

Package: stansum (via r-universe)

August 30, 2024

Title Bayesian Models for Aggregated Relational Data and Network Scale-Up Method

Version 1.0-0

Description Interface to various precompiled Stan models for Aggregated Relational Data that estimate, among other things, network degrees. Includes models by Zheng et al (2006) <[doi:10.1198/016214505000001168](https://doi.org/10.1198/016214505000001168)>, Maltiel et al (2015) <[doi:10.1214/15-AOAS827](https://doi.org/10.1214/15-AOAS827)>, Baum & Marsden (2023) <[doi:10.1016/j.socnet.2023.02.001](https://doi.org/10.1016/j.socnet.2023.02.001)>.

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Encoding UTF-8

Roxygen list(markdown = TRUE)

RoxygenNote 7.2.3

Depends R (>= 3.4.0)

Imports instantiate

Additional_repositories <https://mc-stan.org/r-packages/>

SystemRequirements CmdStan
(<https://mc-stan.org/users/interfaces/cmdstan>)

Suggests cmdstanr (>= 0.5.2), knitr, rmarkdown, testthat (>= 3.0.0)

Config/testthat/edition 3

Remotes wlandau/instantiate

LazyData true

URL <https://coalesce-lab.github.io/stansum/>

Repository <https://coalesce-lab.r-universe.dev>

RemoteUrl <https://github.com/coalesce-lab/stansum>

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Fake

Datasets generated from ARD models

Description

Some artificial datasets simulated from various ARD models.

Usage

Fake_maltiel_RD

Format

Unless stated otherwise below all datasets are data frames with respondents in rows and subpopulations in columns.

Details

- Fake_maltiel_RD is sampled from Maltiel et al (2015) Random Degree model assuming 1000 respondents and 3 subpopulations.

References

Maltiel, R., Raftery, A. E., McCormick, T. H., & Baraff, A. J. (2015). Estimating Population Size Using the Network Scale Up Method. *The Annals of Applied Statistics*, 9(3), 1247–1277. <https://doi.org/10.1214/15-A0AS827>

get_model	<i>List or get Stan model objects</i>
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Description

List Stan models available in this package or load them in the form of CmdStanModel objects as implemented in the **cmdstanr** package.

Usage

```
get_model(name, ...)
list_models()
```

Arguments

name	character; name of the model to load
...	arguments passed to instantiate::stan_package_model

Value

get_model returns an "CmdStanModel" object.
list_models returns a character vector of model names provided with the package.

maltiel_bem	<i>Maltiel et al (2015) Barrier Effects Model</i>
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Description

Bayesian model for ARD including parameters capturing barrier effects.

- maltiel_bem_count – model for count responses
- maltiel_bem_dichotomous – model for dichotomous responses proposed by Baum & Marsden (2023).
- maltiel_bem_trichotomous – model for trichotomous responses proposed by Baum & Marsden (2023).

Usage

```
maltiel_bem_count(N, K, y, m, L, ...)
maltiel_bem_dichotomous(N, K, y, m, L, ...)
maltiel_bem_trichotomous(N, K, y, m, L, ...)
```

Arguments

N	integer; population size
K	integer; number of sub-populations
y	integer matrix; ARD
m	numeric; vector of fractional sizes of sub-populations
L	numeric; lower bound on degree
...	other arguments passed to <code>cmdstanr::sample()</code>

Details

Calling this function(s) will load the model object using `get_model()` and sample from the posterior using the `cmdstanr::sample()` method.

Value

Object of class `cmdstanr::CmdStanMCMC` containing the samples.

References

Baum, D. S., & Marsden, P. V. (2023). Uses and limitations of dichotomous aggregate relational data. *Social Networks*, 74, 42–61. doi:10.1016/j.socnet.2023.02.001

Maltiel, R., Raftery, A. E., McCormick, T. H., & Baraff, A. J. (2015). Estimating Population Size Using the Network Scale Up Method. *The Annals of Applied Statistics*, 9(3), 1247–1277. doi:10.1214/15AOAS827

See Also

Use `get_model()` to return Stan model object of class `cmdstanr::CmdStanModel` without fitting it.

Other models in this package: `maltiel_rdm`, `test_model()`, `zheng_bem`, `zheng_gp`

Other models of Maltiel et al (2015): `maltiel_rdm`

maltiel_rdm

Maltiel et al (2015) Random Degree Model

Description

Bayesian model for ARD with random degree parameters.

- `maltiel_rdm_count` – model for count responses
- `maltiel_rdm_dichotomous` – model for dichotomous responses proposed by Baum & Marsden (2023).

Usage

```
maltiel_rdm_count(N, K, y, m, L, ...)  
maltiel_rdm_dichotomous(N, K, y, m, L, ...)
```

Arguments

N	integer; population size
K	integer; number of sub-populations
y	integer matrix; ARD
m	numeric; vector of fractional sizes of sub-populations
L	numeric; lower bound on degree
...	other arguments passed to <code>cmdstanr::sample()</code>

Details

Calling this function(s) will load the model object using `get_model()` and sample from the posterior using the `cmdstanr::sample()` method.

Value

Object of class `cmdstanr::CmdStanMCMC` containing the samples.

References

Baum, D. S., & Marsden, P. V. (2023). Uses and limitations of dichotomous aggregate relational data. *Social Networks*, 74, 42–61. doi:10.1016/j.socnet.2023.02.001

Maltiel, R., Raftery, A. E., McCormick, T. H., & Baraff, A. J. (2015). Estimating Population Size Using the Network Scale Up Method. *The Annals of Applied Statistics*, 9(3), 1247–1277. doi:10.1214/15AOAS827

See Also

Use `get_model()` to return Stan model object of class `cmdstanr::CmdStanModel` without fitting it.

Other models in this package: `maltiel_bem`, `test_model()`, `zheng_bem`, `zheng_gp`

Other models of Maltiel et al (2015): `maltiel_bem`

test_model	<i>A simple Bernoulli model for testing purposes</i>
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Description

A test Bernoulli model taken from Stan documentation.

Usage

```
test_model(N, y, ...)
```

Arguments

N	integer; number of trials
y	integer; vector of Bernoulli outcomes
...	other arguments passed to <code>cmdstanr::sample()</code>

Details

Calling this function(s) will load the model object using `get_model()` and sample from the posterior using the `cmdstanr::sample()` method.

Value

Object of class `cmdstanr::CmdStanMCMC` containing the samples.

See Also

Use `get_model()` to return Stan model object of class `cmdstanr::CmdStanModel` without fitting it. Other models in this package: `maltiel_bem`, `maltiel_rdm`, `zheng_bem`, `zheng_gp`

zheng_bem	<i>Zheng et al (2006) Barrier Effects Model</i>
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Description

Bayesian model for ARD...

- `zheng_bem_count` – model for count responses
- `zheng_bem_dichotomous` – model for dichotomous responses proposed by Baum & Marsden (2023).
- `zheng_bem_trichotomous` – model for trichotomous responses proposed by Baum & Marsden (2023).

Usage

```
zheng_bem_count(N, K, y, ...)  
zheng_bem_dichotomous(N, K, y, ...)  
zheng_bem_trichotomous(N, K, y, ...)
```

Arguments

N	integer; sample size
K	integer; number of sub-populations
y	integer matrix; ARD
...	other arguments passed to <code>cmdstanr::sample()</code>

Details

Calling this function(s) will load the model object using `get_model()` and sample from the posterior using the `cmdstanr::sample()` method.

Value

Object of class `cmdstanr::CmdStanMCMC` containing the samples.

References

- Baum, D. S., & Marsden, P. V. (2023). Uses and limitations of dichotomous aggregate relational data. *Social Networks*, 74, 42–61. doi:10.1016/j.socnet.2023.02.001
- Zheng, T., Salganik, M. J., & Gelman, A. (2006). How Many People Do You Know in Prison? Using Overdispersion in Count Data to Estimate Social Structure in Networks. *Journal of the American Statistical Association*, 101(474), 409–423. doi:10.1198/016214505000001168

See Also

Use `get_model()` to return Stan model object of class `cmdstanr::CmdStanModel` without fitting it.

Other models in this package: `maltiel_bem`, `maltiel_rdm`, `test_model()`, `zheng_gp`

Other models of Zheng et al (2006): `zheng_gp`

zheng_gp

*Zheng et al (2006) Group Prevalence Model***Description**

Bayesian model for ARD...

- `zheng_gp_count` – model for count responses
- `zheng_gp_dichotomous` – model for dichotomous responses proposed by Baum & Marsden (2023).

Usage

```
zheng_gp_count(N, K, y, ...)
```

```
zheng_gp_dichotomous(N, K, y, ...)
```

Arguments

N	integer; population size
K	integer; number of sub-populations
y	integer matrix; ARD
...	other arguments passed to <code>cmdstanr::sample()</code>

Details

Calling this function(s) will load the model object using `get_model()` and sample from the posterior using the `cmdstanr::sample()` method.

Value

Object of class `cmdstanr::CmdStanMCMC` containing the samples.

References

Baum, D. S., & Marsden, P. V. (2023). Uses and limitations of dichotomous aggregate relational data. *Social Networks*, 74, 42–61. doi:10.1016/j.socnet.2023.02.001

Zheng, T., Salganik, M. J., & Gelman, A. (2006). How Many People Do You Know in Prison? Using Overdispersion in Count Data to Estimate Social Structure in Networks. *Journal of the American Statistical Association*, 101(474), 409–423. doi:10.1198/016214505000001168

See Also

Use `get_model()` to return Stan model object of class `cmdstanr::CmdStanModel` without fitting it.

Other models in this package: `multiel_bem`, `multiel_rdm`, `test_model()`, `zheng_bem`

Other models of Zheng et al (2006): `zheng_bem`

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