

Package ‘statnet’

October 22, 2018

Version 2018.10

Date 2018-10-17

Title Software Tools for the Statistical Analysis of Network Data

Depends R (>= 3.0), tergm (>= 3.5.2), ergm.count (>= 3.3), sna (>= 2.4), tsna (>= 0.2)

Imports ergm (>= 3.9.4), network (>= 1.13), networkDynamic (>= 0.9), statnet.common (>= 4.1.4)

Suggests ergm.rank (>= 1.1), ergm.ego (>= 0.4), EpiModel (>= 1.6.5), degreenet (>= 1.3.1), latentnet (>= 2.9.0), networksis (>= 2.1.3), relevent (>= 1.0.4), ndtv (>= 0.12.3)

BugReports <https://github.com/statnet/statnet/issues>

Description Statnet is a collection of packages for statistical network analysis that are designed to work together because they share common data representations and 'API' design. They provide an integrated set of tools for the representation, visualization, analysis, and simulation of many different forms of network data. This package is designed to make it easy to install and load the key 'statnet' packages in a single step. Learn more about 'statnet' at <http://www.statnet.org>. For an introduction to functions in this package, type `help(package='statnet')`.

License GPL-3 + file LICENSE

URL <http://statnet.org>

NeedsCompilation no

Author Mark S. Handcock [aut],
David R. Hunter [aut],
Carter T. Butts [aut],
Steven M. Goodreau [aut],
Pavel N. Krivitsky [aut] (<https://orcid.org/0000-0002-9101-3362>),
Skye Bender-deMoll [aut],
Martina Morris [aut, cre]

Maintainer Martina Morris <morrism@uw.edu>

Repository CRAN

Date/Publication 2018-10-22 08:20:03 UTC

R topics documented:

statnet-package	2
update_statnet	4

Index	6
--------------	----------

statnet-package	<i>Easily Install and Load the statnet Packages for Statistical Network Analysis</i>
-----------------	--

Description

statnet is a collection of software packages for statistical network analysis that are designed to work together, with a common data structure and API, to provide seamless access to a broad range of network analytic and graphical methodology. This package is designed to make it easy to install and load multiple statnet packages in a single step.

statnet software implements recent advances in network modeling based on exponential-family random graph models (ERGM), as well as latent space models and more traditional descriptive network methods. This provides a comprehensive framework for cross-sectional and dynamic network analysis: tools for description, network visualization model estimation, model evaluation, model-based network simulation. The statistical estimation and simulation functions are based on a central Markov chain Monte Carlo (MCMC) algorithm that has been optimized for speed and robustness.

The code is actively developed and maintained by the statnet development team. New functionality is being added over time.

Details

statnet packages are written in a combination of R and C. It is usually used interactively from within the R graphical user interface via a command line. It can also be used in non-interactive (or “batch”) mode to allow longer or multiple tasks to be processed without user interaction. The suite of packages are available on the Comprehensive R Archive Network (CRAN) at <https://www.r-project.org/> and also on the statnet project website at <http://www.statnet.org/>

The suite of packages has the following components (those automatically downloaded with the **statnet** package are noted):

For data handling:

- **network** is a package to create, store, modify and plot the data in network objects. The **network** object class, defined in the **network** package, can represent a range of relational data types and it supports arbitrary vertex / edge / graph attributes. Data stored as **network** objects can then be analyzed using all of the component packages in the **statnet** suite. (automatically downloaded)
- **networkDynamic** extends **network** with functionality to store information about about evolution of a network over time, defining a **networkDynamic** object class. (automatically downloaded)

For analyzing cross-sectional networks:

- **sna** is a set of tools for traditional social network analysis. (automatically downloaded)
- **ergm** is a collection of functions to fit, simulate from, plot and evaluate exponential random graph models. The main functions within the **ergm** package are **ergm**, a function to fit linear exponential random graph models in which the probability of a graph is dependent upon a vector of graph statistics specified by the user; **simulate**, a function to simulate random graphs using an ERGM; and **gof**, a function to evaluate the goodness of fit of an ERGM to the data. **ergm** contains many other functions as well. (automatically downloaded)
- **ergm.count** is an extension to **ergm** enabling it to fit models for networks whose relations are counts. (automatically downloaded)
- **ergm.ego** is an extension to **ergm** enabling it to fit models for networks based on egocentrically sampled network data. (separate download required)
- **ergm.rank** is an extension to **ergm** enabling it to fit models for networks whose relations are ranks. (separate download required)
- **latentnet** is a package to fit and evaluate latent position and cluster models for statistical networks. The probability of a tie is expressed as a function of distances between these nodes in a latent space as well as functions of observed dyadic level covariates. (separate download required)
- **degreenet** is a package for the statistical modeling of degree distributions of networks. It includes power-law models such as the Yule and Waring, as well as a range of alternative models that have been proposed in the literature. (separate download required)

For temporal (dynamic) network analysis:

- **tsna** is a collection of extensions to **sna** that provide descriptive summary statistics for temporal networks. (automatically downloaded)
- **tergm** is a collection of extensions to **ergm** enabling it to fit discrete time models for temporal (dynamic) networks. The main function in **tergm** is **stergm** (the “s” stands for separable), which allows the user to specify one **ergm** for tie formation, and another **ergm** for tie dissolution. The models can be fit to network panel data, or to a single cross-sectional network with ancillary data on tie duration. (automatically downloaded)
- **relevent** is a package providing tools to fit relational event models. (separate download required)

Additional utilities:

- **ergm.userterms** provides a template for users who want to implement their own new ERGM terms. (separate download required)
- **networksis** is a package to simulate bipartite graphs with fixed marginals through sequential importance sampling. (separate download required)
- **EpiModel** is a package for simulating epidemics (separate download required)

statnet is a metapackage; its only purpose is to provide a convenient way for a user to load the main packages in the **statnet** suite. Those can, of course, also be installed individually.

Each package in **statnet** has associated help files and internal documentation, and additional the information can be found on the **statnet** project website (<http://www.statnet.org/>). Tutorials, instructions on how to join the **statnet** help mailing list, references and links to further resources

are provided there. For the reference paper(s) that provide information on the theory and methodology behind each specific package use the `citation("packagename")` function in R after loading **statnet**.

We have invested much time and effort in creating the statnet suite of packages and supporting material so that others can use and build on these tools. We ask in return that you cite it when you use it. For publication of results obtained from **statnet**, the original authors are to be cited as described in `citation("statnet")`. If you are only using specific package(s) from the suite, please cite the specific package(s) as described in the appropriate `citation("packgename")`. Thank you!

Author(s)

Mark S. Handcock <handcock@stat.ucla.edu>
 David R. Hunter <dhunter@stat.psu.edu>
 Carter T. Butts <buttsc@uci.edu>
 Steven M. Goodreau <goodreau@uw.edu>
 Pavel N. Krivitsky <pavel@uow.edu.au>
 Skye Bender-deMoll <skyebend@skyeome.net>
 Samuel Jenness (for EpiModel) <samuel.m.jenness@emory.edu>, and
 Martina Morris <morris@uw.edu>
 Maintainer: Martina Morris <morris@uw.edu>

update_statnet

Update the Component Packages of the Statnet Suite

Description

A wrapper around [update.packages](#) to update the component packages of Statnet Suite to their latest versions.

Usage

```
update_statnet(..., ask = FALSE, checkBuilt = TRUE, addURLs = character())
```

Arguments

ask, checkBuilt	Arguments to update.packages documentation. The defaults are different from those of that function.
addURLs	Optional repository URLs in addition to CRAN, such as http://statnet.csde.washington.edu/preview . Defaults to none.
...	Additional arguments to be passed to update.packages .

Details

Updates the list component packages of Statnet Suite, using [setRepositories](#) and [update.packages](#). Since there are no good ways to update packages once they are loaded, this function should be called immediately after restarting R.

Value

`update_statnet` returns NULL invisibly.

See Also

[setRepositories](#), [update.packages](#), [install.packages](#)

Examples

```
## Not run:  
# Update from CRAN  
statnet::update_statnet()  
  
# Update from statnet.org's preview release, taking packages from CRAN  
# as needed  
statnet::update_statnet(addURLs="http://statnet.csde.washington.edu/preview")  
  
## End(Not run)
```

Index

*Topic **utilities**

update_statnet, 4

ergm, 3

gof, 3

install.packages, 5

network, 2

networkDynamic, 2

setRepositories, 4, 5

statnet (statnet-package), 2

statnet-package, 2

update.packages, 4, 5

update_statnet, 4