2.5 Managing your NodeXL Pro INSIGHTS reports 14

3. Finding insights 15
   3.1 Analytical dimensions, data and visuals 15
   3.2 The Network Dimension 16
   3.3 The Content Dimension 20
   3.4 The Metadata Dimension 22
   3.5 Tips and tricks 23

4. Report Pages 24
   4.1 Start Page 24
   4.2 Overview 25
   4.3 Network 26
   4.4 Time 27
   4.6 Time Joined 29
   4.7 Location 30
   4.8 Influencers 31
   4.9 Groups 32
   4.10 Top Tweets 33
   4.11 Hashtags 34
   4.12 Words 35
   4.13 Sentiment 36
   4.14 Media 37
   4.15 Web Links 38
   4.16 Compare 2 39
   4.17 Compare 4 40
   4.18 Drillthrough page: Group 41
   4.19 Drillthrough page: Active User 42
   4.20 Drillthrough page: Mentioned User 43

5. FAQs 44
1. NodeXL Pro INSIGHTS

At the Social Media Research Foundation, the NodeXL team has produced a new application called NodeXL Pro INSIGHTS that integrates NodeXL Pro Twitter social media network data sets with the Microsoft Power BI data model and visualization interfaces.

1.1 What is NodeXL Pro INSIGHTS?

NodeXL Pro INSIGHTS is a Microsoft Power BI based report service that creates web browser accessible interactive social media network reports from NodeXL Pro Twitter datasets. A NodeXL Pro INSIGHTS report makes use of many different data visualizations – from simple tables to hashtag clouds, from image grids to scatter plots - to enable insights into social media content streams. It makes it easy to pivot around several interconnected analytical dimensions in social media:

- **Network** analysis: how are people connected?
- **Content** analysis: how are words used?
- **Metadata** analysis: how are language, location, and devices used?

NodeXL Pro INSIGHTS allows users to explore Tweets, users and groups from a network perspective. The INSIGHTS reports segment Twitter data into social clusters to reveal the distribution of hashtags, media files and shared URLs over space and time.

**Network Insights**
The core of any NodeXL Pro INSIGHTS report is an analysis of the network structure of social media at the overall, group and individual user level. A network approach views social media as collections of annotated connections between users. When people reply, retweet, and mention one another, they form complex webs of connections. In aggregate, these collections of connections have an emergent structure that highlights key people and clusters of people.

**Understand Communities**
NodeXL Pro INSIGHTS uses advanced network cluster algorithms to segment users into groups which can then be explored on the content level. As social media users flock together, NodeXL Pro INSIGHTS reports summarize each group’s top hashtags, URLs, words, and sentiment. Network cluster analysis is the key to understanding social media communities and affinity groups.

**Reveal the Influencers**
NodeXL Pro INSIGHTS uses network analysis to identify the very small group of important influencers found in most collections of Tweets. Network centrality scores like Betweenness Centrality, Eigenvector Centrality and others measure how much each user is in the “middle” of the network. The people most in the middle are often the most influential.
Analysis and Profile for each user

NodeXL Pro INSIGHTS analyzes all users in a collection of Tweets and displays the population in an innovative crowd view that highlights the most active and influential users along with the spammers and (potential) bots. Drillthrough to get a profile for each user that highlights their content and connections over time.

Discover the most salient Content

NodeXL Pro INSIGHTS displays the most frequently used hashtags, words, URLs and domains. It displays word clouds and image grids to display the most shared images and videos linked to in many tweets. Click on the grid of the most tweeted images to display the people, hashtags, and URLs associated with each.

Find critical times of day and days of week with Time Series Analysis

See the rhythms and spikes in the activity of users, groups and the whole network over time – by day, by the hour, the minute and the second.

Interactive data

Click on any item on any report page to filter the data. Click while holding the Control-key to select multiple data dimensions.

Share your NodeXL Pro INSIGHTS

Easily publish your NodeXL Pro INSIGHTS reports to the web and/or embed them on your website.

1.2 What is NodeXL Pro?

NodeXL Pro is an integrated solution for (social media) network data collection, analysis and visualization using the familiar Microsoft Excel spreadsheet application. NodeXL Pro generates network-based content analysis insights into connected structures while requiring no programming skills. It produces data about influencers, groups, and content exchanged in a network over time. NodeXL Pro can directly import data from Twitter, YouTube, Flickr and Wikipedia. You can also import and analyze existing network data file formats such as gexf, gdf, graphml and UCInet and Pajek files. Currently, NodeXL Pro INSIGHTS reports are only available for Twitter datasets created with the NodeXL Pro Twitter data importers.

1.3 What is Power BI?

Microsoft Power BI is a powerful data analysis and visualization platform in the cloud, similar in some ways to Tableau¹ or Qlik². Microsoft Power BI enables the creation of rich linked interactive data dashboards that allow users to quickly slice and filter data to discover useful insights.

Users can connect databases to report templates that enable interactive exploration, discovery, and presentation of data insights. These reports can be shared over the web and accessed from most devices with a web browser.

¹ [https://en.wikipedia.org/wiki/Tableau_Software](https://en.wikipedia.org/wiki/Tableau_Software)
The **Microsoft Power BI Desktop application** is **free** for all users. The **Power BI Pro** web service does charge a modest monthly fee (USD $9) for additional features (many universities and large corporations may already have access to Power BI Pro - check with your IT support!).

Video: [https://www.youtube.com/watch?v=yKTSLffVGBk](https://www.youtube.com/watch?v=yKTSLffVGBk)

Microsoft Power BI can connect to Excel workbooks, SQL databases, and a range of other data sources and present rich interfaces and visualizations to that data.

**Microsoft Power BI Desktop** is a free application for use on Windows PCs. The **Microsoft Power BI Pro** product is a cloud extension to the Power BI desktop application. Using Power BI Pro, users can selectively publish their data sets and interfaces to the web.

**What is a Microsoft Power BI "Template", and a "Report"? How are they like "Jell-O"?**

**Templates** and **data** have a relationship not that different from **Jell-O Molds** and **Jell-O**!

**Data** is like **Jell-O** in liquid form: it can flow into almost any shape:

A **template** is like a **Jell-O mold**, data flows into it and takes a particular shape:

A **report** is like the final solid Jello, the data in it takes the shape of the report mold:

In **NodeXL**, our liquid Jell-O is a collection of network data, often drawn from social media sources. Each source of data requires a Jell-O mold, or a report template, appropriate to its contents.
2. How to create a NodeXL Pro INSIGHTS report

A **NodeXL Pro INSIGHTS** report is created by first generating a **NodeXL Pro** Twitter Network dataset. **NodeXL Pro** users can create Twitter network datasets using one of the three NodeXL Pro data importers (Search term, Users Lists, and Lists of Tweet IDs). After the Twitter network data is collected, one of the official “NodeXL Pro Twitter Data Recipes” **must** be applied which will create all the necessary spreadsheets and tables needed for the **NodeXL Pro INSIGHTS** report. When the calculations are completed, the dataset is then exported via the “**NodeXL Pro > Data > Export > Export to NodeXL Pro INSIGHTS**” feature. During this step, the **NodeXL Pro INSIGHTS** Power BI report template is applied. After a few minutes the full report will appear in your main **NodeXL Pro INSIGHTS** dashboard on the NodeXL Graph Gallery and also in your Microsoft Power BI workspace. This process is explained in detail below.

2.1 Requirements

In order to create your own **NodeXL Pro INSIGHTS** report you need the following:

a. **NodeXL Pro User license**: A **NodeXL Pro** User license can be purchased on the following page: [https://nodexlgraphgallery.org/Pages/registration.aspx](https://nodexlgraphgallery.org/Pages/registration.aspx). NodeXL Pro runs on Windows and requires Office. Full system and software requirements for the NodeXL Pro App can be found [here](https://nodexlgraphgallery.org/Pages/registration.aspx), an installation guide is also available [here](https://nodexlgraphgallery.org/Pages/registration.aspx).

b. **Microsoft Power BI Pro Account**: A [Microsoft PowerBI Pro](https://powerbi.microsoft.com) account is required before subscribing to **NodeXL Pro INSIGHTS**. You may already have a Power BI user account. If you can log into [https://portal.office.com](https://portal.office.com) you can then check to see if the Power BI application is one of the options listed in your dashboard.
Select “All apps” and then, if you already have PowerBI, it will be displayed in the list there.
If you do not have Power BI a two month free trial is available, or a monthly subscription for USD$9 a month. Students and non-profits may be able to get Power BI for a much lower monthly rate of $3 per month.

c. **NodeXL Pro INSIGHTS subscription:** A NodeXL Pro INSIGHTS subscription can be purchased on the page: https://nodexlgraphgallery.org/Pages/registration.aspx. You can also purchase the NodeXL Pro User license in combination with an INSIGHTS subscription. **NodeXL Pro INSIGHTS** works with both the desktop and the cloud versions of NodeXL Pro.

d. **NodeXL Pro Twitter network dataset** that has been successfully processed by the **NodeXL Pro INSIGHTS** “data recipe” (settings options file).
2.2 Create a NodeXL Pro Twitter dataset

A NodeXL Pro Twitter dataset can be easily created with just a few clicks using the application’s graph “Automation” feature. Automation makes use of our pre-tested NodeXL Pro network “data recipes” which are settings options files that will configure and automate all the tasks needed to perform a full-scale social network and content analysis. The following is a step-by-step guide to use the NodeXL Pro INSIGHTS feature. More information about NodeXL Pro automation is available in our tutorial “How to Automate NodeXL Pro - download as pdf file and/or watch this video.

Step 1: Download the official NodeXL Pro data recipe bundle

Before downloading any Twitter data, you need to download the official NodeXL Pro Data Recipe Bundle available from this page: https://www.smrfoundation.org/nodexl/automation/. When opening the recipe bundle, you will need to first unzip it and then save the contents to your machine. You will see many different files that have been customized for the different NodeXL data importers.

Step 2: Open NodeXL Pro and import a Twitter data recipe into NodeXL

Open a new NodeXL Pro workbook and click on NodeXL Pro > Options > Import to open the Windows file explorer. Navigate to the folder where you have placed the previously downloaded data recipes. Then select one of the four Twitter data recipes and click Open:

Twitter User Network 01 - standard
Twitter User Network 02 - large
Twitter User Network 03 - large - shapes
Twitter User Network 04 - alternative layout

Each of these data recipes allows the creation of a NodeXL Pro INSIGHTS report. All of them perform the same task, the only differences are seen in the ways the visualization is customized. NodeXL Pro users can customize the visualization in terms of coloring, sizing, labeling and layout. More information on these NodeXL Pro Twitter data recipes can be found here.

Step 3: Select one of the NodeXL Pro Twitter network data importers

NodeXL Pro users can create Twitter network datasets using one of the three Twitter network data importers: the Twitter Search Network importer, the Twitter Users Network importer or the Tweet ID List network importer.
In the following example we will analyze a network based on searching for a query term using the Import from Twitter Search network. Alternatively, we could import tweets from a list of users, or a list of Tweets from a list of Tweet IDs. First, open the NodeXL Pro Twitter Search Network importer via NodeXL Pro > Data > Import > From Twitter Search Network...

Step 4: Enter your search term

Enter the Twitter search query of your choice into the text box and click OK. You can use a variety of search operators to create a customized advanced search query. Check out the official Twitter documentation about available search operators, and have a look at this great blog post about this topic. Please note that the download of 18k tweets may take up to half an hour.

Step 5: Run NodeXL Pro Graph Automation

After the data has been downloaded, click on NodeXL Pro > Graph > Automate to open the Automate window:
NodeXL Pro Automation will run through this series of operations and steps that calculate and analyze the network data set once you click “Run”. Depending on the size of the network and the computing resources, this Automation process may take a couple of minutes to several hours to finish the analysis. You may want to include the option “Export to NodeXL Pro INSIGHTS” in the recipe, but we recommend to review the NodeXL workbook and the resulting network map before exporting, and use the option “Export to NodeXL Pro INSIGHTS” via Data > Export (→ see 2.3).

Selecting the option “Automate the graph after the data is imported” via the NodeXL Pro > Data > Import > Import Options dialog will make the Automation step itself an automatic part of the data collection process. If this option is selected Graph Automation will start automatically after the data has been downloaded.

Once these steps are completed the network, content, and time series analysis of your Twitter social media data set is done.

Congratulations! You have now successfully created a NodeXL Pro Twitter network dataset that can be exported to NodeXL Pro INSIGHTS.
2.3 Set Export Options (optional, but recommended)

You can add your own branding to a NodeXL Pro INSIGHTS report. The dialog for export options is found at NodeXL Pro > Data > Export > Export Options. Here you can configure six data elements that are later used to brand and customize your NodeXL Pro INSIGHTS reports.

In this dialog, you may provide a hashtag, a URL, a link to an image, a URL to which the image links, a text string often used for a marketing slogan, and another URL to which the slogan is linked. These elements will be seen on the Start Page of the NodeXL Pro INSIGHTS report (see → 4.1).
2.4 Export to NodeXL Pro INSIGHTS

When all of the steps and calculations in the NodeXL Pro > Graph > Automate process are finished, the NodeXL Pro Twitter Network data set is ready to be converted into a NodeXL Pro INSIGHTS Power BI report. This step can also be integrated into your data recipe by checking the box “Export graph to NodeXL Pro INSIGHTS” in the Task Automation window before starting the automation.

To export the file, click on NodeXL Pro > Data > Export > To NodeXL Pro INSIGHTS… and you will see the following dialog box:

Enter the Username and Password that were generated during your NodeXL Pro INSIGHTS registration.

When you click “Publish to PowerBI Service” the data set is then exported to your Power BI workspace. This step may take several minutes depending on the file size. Your Power BI workspace is your personal storage place within the Power BI online service where your NodeXL Pro INSIGHTS reports are stored. You can also find a list of all links to all of your reports in your NodeXL Graph Gallery dashboard (→ see 2.4).

Optionally, if you would like to share the report with others or embed it on a public website, check the box “Export a public web copy of this data for sharing”. If selected, you will receive an email notification with a link and an embed code when the file has been published to the web. This step can also be done later from your NodeXL Graph Gallery dashboard (Section 2.4).
2.5 Managing your **NodeXL Pro INSIGHTS** reports

- You can manage all of your **NodeXL Pro INSIGHTS** reports via your [NodeXL Graph Gallery dashboard](#).
- You can delete or share any **NodeXL Pro INSIGHTS** reports you create via that dashboard.
- You can create as many **NodeXL Pro INSIGHTS** reports as you can fit in your 10GB data storage quota as provided by the PowerBI Service.
- Reports are retained for the duration of your **NodeXL Pro INSIGHTS** subscription and for 90 days after the last subscription payment.
- You cannot recover reports once they are deleted after your subscription ends, but you can always re-create the same **NodeXL Pro INSIGHTS** report at any time when starting a new subscription by exporting the original dataset from **NodeXL Pro** again.

![NodeXL Graph Gallery](image)

When you click on a link in the first column “Report”, you will be directed to your Power BI workspace:
3. Finding insights

In order to gain insights from a NodeXL Pro INSIGHTS report, it is helpful to understand the underlying data structure and analytical dimensions.

3.1 Analytical dimensions, data and visuals

A NodeXL Pro INSIGHTS report contains three interconnected analytical dimensions:

- **Network** analysis: how user accounts connect to one another
- **Content** analysis: how words are used
- **Metadata** analysis: how location, language, device type, and other attributes are used

This allows the detailed exploration of a Twitter dataset from many different angles. The value of a report is found in the connectedness of these analytical dimensions. The chart below shows the many paths to an insight.

The inner circle represents the analytical dimensions and its cores: Tweet - User - Group. The outer ring shows the elements of a report which are displayed as tables, metrics and dedicated report pages:

There is no way to show all available data on one report page. That is why we have created the “analytical main frame” which shows the basic data on all report pages while creating a dedicated report page to highlight each major aspect of the different analytical dimensions. This “analytical main frame” consists of the Groups treemap on the left, the users and connections tables at the bottom, and the content tables on the right.
3.2 The Network Dimension

The network dimension is represented by a network Graph, a visualization of a network based on one or more layout algorithms. At the core of any network dataset there are Connections between two Users based on their Tweets. A Cluster algorithm finds Groups within the structure of all connected users. Then Network Metrics are created for all network levels - the overall network, the group and the level of each user. You find the basic network related data dimensions Group, Connections and Metrics in the following recurring visuals throughout every report page:

Data visualization: Treemap - Groups

This visual on the left of each report page is one of the most important visuals of a NodeXL Pro INSIGHTS report. It is a treemap that shows the distribution of tweets by each detected group (cluster). If you hover over a group, a tooltip will pop up showing another treemap showing the distribution of tweets by users within that group.

Click on any box in this visual to filter the data in order to explore related content and influencers just in that group. The group name is equivalent to the group label that is created during the NodeXL Pro automation step “Autofill columns” and can be customized. It is usually set to show the top 10 most frequently used words in a group.

INSIGHTS spotlight

Explore the top groups one by one to identify patterns. Just click on any group and then review the content, network and metadata dimension tables. This is how you can understand the characteristics of each group.

On the “Compare 2” and “Compare 4” report pages later in the
report, you are also able to compare two or four groups on one page.

Data visualization: Tables - Top Active Users, Connections and Top Mentioned Users

These three tables belong together. The “Active Users” table is the same as the “Vertex 1” column on the NodeXL Pro Edges spreadsheet, while the “Mentioned Users” table is the same as the “Vertex 2” column.

You can click on any user image in these tables to open the Twitter profile page of that user in a new browser tab. By right-clicking on a user, you can make use of the drillthrough function of Power BI. This will take you to a dedicated report page that shows only data related to that user (→ see 4.18). When you hover over any user, a tooltip will pop up that will give you a quick overview of that user showing the number of tweets in the dataset, the overall number of tweets, the number of followers and the user’s self-description.

The table “Connections” in between these two user tables shows the network relationship between these accounts. These connections correspond with the column “Relationship Type” on the NodeXL Pro Edges spreadsheet. Currently we have defined five types of “Connections” that form Twitter networks:

- **Self Tweets**: This is actually no connection. It just means that a user has not mentioned anyone in a tweet.
- **Mentions**: This connection is created when a user mentions another user in one tweet. Note that one tweet may contain several mentions.
- **Replies to**: When a user replies to a tweet, this connection is created.
- **Retweets**: When a user retweets a tweet, a connection is created from the Retweeter to the original Tweeter.
- **Mentions In Retweet**: If the original tweet that gets retweeted, contains a mention of another user, then this connection is created.

**INSIGHTS spotlight**

Click on any user in the “Most Active Users” table, and the data will filter all visuals on the report page. The page then represents the content analysis of a single user. Look at the “Connections” to see the tweet strategy of that user.

**INSIGHTS spotlight**

Click on any user on the “Most Mentioned Users” table and the data will filter all visuals on the report page. Then look at the “Connections” table again to see how people are talking about a user. A user is “popular" if you find mostly retweets in that table. A majority of replies and mentions rather than generating new messages.

**INSIGHTS spotlight**

In some cases it may be useful to look only at original tweets, filtering out retweets. To remove retweets from the data, you need to hold down the shift button and select all categories in the “Connections” table one by one leaving out the categories “Retweets” and “MentionsInRetweet".

---

**Data visualization: Table - Top Users by “Betweenness”**

This table contains basic network centrality metrics that have been calculated for each user. The column “Tweet Count” has been added to the network metrics In-Degree, Out-Degree and Betweenness Centrality. Selecting one user in this table is the same as selecting a user in the “Most Active Users” table. Thus the filtered data represents the tweet content of that particular user.

- “In-Degree”: measures how many other users are connecting to a particular account.
- “Out-Degree” measures the number of users that are connected to by the tweets of a particular user.
- Betweenness Centrality is the "Bridge Score" that measures how much a person is the only way to connect from one part of the network to another. It is a sociological proxy for "influence". It is different from other "social media reputation" scores in that it is local and bounded: It finds the people other people find valuable within a particular topic during a particular time. This is in contrast to "global" reputation scores that claim to capture the value...
of a person in all possible contexts with a single value. In contrast, local and bounded reputation is timely and specific to a selected topic or issue. This score does NOT use follower count, tweet count, or retweet count as an input. It is based on the behavior of other people towards a user to determine their value.

The detailed table with all available network metrics is found on the "Influencer" report page (→ see 4.8).
3.3 The Content Dimension

The **content dimension** is represented by a set of tables on the right side of the NodeXL Pro INSIGHTS report pages showing the number of tweets in the dataset that contain the following elements: Hashtags, Domains, URLs and Words. The second main element of the content dimension is the “Retweet Table”. Further, there are dedicated report pages each for Top Tweets, Words, Hashtags, Sentiment, Media, and Web Links.

**Data visualization: Tables - Hashtags, Domains, URLs, Words**

The tables on the right are the main Content tables of a NodeXL Pro INSIGHTS report showing the tweet counts for hashtags, domains, URLs and words. By selecting any row in one of these tables, the overall data will filter to include only messages that also contain the selected item.

**INSIGHTS spotlight**

Select one item in one of the content tables and then look at the Groups visual. Where is the action? Is the hashtag, word or link used only in one group or does it spread across the network?

**Data visualization: Table - Retweet table**

On most pages you find the “Retweet Table” in the lower right corner. The columns **Faves** and **RTs** are part of the tweet metadata and show the official number of favorites and retweets of a tweet at the time of the data collection. The column **RTed** shows the actual number of retweets that were collected in this dataset. This number may differ from the original number because of two reasons. First, the original tweet was tweeted before the data collection period and thus only a fraction of retweets were collected. Second, not all retweets are collected because of Twitter API limitations.
Click on any row in the Retweet Table and then check the Most Active Users table to find out who retweeted the original tweet. Also take a look at the groups treemap to identify the group(s) where the retweets are located in the network.
3.4 The Metadata Dimension

NodeXL Pro data sets contain many columns with metadata describing each user and tweet. Some of the most helpful metadata elements are shown in a set of visuals located next to the Groups treemap. Additional metadata is also found on the Drillthrough pages for Users and Groups. Just right-click on a user or group and then select the Drillthrough page. In addition, there are dedicated report pages:

**Data visualization: Treemap - Language**

Twitter algorithms automatically try to identify the language of any tweet. If there is no text in a tweet or the language can’t be identified, the category is set to “und” = undefined.

**INSIGHTS spotlight**

NodeXL Pro Twitter Data Collection Tip: You can add the language search operator “lang:” in combination with a language code to your search query. E.g. to collect only tweets in the English language, just add the operator lang:en to your query before collecting data. For the complete list of Twitter language codes please follow [this link](#) and for more information about Twitter search operators please follow [this link](#).

**Data visualization: Treemap - Client**

Any published tweet is sent from a client with Twitter for Android, Twitter for iPhone and Twitter Web App as the most popular clients. Clicking any of these items will filter the remaining report display to users who Tweet using a particular type of device.
Data visualization: Bar chart - Verified

Public figures like celebrities and politicians can have their accounts verified by Twitter which will result in a blue checkmark sign behind the username. This bar chart allows you to select and filter the data to look at only verified or non-verified users.

Data visualization: Bar chart - Active

Twitter users can mention any other Twitter user in a tweet, but this does not mean that a mentioned user is taking part in a discussion. An “active” user has used the search term or keyword that was specified in the query of the data selection.

3.5 Tips and tricks

Here are some helpful Power BI tips and tricks to work with your NodeXL Pro INSIGHTS report:

- **Focus mode**
  - Any data visualization can be enlarged by clicking on the “Focus Mode” icon on the far upper right corner of any visual. This feature is especially valuable when reviewing images in the image grid visual.

- **Data export**
  - Any table on a report page can be exported as .xlsx files when selecting “Data Export” under the icon with the three dots on the far upper right corner of any visual.
  - In addition, any visualization can also be exported as an image file via the “Copy visual as image” icon.

- **Multiple data selection**
  - Hold down the control button and click to select several data points on a report page to filter the data on different dimensions. This approach is needed to compare groups on the Compare 2 and Compare 4 report pages.

- **Drillthrough**
  - **Groups drillthrough**: By right-clicking on the groups treemap, you can open up a dedicated report page that will show only data from the selected group.
  - **User drillthrough**: By right-clicking on any user in a table, you can open up a dedicated report page that will show only data from the selected user.

- **Tooltips**
  - **User tooltip**: Hovering over any user in a user table will load a tooltip that provides a quick overview of a user profile, network metrics and the distribution of tweets in a timeline.
  - **Group tooltip**: Hovering over any group in the Groups visual will load a tooltip with a treemap that shows the distribution of tweets by user in that particular group.
4. Report Pages

In this chapter you find detailed explanations of all report pages, the data visualizations as well as tips and tricks for making the best use of each report page.

4.1 Start Page

The first page of the NodeXL Pro INSIGHTS Report shows the NodeXL Pro network map and allows a quick overview of the dataset. It also shows the time the report was created, the time period of the data it contains, the author of the report, the author’s logo with a link to the author’s website (as specified in → 2.3).

On the far right side of the page there is a column of icons that link to many of the other report pages for Network Overview, Time Series analysis, Location analysis, Influencers, Top Tweets, Hashtags, Words, Sentiment, Images, and URLs. Click any of these icons to jump straight to that part of the report. Alternatively you can navigate between report pages via the Power BI report menu found at the center bottom of the web browser page - click “1 of 18” to display a full table of contents for the INSIGHTS report.

**INSIGHTS spotlight**

Use this page to look at the overall network structure and the group layouts on the map, and start learning about this network with the most basic data tables Groups, Hashtags, Top Active Users, Connections and Top Mentioned Users.
4.2 Overview

The **Overview report page** is a compact summary of the data set. In addition to the standard visuals explained in the previous report page (groups, most active and mentioned users, top hashtags, top URLs/domains, top words) it shows the rate of activity over time, images shared in tweets, and the most popular tweets and the most influential authors.

Users can enter search for terms or click on any display element to filter the remaining data. By left-clicking on a user’s profile image, you will be directed to that user account’s profile on Twitter. By right-clicking on a user you can drill through to the available data about that user within the NodeXL Pro INSIGHTS report. Also, by right-clicking on a group you can drill through to a dedicated groups report page.

**Note:** This page may be displayed with empty data when using the NodeXL Pro Users Network importer and the NodeXL Pro Tweet ID list importer. Just click the button “Select all” below the time visual on the middle right to show all the data.

**INSIGHTS spotlight:** Hold down the Shift button on your keyboard when clicking on different visuals to additionally filter the data. This feature is available on all report pages in the NodeXL Pro INSIGHTS report.
4.3 Network

The **Network report page** displays a visualization of the shape of the virtual crowd by plotting each author in a scatter plot chart located close to the other users with whom they are most connected. The layout is based on the X and Y coordinates of the original NodeXL Pro graph layout.

**INSIGHTS spotlight**: Use the Betweenness slider to filter users by their influence, *just a small adjustment here can quickly reveal the thought leaders in a group*. Take a closer look at these users either by clicking on the profile images in the tables at the bottom, or right-clicking on a user name to open a drillthrough page.
4.4 Time

The **Time report page** displays the tweet activity in the data set over the duration of the data, revealing the days of highest activity along with the general pattern of activity over time. These patterns can reveal important insights into when a conversation reaches its peak of activity. The coloring in the main visual is based on the groups shown in the treemap on the left.

**Note:** This page may be displayed with empty data when using the NodeXL Pro Users Network importer and the NodeXL Pro Tweet ID list importer. Just click the button “Select all” above the time visual at the top to show all the data.

**INSIGHTS spotlight**

Click on any group, user, hashtag, URL or word to reveal underlying timing patterns from different perspectives.
4.5 Time Grid

The **Time Grid report page** displays activity time patterns in a different way – highlighting the days of the week and the hours of the day that are most active. Zero in on the most active hour of a week and display the content and authors that lead that activity. The coloring in the time visuals in the center of the page is related to the groups on the treemap on the left.

**INSIGHTS spotlight**

**INSIGHTS spotlight:** Peaks in the “Tweet count by minute” and “Tweet count by second” tables may be indicators of scheduled or bot generated tweet activity.
4.6 Time Joined

The Time Joined report page is dedicated to understanding the pattern of account creation in this population. The time grid in the center of the page reveals the number of users that have joined twitter in each month of the past years. The bar charts on the right show the same data colored by group affiliation in three different ways: By year, by month, and by week day. Patterns found in these displays can indicate a group of accounts that are all created in a short window of time, which is a possible indication of a coordinated effort to manipulate a discussion.

INSIGHTS spotlight

INSIGHTS spotlight: Select any cell in the time grid to filter the data to just those users who joined in a certain month. Outliers in this table may be indicators of orchestrated tweet activity.
4.7 Location

The **Location report page** contains a world map to display Twitter users by location. The location is based on a user’s self-description as seen on their Twitter user profile. Thus the accuracy of the given location may vary and the location of all users may not be displayed. Since users create their own location descriptions, these locations are not validated. About 50% of the users show a city location that can be plotted. While noise may be present in location data, the aggregate pattern of activity can be very revealing - highlighting different language and national concentrations of activity.

(!) **Note:** A data filter is set on this report page. Only the tweets by users with a self-described location are shown on this page. Other users may be present in the data but not displayed in this report page.

**INSIGHTS spotlight**

**INSIGHTS spotlight:** Check the Location table on the bottom right to find the most active tweet locations.

**NodeXL Pro Twitter Data Collection Tip:** You can add the search operator “geocode:” to your search query in the NodeXL Pro Twitter Search Network importer. For more information about Twitter search operators please follow [this link](#).
All of the participants in a discussion on Twitter are not all the same. Users vary significantly in terms of the number of people they connect to and the number of people who connect to them. Network metrics that capture the “centrality” of a user are also helpful ways to identify the most influential contributors. The two scatter plots at the top display complementary views of the population. On the left the population is plotted in terms of in-degree and out-degree, these are the number of people who mention a user by name and the number of people a user mentions themselves. Quadrant two of this scatter plot is where people who both mention many others and are mentioned by many others are displayed. This is often a low population quadrant, with less than 1% of the population present in this region. These users are often very influential. The second scatter plot displays the same population using two different dimensions: betweenness centrality and eigenvector centrality. These measures capture the location of each user in a network. Betweenness centrality captures the uniqueness of a user’s position in the network, while eigenvector centrality captures how well connected each user is to highly connected other users. When plotted on these dimensions, the population again is sparse in quadrant two, this is where people who have high values for both measures can be found. These users are again the most influential people in the network.

**INSIGHTS spotlight**

The **User Table** in the center can be maximized by clicking on the icon “Focus Mode” in the header bar just above the Betweenness column. This will then reveal the whole table with all user statistics and network metrics statistics.
4.9 Groups

The Groups report page offers a variety of measures that help to compare the composition of the different subgroups present in the network. Using this report we can find patterns in the data that suggest similarities and highlight differences between groups. The specific clustering algorithm that has been used to segment the network into groups can be checked on the start page of any report just below the network map. NodeXL Pro offers a variety of ways to segment a network into sub-groups and communities.

**INSIGHTS spotlight**: The “Community ratio” in the fifth column of the top table represents the ratio of active users vs. mentioned users. If this value is around 1.00, there is a balance between these groups suggesting a community cluster. If the value is higher than 1.0 it points to a broadcast cluster, eg. if there is one single user in the center of a group and gets retweeted by a large number of other users (G5 and G3 in the image above). On the other hand, if this value is lower than 1.0 we may think of this as a “spread” group, where few users mention, retweet or reply to many other users.
Content in a Twitter stream can be ranked to highlight the most important and influential Tweets. This is reported on the NodeXL Pro Insights **Top Tweets** report page.

Each tweet can be ranked in terms of the number of retweets it received and plotted against the number of likes (or “Favorites”) it received. At the upper right corner of this scatter plot are a special group of messages, the tweets that rank highly on both dimensions.

These influential authors and their content have more visibility and impact than almost all the other messages in the data set.

**INSIGHTS spotlight**

Click on one of the top tweets in the scatter plot and the tweet author and text will be shown in the Tweet Table.
4.11 Hashtags

Hashtags are a specially marked type of content used in Tweets, the use of the leading number sign indicates that a word is a “hashtag” which describes the topic of a tweet.

The **Hashtags** report page displays the most frequently used hashtags in the tweets in this dataset sized by their frequency of use.

Select any hashtag to see the users who used it most frequently and the associated URLs and other words and hashtags.

**(!) Note**: A data filter is set on the entire page. **Only tweets that contain a hashtag are shown on this page.**

**INSIGHTS spotlight**

Click on one of the top tweets in the word cloud and the tweet author and text will be shown in the Tweet Table.
4.12 Words

Words are the most common type of content used in a Tweet. In the Words report page we display a word cloud with words sized by their frequency of use.

Select any of the related filters to narrow down the words based on other attributes, like the type of device used to access Twitter.

Select any of the related filters to narrow down the words based on other attributes, like the hashtags that co-occur with these words.

**INSIGHTS spotlight**

Click on any user or set of users to focus the words report to the selected population.
4.13 Sentiment

Words can be classified as positive or negative. NodeXL Pro Insights uses a sentiment list provided by the NodeXL Pro workbook to help identify positive and negative words along with the people who use them.

Select any of the related filters to narrow down the users and reveal their language use.

**INSIGHTS spotlight**

Select a user in the Most Active Users table to see the sentiment word clouds by that particular user. If you select a user in the Top Mentioned Users table, you will see how the mentioning users talk about that selected user.
4.14 Media

An overview of the images and videos that are shared via tweets can be seen in the Media report page of NodeXL Pro Insights report. Select one or more images to reveal the details of the people who tweeted them.

(!) Note: A data filter is set on the entire page. Only tweets that contain a media file are shown on this page.

INSIGHTS spotlight

Select a user in the Most Active Users table to see the images and media files published by that particular user. If you select a user in the Top Mentioned Users table, you will see the images associated with tweets that mention those users.

INSIGHTS spotlight

NodeXL Pro Twitter Data Collection Tip: You can add the search operator "filter:media" to your search query in the NodeXL Pro Twitter Search Network importer to only import tweets that contain a media file. For more information about Twitter search operators please follow this link.
URLs are an important part of many tweets. The Web Links report page displays the list of URLs and their Domains to highlight the web sites that are most often mentioned in a data set.

Understanding the sources of information in a discussion is important for many communication engagement plans.

(!) Note: A data filter is set on the entire page. Only tweets that contain a URL are shown on this page.

NodeXL Pro Twitter Data Collection Tip: You can add the search operators “filter:links” or “url:[domain]” to your search query in the NodeXL Pro Twitter Search Network importer to only import tweets that contain a web link. For more information about Twitter search operators please follow this link.
4.16 Compare 2

Quickly contrast two sets of users via the NodeXL Pro Insights “Compare 2” report page. Select two sets of attributes to quickly compare the resulting sub-populations and market segments.

See the side-by-side results with just a few clicks to reveal the ways sub populations differ or are similar to one another.

These resulting report displays an easy to contrast summary of each of the two populations in terms of the words, hashtags, URLs, domains, and influencers in each population.

**INSIGHTS spotlight**

To compare two groups, select any group in the Groups table on the left. Then hold down the Shift button and select a different group in the Groups table on the right.

Note that the display of the images in the Media and Profile picture image grids take a while to be loaded.
For a broader overview, the “**Compare 4**” report page allows users to select up to 4 different sets of attributes to quickly display a table that contrasts these distinct populations.

**INSIGHTS spotlight**

To compare four groups, select any group in the Groups table on the top left. Then hold down the Shift button and select different groups in the other three groups tables below.
4.18 Drillthrough page: Group

The drillthrough page for each Group can be accessed when you right-click on a row in any Groups table on any report page. This will open a dedicated report page that contains only data from the selected group. Groups often vary in terms of their language, focus and leaders. Contrasting different groups can highlight the diversity of opinion on a common topic.
4.19 Drillthrough page: Active User

The drillthrough page for each Author can be accessed when you right-click on a row in the Most Active User table on any report page. This will direct you to a dedicated page that shows data around one single user. Each user’s activity is summarized, reporting on their overall statistics and detailed lists of their most popular tweets and interaction partners.
4.20 Drillthrough page: Mentioned User

The drillthrough page for each Mentioned User can be accessed when you right-click on a row in the Top Mentioned User table on any report page. This report contains a summary of the tweets that mention the selected user. In contrast, the previous Active Users report page contains the summary of the tweets authored by the selected user. This report is a dedicated page that shows data focused on a single user.
5. FAQs

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
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</thead>
</table>
| **What are the requirements to create my own NodeXL Pro INSIGHTS report?** | In order to create your own NodeXL Pro INSIGHTS report you need  
1) a NodeXL Pro INSIGHTS subscription  
2) a NodeXL Pro User license  
3) a NodeXL Pro Twitter network data set that has been successfully processed by the NodeXL Pro INSIGHTS “recipe” (settings options file).  
A tutorial on how to create a NodeXL Pro INSIGHTS report is available [here](#).  
System and software requirements for NodeXL Pro can be found [here](#). |
| **How is a NodeXL Pro INSIGHTS report created?**                        | NodeXL Pro Users can import network datasets from Twitter with several importers: The Twitter Search Network Importer, The Twitter Users Network importer, and the Tweet ID network importer.  
When these datasets are analyzed with any of the official “NodeXL Pro Twitter Data Recipes”, they can be exported to the Power BI Pro Service via Data > Export > To Power BI Service.  
During the export, the NodeXL Pro INSIGHTS report template is applied to the dataset, and after a short while the full report will appear in your MS Power BI workspace.  
This process is explained in further detail in the tutorial "How to create a NodeXL Pro INSIGHTS report". |
| **Do I need NodeXL Pro to create a NodeXL Pro INSIGHTS report?**        | Yes. A NodeXL Pro Twitter Social Media Network data set created with NodeXL Pro is required to generate a NodeXL Pro INSIGHTS report.                                                                 |
| **Can I create a NodeXL Pro INSIGHTS report from an old NodeXL Pro workbook?** | Yes. To ensure compatibility, we recommend that older Twitter data sets be processed with the latest NodeXL Pro Options file. You can learn more about these “data recipes” [here](#).  
Please import this into the NodeXL Pro data set file you would like to publish via NodeXL Pro INSIGHTS via NodeXL>Options>Import.  
Then process the file using this recipe via NodeXL>Graph>Automate>Run.  
When completed, you may then use the NodeXL>Data>Export>To NodeXL Pro INSIGHTS to publish to Power BI. |
<p>| <strong>Can I get a NodeXL Pro INSIGHTS report without a</strong>                    | Connected Action offers a service providing NodeXL Pro INSIGHTS reports for Twitter topics for a per report fee with no                                                                                                                                 |</p>
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>subscription or NodeXL Pro?</strong></td>
<td>subscription. See: <a href="https://connectedaction.net">https://connectedaction.net</a></td>
</tr>
<tr>
<td><strong>How many reports can I create per month?</strong></td>
<td>As many as you can fit in a 10GB data storage quota.</td>
</tr>
<tr>
<td><strong>How many reports can I have in my workspace at a time?</strong></td>
<td>As many as you can fit in a 10GB data storage quota.</td>
</tr>
<tr>
<td><strong>For how long can I keep the data in my Power BI workspace?</strong></td>
<td>Reports are retained for the duration of your NodeXL Pro INSIGHTS subscription and for 90 days after the last subscription payment.</td>
</tr>
<tr>
<td><strong>How can I remove a report from my workspace?</strong></td>
<td>Log into your Microsoft Power BI account and simply select and delete any unwanted NodeXL Pro INSIGHTS reports.</td>
</tr>
<tr>
<td><strong>Can I recover reports once they have been deleted after my subscription ends?</strong></td>
<td>No. But you can re-create the same report at any time when starting a new subscription and exporting the original dataset from NodeXL Pro again.</td>
</tr>
<tr>
<td><strong>Why is the group label blank?</strong></td>
<td>The groups are based on the automatic group labeling process in NodeXL. The settings are set via Visual Properties &gt; Autofill Columns &gt; Groups &gt; Label.</td>
</tr>
<tr>
<td><strong>Why do I not see any data on the time and time grid report page?</strong></td>
<td>Click the button “Select all” below or above the time visual.</td>
</tr>
<tr>
<td><strong>How can I share my NodeXL Pro INSIGHTS report?</strong></td>
<td>You can choose to publish a NodeXL Pro INSIGHTS report to the web when selecting this option in the “Export to NodeXL Pro INSIGHTS” window in NodeXL Pro under Data &gt; Export.</td>
</tr>
<tr>
<td></td>
<td>In this case you will receive an email with a link to a publicly accessible URL that starts like this <a href="https://app.powerbi.com/">https://app.powerbi.com/</a>....</td>
</tr>
<tr>
<td></td>
<td>The email also contains a html embed code so you can publish the report on your own website.</td>
</tr>
<tr>
<td><strong>How can I delete a NodeXL Pro INSIGHTS report once it has been shared publicly to the web?</strong></td>
<td>You can delete and control reports in your NodeXL Pro INSIGHTS dashboard at <a href="https://nodexlgraphgallery.org/INSIGHTS">https://nodexlgraphgallery.org/INSIGHTS</a></td>
</tr>
<tr>
<td><strong>How can I delete a NodeXL Pro INSIGHTS report once it has been published to the Power BI service?</strong></td>
<td>You have full control over your data sets via your NodeXL Pro INSIGHTS dashboard at <a href="https://nodexlgraphgallery.org/INSIGHTS">https://nodexlgraphgallery.org/INSIGHTS</a></td>
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