# social network analysis in r

Social Network Analysis in R: Unlocking Insights from Relationships and Connections

**social network analysis in r** offers a fascinating way to explore and understand the intricate patterns of relationships between individuals, groups, or even entire organizations. Whether you're studying friendships, professional networks, or communication flows, R provides powerful tools to visualize, analyze, and interpret social structures. If you've ever wondered how to map influence, detect communities, or measure centrality within networks, diving into social network analysis (SNA) using R is a great starting point.

## What Is Social Network Analysis?

At its core, social network analysis is a methodological approach used to investigate social structures through networks and graph theory. These networks consist of nodes (representing entities like people or organizations) and edges (representing relationships or interactions). By analyzing the patterns and properties of these connections, we can uncover hidden insights such as influential actors, clusters, or the overall cohesion of the network.

Social network analysis isn't just limited to sociology—it's widely applied across disciplines like epidemiology, marketing, organizational studies, and computer science. This broad applicability is one reason why R, with its extensive statistical and graphical capabilities, has become a popular platform for conducting SNA.

## Getting Started with Social Network Analysis in R

If you're new to social network analysis in R, the first step is to familiarize yourself with some of the primary packages designed for network data manipulation and visualization. Packages like **igraph**, **statnet**, and **ggraph** are fundamental tools in this space.

### Key R Packages for Social Network Analysis

- **igraph**: One of the most popular and comprehensive packages for network analysis, igraph offers functions to create, manipulate, and visualize graphs. It supports various network metrics, community detection algorithms, and network layouts.
- **statnet**: A suite of packages that provides tools for statistical modeling of network data, including exponential random graph models (ERGMs) and network visualization.

- **ggraph:** Built on top of ggplot2, ggraph allows for highly customizable and aesthetically pleasing network visualizations using a grammar of graphics approach.
- **tidygraph:** Integrates network analysis with the tidyverse style, making it easier to manipulate network data frames and pipelines.

## Loading and Preparing Network Data

Social network analysis in R often begins with importing network data. This data can come in various formats, such as adjacency matrices, edge lists, or even from social media APIs.

For example, an edge list might look like this:

| Source | Target |
|---|---|
| Alice | Bob |
| Bob | Carol |
| Alice | Dave |

You can load such data using `read.csv()` or create it manually and then convert it into a network object with igraph's `graph_from_data_frame()` function.

```r
library(igraph)

edges <- data.frame(
from = c("Alice", "Bob", "Alice"),
to = c("Bob", "Carol", "Dave")
)

network <- graph_from_data_frame(edges, directed = FALSE)
plot(network)
```

This simple example demonstrates how quickly you can visualize relationships in R.

# Exploring Network Metrics and Their Significance

Understanding the structure of a social network involves calculating metrics that describe nodes' roles or the network's overall properties.

## Commonly Used Network Metrics

- **Degree Centrality:** Measures how many connections a node has, indicating

its direct influence or activity.

- **Betweenness Centrality:** Reflects a node's role as a bridge in the shortest paths across the network, highlighting potential brokers or gatekeepers.
- **Closeness Centrality:** Indicates how close a node is to all others in terms of the shortest paths, suggesting how quickly information can spread from that node.
- **Eigenvector Centrality:** Considers not only the number of connections but also the importance of those connections, identifying influential nodes within influential neighborhoods.
- **Clustering Coefficient:** Measures the tendency of nodes to form tightly-knit groups, which can reveal community structures.

Calculating these metrics in R is straightforward with igraph. For example:

```r
degree_centrality <- degree(network)
betweenness_centrality <- betweenness(network)
```

These values help you identify key players or understand the network's resilience and communication flow.

# Visualizing Social Networks in R

One of the most rewarding aspects of social network analysis in R is the ability to create vivid visualizations that make complex relationships easier to grasp.

## Basic Network Plots with igraph

igraph provides default plotting functions that allow quick visual checks of network structure.

```r
plot(network, vertex.size=degree(network)*5, vertex.label=V(network)$name)
```

Here, node size is scaled by degree, making highly connected nodes stand out.

## Advanced Visualization with ggraph

For more polished and customizable plots, ggraph is invaluable. It enables layering, coloring, and theming similar to ggplot2.

```r
library(ggraph)
```

```
library(tidygraph)

tg <- as_tbl_graph(network)

ggraph(tg, layout = "fr") +
geom_edge_link(alpha = 0.8) +
geom_node_point(aes(size = degree(tg)), color = "steelblue") +
geom_node_text(aes(label = name), repel = TRUE) +
theme_void()
```

This approach combines the power of tidy data manipulation with elegant graphics, making it easier to communicate your findings.

# Applications of Social Network Analysis in R

Social network analysis in R can be applied across various domains and datasets, offering valuable insights.

## Analyzing Online Social Media Networks

With the rise of platforms like Twitter and Facebook, analyzing digital social interactions has become crucial. R packages like **rtweet** allow users to collect Twitter data, which can then be analyzed to identify influencers, trending topics, or community clusters.

For instance, you might examine retweet networks to see how information propagates or detect groups sharing similar interests.

## Organizational Network Analysis

Within companies, understanding communication patterns or collaboration networks helps managers optimize workflows and identify key connectors or bottlenecks. Social network analysis in R facilitates modeling these complex relationships, helping improve organizational effectiveness.

## Health and Epidemiology Studies

Tracking the spread of diseases often depends on understanding contact networks. By modeling these networks in R, researchers can simulate outbreaks, identify super-spreaders, and design targeted interventions.

# Tips for Effective Social Network Analysis in R

Embarking on social network analysis can feel overwhelming, but a few practical tips can smooth the process:

- **Start Small:** Begin with simple networks to understand the basic concepts before scaling up to larger, more complex datasets.
- **Clean Your Data:** Ensure your network data is accurate and consistent. Remove duplicates, handle missing values, and verify node identities.
- **Use Network Visualizations Wisely:** Avoid cluttered plots by filtering or aggregating nodes and edges when working with large networks.
- **Combine Metrics:** Don’t rely on a single centrality measure. Using multiple metrics provides a more nuanced understanding of node importance.
- **Leverage Community Detection:** Algorithms like Louvain or Walktrap can reveal hidden groups within your network, offering deeper insights.

## Community Detection and Clustering in R

Identifying communities or clusters within a network is a key part of social network analysis. These groups can represent social circles, interest groups, or functional teams.

Using igraph, you can apply various algorithms:

```r
clusters <- cluster_louvain(network)
plot(clusters, network)
```

These methods help uncover the underlying modular structure of networks, making interpretation and reporting more meaningful.

## The Future of Social Network Analysis in R

As data grows in volume and complexity, social network analysis in R continues to evolve. Integration with machine learning, dynamic network analysis (tracking changes over time), and enhanced visualization tools are pushing the boundaries of what can be achieved.

For anyone interested in data science, sociology, or complex systems, mastering social network analysis in R opens doors to uncovering patterns that would otherwise remain hidden in the noise of raw data.

By combining R’s flexibility with the rich theoretical foundation of social network analysis, you can transform relational data into actionable insights that drive decisions and understanding across countless fields.

## Frequently Asked Questions

## What is social network analysis (SNA) in R?

Social network analysis (SNA) in R involves using R programming language to study and analyze social structures through networks and graph theory. It helps in understanding relationships, patterns, and influences among entities such as individuals, organizations, or groups.

## Which R packages are commonly used for social network analysis?

Popular R packages for social network analysis include igraph, statnet, sna, tidygraph, and ggraph. These packages provide tools for creating, visualizing, and analyzing network data efficiently.

## How do you create a basic social network graph in R using igraph?

To create a basic social network graph in R with igraph, first install and load the package, then create a graph object using functions like graph_from_data_frame() or graph_from_edgelist(), and finally plot the graph using the plot() function.

## What are key network metrics that can be computed in R for social network analysis?

Key network metrics include degree centrality, betweenness centrality, closeness centrality, eigenvector centrality, density, clustering coefficient, and diameter. These metrics help quantify the importance and structure of nodes within the network.

## How can I visualize social networks effectively in R?

Effective visualization of social networks in R can be achieved using packages like igraph for basic plots, ggraph and ggplot2 for advanced and customizable visualizations, allowing layout adjustments, node/edge styling, and interactive plotting.

## Can R handle large-scale social network data efficiently?

Yes, R can handle large-scale social network data, especially when using optimized packages like igraph, which is designed for performance. However, for extremely large networks, additional tools or integration with big data platforms may be required.

## How do you perform community detection in social networks using R?

Community detection in R can be performed using igraph’s built-in functions such as cluster_walktrap(), cluster_louvain(), or cluster_edge_betweenness(). These methods identify groups of nodes that are more densely connected internally.

## Is it possible to analyze dynamic social networks in R?

Yes, dynamic social network analysis can be done in R using packages like tsna and ndtv, which allow analysis and visualization of networks that change over time.

## How do you import social network data into R for analysis?

Social network data can be imported into R from various formats such as edge lists, adjacency matrices, or graph files (e.g., GraphML, GML, Pajek) using functions like read.csv(), read.delim() for edge lists, or igraph's read_graph() for graph files.

# Additional Resources

Social Network Analysis in R: Unlocking the Power of Relational Data

**social network analysis in r** has become an indispensable approach for researchers, data scientists, and analysts aiming to understand complex relationships and interactions within data sets. As networks—whether social, biological, or technological—grow increasingly intricate, the need for robust, flexible, and efficient tools to map and analyze these connections has never been greater. R, as a powerful statistical programming language, offers an extensive ecosystem tailored for social network analysis (SNA), enabling practitioners to extract meaningful insights from relational data with precision and clarity.

# Understanding Social Network Analysis and Its Importance

Social network analysis refers to the methodological framework used to explore social structures through networks and graph theory. By examining nodes (representing individuals or entities) and edges (depicting ties or relationships), SNA reveals patterns such as clusters, centrality, influence, and network dynamics that traditional data analysis might overlook. These insights have broad applications—from tracking information flow in social media platforms to modeling disease spread in epidemiology or understanding collaboration patterns in organizations.

R's appeal for social network analysis lies in its open-source nature, extensive community support, and integration with other statistical and machine learning tools. The language's ability to handle large datasets and produce high-quality visualizations makes it a preferred choice for many professionals.

# Core Packages for Social Network Analysis in R

The R environment boasts several specialized packages designed specifically for network analysis, each with unique strengths:

## igraph

One of the most widely used libraries, igraph offers a comprehensive suite of tools for creating, manipulating, and visualizing graphs. It supports both directed and undirected networks, weighted edges, and provides a wide array of algorithms for community detection, shortest paths, centrality measures (degree, closeness, betweenness), and network motifs.

- Pros:

  - Efficient handling of large-scale networks.
  - Extensive documentation and active development.
  - Compatibility with multiple graph formats (GraphML, Pajek, etc.).

- Cons:

  - Learning curve for users unfamiliar with graph theory concepts.
  - Visualization capabilities, while strong, are sometimes considered less intuitive than specialized plotting packages.

## statnet Suite

The statnet collection of packages (including network, sna, and ergm) focuses on statistical modeling of network data. It excels in analyzing network dependencies and testing hypotheses about network formation processes using Exponential Random Graph Models (ERGMs).

- Features:

  - Advanced statistical modeling tailored for network data.
  - Good integration with other R statistical tools.
  - Support for dynamic networks and longitudinal data.

## tidygraph and ggraph

For users familiar with the tidyverse ecosystem, tidygraph extends the grammar of data manipulation to network objects, making it easier to work with graph data in a “tidy” format. ggraph complements tidygraph by providing flexible and aesthetically pleasing network visualizations based on ggplot2.

- Benefits:

  - Intuitive syntax for data wrangling and visualization.
  - Highly customizable plots with layered graphics support.

- Seamless integration with tidyverse workflows.

# Practical Applications and Methodologies

Implementing social network analysis in R involves several key steps, each supported by the rich toolkit R provides:

## Data Preparation and Import

R supports importing network data from multiple sources and formats, including adjacency matrices, edge lists, and standard graph files. Packages like readr and data.table facilitate efficient data ingestion, while igraph and network can directly convert these inputs into network objects.

## Descriptive Network Metrics

Analyzing network structure begins with calculating metrics such as:

- **Degree Centrality:** Measures the number of direct connections a node has.
- **Betweenness Centrality:** Captures nodes that act as bridges within the network.
- **Closeness Centrality:** Reflects how close a node is to all others.
- **Density:** Represents the level of connectivity across the network.
- **Clustering Coefficient:** Indicates the degree to which nodes tend to cluster together.

These metrics help identify influential actors, cohesive subgroups, and overall network cohesion.

## Community Detection and Network Partitioning

Discovering communities or clusters within networks is a common goal. R's igraph package includes algorithms such as Louvain, Infomap, and edge betweenness community detection methods. These techniques reveal hidden groupings, which might correspond to social cliques, functional modules, or thematic clusters.

## Dynamic Network Analysis

Many real-world networks evolve over time. R supports dynamic network

analysis through packages like tsna and ndtv, which enable the visualization and modeling of temporal changes in network structure. This is particularly valuable in studying social media interactions, communication patterns, or disease transmission over time.

## Comparative Insights: R vs Other Platforms for Social Network Analysis

While R is a powerful choice for social network analysis, it competes with other specialized platforms and languages such as Python (with NetworkX, SNAP), Gephi, and UCINET.

– R excels in statistical rigor and integration with data science workflows, making it ideal for analysts needing to combine network analysis with advanced statistics or machine learning.
– Python offers more general programming flexibility and a growing set of network libraries but may require additional effort to reach the same level of statistical depth.
– Gephi and UCINET provide user-friendly graphical interfaces for exploratory network visualization but lack the programmability and reproducibility advantages of R scripts.

For analysts prioritizing reproducibility, automation, and integration with broader data analysis pipelines, social network analysis in R remains a top-tier choice.

## Challenges and Considerations in Using R for Social Network Analysis

Despite its strengths, practitioners should be aware of certain challenges:

- **Scalability**: Handling extremely large networks (millions of nodes) may require specialized tools beyond R’s typical capacity or integration with big data frameworks.
- **Learning Curve**: Mastery of both network theory and R programming is needed to fully leverage the available packages.
- **Visualization Complexity**: While R’s visualization packages are powerful, producing interactive and highly customized network diagrams can be complex and sometimes require combining several tools.

Nonetheless, continued development within the R community is steadily addressing these issues, with improvements in package efficiency, user-friendliness, and interoperability.

## Future Trends: The Evolution of Social Network Analysis in R

Emerging trends suggest greater convergence between social network analysis and machine learning. Integrating graph neural networks (GNNs) with traditional SNA methodologies is gaining traction, and R is adapting with packages such as torch and ggraph extensions to facilitate these hybrid approaches.

Moreover, the proliferation of real-time data streams and internet-of-things (IoT) devices is driving demand for dynamic and scalable network analysis solutions, prompting enhancements in R's capabilities for temporal and spatial network modeling.

As interdisciplinary research grows, the versatility of social network analysis in R will continue to empower professionals across sociology, marketing, epidemiology, and beyond, enabling deeper insights into the interconnected world.

Social network analysis in R stands at the intersection of statistical rigor, computational efficiency, and graphical exploration, providing a rich platform for dissecting the complexities of relational data. For analysts seeking to uncover the hidden patterns within networks, mastering R's tools opens a gateway to a nuanced understanding of connectivity and influence in diverse domains.

## Social Network Analysis In R

**social network analysis in r: Network Analysis and Visualization in R** Alboukadel Kassambara, 2017-11-26 Social network analysis is used to investigate the inter-relationship between entities. Examples of network structures, include: social media networks, friendship networks and collaboration networks. This book provides a quick start guide to network analysis and visualization in R. You'll learn, how to: - Create static and interactive network graphs using modern R packages. - Change the layout of network graphs. - Detect important or central entities in a network graph. - Detect community (or cluster) in a network.

**social network analysis in r: Introduction to Social Network Analysis with R** Michal Bojanowski, 2022-04-22 Introduction to Social Network Analysis with R provides an introduction to performing SNA studies using R, combining the theories of social networks and methods of social network analysis with the R environment as an open source system for statistical data analysis and graphics.

**social network analysis in r:** Applied Social Network Analysis With R: Emerging Research and Opportunities Gençer, Mehmet, 2020-02-07 Understanding the social relations within the fields of business and economics is vital for the promotion of success within a certain organization. Analytics and statistics have taken a prominent role in marketing and management practices as professionals are constantly searching for a competitive advantage. Converging these technological tools with traditional methods of business relations is a trending area of research. Applied Social Network Analysis With R: Emerging Research and Opportunities is an essential reference source that materializes and analyzes the issue of structure in terms of its effects on human societies and the state of the individuals in these communities. Even though the theme of the book is business-oriented, an approach underlining and strengthening the ties of this field of study with

social sciences for further development is adopted throughout. Therefore, the knowledge presented is valid for analyzing not only the organization of the business world but also for the organization of any given community. Featuring research on topics such as network visualization, graph theory, and micro-dynamics, this book is ideally designed for researchers, practitioners, business professionals, managers, programmers, academicians, and students seeking coverage on analyzing social and business networks using modern methods of statistics, programming, and data sets.

**social network analysis in r:** Computational Network Analysis with R Matthias Dehmer, Yongtang Shi, Frank Emmert-Streib, 2016-07-22 This new title in the well-established Quantitative Network Biology series includes innovative and existing methods for analyzing network data in such areas as network biology and chemoinformatics. With its easy-to-follow introduction to the theoretical background and application-oriented chapters, the book demonstrates that R is a powerful language for statistically analyzing networks and for solving such large-scale phenomena as network sampling and bootstrapping. Written by editors and authors with an excellent track record in the field, this is the ultimate reference for R in Network Analysis.

**social network analysis in r: Research Methods in Social Network Analysis** Linton C. Freeman, 2017-07-28 Since the publication of Herbert Spencer's Principles of Sociology in 1875, the use of social structure as a defining concept has produced a large body of creative speculations, insights, and intuitions about social life. However, writers in this tradition do not always provide the sorts of formal definitons and propositions that are the building blocks of modern social research. In its broad-ranging examination of the kind of data that form the basis for the systematic study of social structure, Research Methods in Social Network Analysis marks a significant methodological advance in network studies.As used in this volume, social structure refers to a bundle of intuitive natural language ideas and concepts about patterning in social relationships among people. In contrast, social networks is used to refer to a collection of precise analytic and methodological concepts and procedures that facilitate the collection of data and the systematic study of such patterning. Accordingly, the book's five sections are arranged to address analytical problems in a series of logically ordered stages or processes.The major contributors define the fundamental modes by which social structural phenomena are to be represented; how boundaries to a social structure are set; how the relations of a network are measured in terms of structure and content; the ways in which the relational structure of a network affects system actors; and how actors within a social network are clustered into cliques or groups. The chapters in the last section build on solutions to problems proposed in the previous sections. This highly unified approach to research design combined with a representative diversity of viewpoints makes Research Methods in Social Network Analysis a state-of-the-art volume.

**social network analysis in r:** *Social Network Analysis* David Knoke, Song Yang, 2019-12-02 David Knoke and Song Yang′s Social Network Analysis, Third Edition provides a concise introduction to the concepts and tools of social network analysis. The authors convey key material while at the same time minimizing technical complexities. The examples are simple: sets of 5 or 6 entities such as individuals, positions in a hierarchy, political offices, and nation-states, and the relations between them include friendship, communication, supervision, donations, and trade. The new edition reflects developments and changes in practice over the past decade. The authors also describe important recent developments in network analysis, especially in the fifth chapter. Exponential random graph models (ERGMs) are a prime example: when the second edition was published, P* models were the recommended approach for this, but they have been replaced by ERGMs. Finally, throughout the volume, the authors comment on the challenges and opportunities offered by internet and social media data.

**social network analysis in r:** Handbook of Social Network Analysis and Education Nina Kolleck, 2025-07-15 This prescient Handbook analyzes how Social Network Analysis (SNA) is revolutionizing educational research by transforming how we interpret the complex web of interactions between students, teachers, parents, and education systems.

**social network analysis in r:** Social Network Analysis Song Yang, Franziska B. Keller, Lu

Zheng, 2016-10-28 Social Network Analysis: Methods and Examples by Song Yang, Franziska B. Keller, and Lu Zheng prepares social science students to conduct their own social network analysis (SNA) by covering basic methodological tools along with illustrative examples from various fields. This innovative book takes a conceptual rather than a mathematical approach as it discusses the connection between what SNA methods have to offer and how those methods are used in research design, data collection, and analysis. Four substantive applications chapters provide examples from politics, work and organizations, mental and physical health, and crime and terrorism studies.

**social network analysis in r: Social Network Analysis** Xiaoming Fu, Jar-Der Luo, Margarete Boos, 2017-03-31 The book addresses the issue of interdisciplinary understanding of collaboration on the topic of social network studies. Researchers and practitioners from various disciplines including sociology, computer science, socio-psychology, public health, complex systems, and management science have worked largely independently, each with quite different principles, terminologies, theories. and methodologies. The book aims to fill the gap among these disciplines with a number of the latest interdisciplinary collaboration studies.

**social network analysis in r: Models and Methods in Social Network Analysis** Peter J. Carrington, John Scott, Stanley Wasserman, 2005-02-07 Models and Methods in Social Network Analysis, first published in 2005, presents the most important developments in quantitative models and methods for analyzing social network data that have appeared during the 1990s. Intended as a complement to Wasserman and Faust's Social Network Analysis: Methods and Applications, it is a collection of articles by leading methodologists reviewing advances in their particular areas of network methods. Reviewed are advances in network measurement, network sampling, the analysis of centrality, positional analysis or blockmodelling, the analysis of diffusion through networks, the analysis of affiliation or 'two-mode' networks, the theory of random graphs, dependence graphs, exponential families of random graphs, the analysis of longitudinal network data, graphical techniques for exploring network data, and software for the analysis of social networks.

**social network analysis in r:** Social Network Analysis Using R. Curt Frye, 2017

**social network analysis in r: The SAGE Handbook of Social Network Analysis** John Scott, Peter J. Carrington, 2011-10-07 This sparkling Handbook offers an unrivalled resource for those engaged in the cutting edge field of social network analysis. Systematically, it introduces readers to the key concepts, substantive topics, central methods and prime debates. Among the specific areas covered are: Network theory Interdisciplinary applications Online networks Corporate networks Lobbying networks Deviant networks Measuring devices Key Methodologies Software applications. The result is a peerless resource for teachers and students which offers a critical survey of the origins, basic issues and major debates. The Handbook provides a one-stop guide that will be used by readers for decades to come.

**social network analysis in r:** Exploratory Social Network Analysis with Pajek Wouter De Nooy, Andrej Mrvar, Vladimir Batagelj, 2018-07-19 An extensively revised and expanded third edition of the successful textbook on analysis and visualization of social networks integrating theory, applications, and professional software for performing network analysis (Pajek). The main structural concepts and their applications in social research are introduced with exercises. Pajek software and datasets are available, so readers can learn network analysis through application and case studies. In the end readers will have the knowledge, skills, and tools to apply social network analysis across different disciplines. A fundamental redesign of the menu structure and the capability to analyze much larger networks required a new edition. This edition presents several new operations including community detection, generalized main paths searches, new network indices, advanced visualization approaches, and instructions for installing Pajek under MacOSX. This third edition is up-to-date with Pajek version 5 and it introduces PajekXXL for very large networks and Pajek3XL for huge networks.

**social network analysis in r:** Social Network Analysis for Ego-Nets Nick Crossley, Elisa Bellotti, Gemma Edwards, Martin G Everett, Johan Koskinen, Mark Tranmer, 2015-07-27 The ego-net approach to social network analysis, which takes discrete individual actors and their contacts as its starting point, is one of the most widely used approaches in the field. This is the first

textbook to take readers through each stage of ego-net research, from conception, through research design and data gathering to analysis. It starts with the basics, assuming no prior knowledge of social network analysis, but then moves on to introduce cutting edge innovations, covering both new statistical approaches to ego-net analysis and also the most recent thinking on mixing methods (quantitative and qualitative) to achieve depth and rigour. It is an absolute must for anybody wishing to explore the importance of networks.

**social network analysis in r:** Trends in Social Network Analysis Rokia Missaoui, Talel Abdessalem, Matthieu Latapy, 2017-04-29 The book collects contributions from experts worldwide addressing recent scholarship in social network analysis such as influence spread, link prediction, dynamic network biclustering, and delurking. It covers both new topics and new solutions to known problems. The contributions rely on established methods and techniques in graph theory, machine learning, stochastic modelling, user behavior analysis and natural language processing, just to name a few. This text provides an understanding of using such methods and techniques in order to manage practical problems and situations. Trends in Social Network Analysis: Information Propagation, User Behavior Modelling, Forecasting, and Vulnerability Assessment appeals to students, researchers, and professionals working in the field.

**social network analysis in r: Social Interaction in Animals: Linking Experimental Approach and Social Network Analysis** Cédric Sueur, Frédéric Mery, 2017-03-14 Understanding the link between individual behaviour and population organization and functioning has long been central to ecology and evolutionary biology. Behaviour is a response to intrinsic and extrinsic factors including individual state, ecological factors or social interactions. Within a group, each individual can be seen as part of a network of social interactions varying in strength, type and dynamic. The structure of this network can deeply impact the ecology and evolution of individuals, populations and species. Within a group social interactions can take many forms and may significantly affect an individual's fitness. These interactions may result in complex systems at the group-level, such as in the case of collective decisions (to migrate, to build nest or to forage). Among them, social transmission of information has been studied mostly in vertebrates: fish, birds and mammals including humans. In insects, social learning has been unambiguously demonstrated in social Hymenoptera but this probably reflects limited research effort and recent evidence show that even non-eusocial insects such as Drosophila, cockroaches and crickets can copy the behaviour of others. Compared to individual learning, which requires a trial and error period every generation, social learning can potentially result in the stable transmission of behaviours across generations, leading to cultural traditions in some species. The study of the processes which may facilitate or prevent this transmission and the analyses of the relationship between social network structure and efficiency of social transmission became these recent years an emerging and promising field of research. The goal of this research topic is to present the genetic and socio-environmental factors affecting social interaction and information or pathogen transmission with the integration of experimental approaches, social network analyses and modelling. Importantly, we aim to understand whether a relationship between social network structures and dynamics can reflect the efficiency of social transmission, i.e. can we use social network analysis to predict the social transmission of information or of pathogen, collective decision-making and ultimately the evolutionary trajectory of a group?

**social network analysis in r: Multilevel Network Analysis for the Social Sciences** Emmanuel Lazega, Tom A.B. Snijders, 2015-12-16 This volume provides new insights into the functioning of organizational, managerial and market societies. Multilevel analysis and social network analysis are described and the authors show how they can be combined in developing the theory, methods and empirical applications of the social sciences. This book maps out the development of multilevel reasoning and shows how it can explain behavior, through two different ways of contextualizing it. First, by identifying levels of influence on behavior and different aggregations of actors and behavior, and complex interactions between context and behavior. Second, by identifying different levels as truly different systems of agency: such levels of agency can be examined separately and jointly since the link between them is affiliation of members of one level

to collective actors at the superior level. It is by combining these approaches that this work offers new insights. New case studies and datasets that explore new avenues of theorizing and new applications of methodology are presented. This book will be useful as a reference work for all social scientists, economists and historians who use network analyses and multilevel statistical analyses. Philosophers interested in the philosophy of science or epistemology will also find this book valuable.

**social network analysis in r: Social Network Analysis and Egyptology** Danijela Stefanović, 2024-02-09 This book addresses Social Network Analysis (SNA) as a methodological approach in the field of Egyptology, exploring its possibilities, limitations, and applications within the discipline. Social Network Analysis is a sociological, graph theory-based approach used to investigate social structures created by patterns of relationships (ties or links) between actors (nodes), which has been utilised by scholars in other areas of ancient history. The book first provides readers with basic information on the theoretical background of methods applied in SNA, as well as network theory and Actor-Network Theory (ANT) more generally. It discusses the history of SNA specifically within the discipline of Egyptology, evaluating the advantages and limitations of this approach when applied to different types of datasets, such as written sources and material records. The author then explores a case study, examining the potential of network modelling on datasets from the Abydos votive zone during the Middle Kingdom period (c. 2040-1750 BC). The book highlights how SNA and network theory can be useful supplementary tools alongside more traditional research approaches in Egyptology for a more comprehensive understanding of social relations and interconnections in ancient contexts. Social Network Analysis and Egyptology is suitable for students and scholars working on Egyptology who are interested in SNA methodology, as well as those working on Classical and Ancient Near Eastern archaeology and history. It also appeals to those interested in network research and theory more broadly. Colour versions of images in this book can be found in the Support Material: www.routledge.com/9781032599632.

**social network analysis in r:** *Social Network Analysis and Mining Applications in Healthcare and Anomaly Detection* Mehmet Kaya, Sleiman Alhajj, Kashfia Sailunaz, Min-Yuh Day, 2024-12-20 This book is an excellent source of knowledge for readers interested in the latest developments in social network analysis and mining, particularly with applications in healthcare and anomaly detection. It covers topics such as sensitivity to noise in features, enhancing fraud detection in financial systems, measuring the echo-chamber phenomenon, detecting comorbidity, and evaluating the effectiveness of mitigative and preventative actions on viral spread in small communities using agent-based stochastic simulations. Additionally, it discusses predicting behavior, measuring and identifying influence, analyzing the impact of COVID-19 on various social aspects, and using UNet for handling various skin conditions. This book helps readers develop their own perspectives on adapting social network concepts to various applications. It also demonstrates how to use various machine learning techniques for tackling challenges in social network analysis and mining.

**social network analysis in r: Social Network Computing** Jiang Wu, 2024-11-01 In the era of digital economy with highly-connected world, the ability to comprehend social network computing has become an indispensable skill. This book serves as a vital guide for academics and professionals engaged in research within this rapidly expanding field. The book is organized into three parts, each dedicated to different facets of social network computing. The journey commences with an exploration of foundational principles, encompassing triadic closure, strong and weak ties, network homophily, and positive and negative balance. This lays the groundwork for an in-depth examination of fundamental theories governing social networks. Subsequently, the focus shifts to the laws dictating social networks, elucidating phenomena like the small world effect, power law distribution, community detection, diffusion processes, game theory dynamics, and hypernetworks, also including multiplex networks, multi-mode networks and temporal networks. The final section of the book centers on the practical aspects of social network analysis, delving into topics such as link prediction, influence evaluation, dynamic analysis, random experiments, modeling and simulation, and representation learning. This provides a comprehensive exploration of the applicability of social

network analysis in real-world scenarios. This book seamlessly integrates theory with practice by incorporating popular social network computing software, including igraph, Gephi, Ucinet, and Netlogo. By mastering the computational thinking methods presented in this book, readers will deepen their understanding of social network computing and acquire the skills to effectively apply it in various real-world contexts.

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