

Package ‘Compositionalzerocens’

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Type Package

Title Modelling Zero Values in Compositional Data Using a Censored Model

Version 1.0

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Depends R (>= 4.0)

Imports Compositional, far, Rfast, stats

Suggests Rfast2

Description Modelling structural zeros in compositional data assuming a latent Gaussian model, where MLE is performed via the EM algorithm. The relevant paper is Tsagris M. (2026). Modelling structural zeros in compositional data via a zero-censored multivariate normal model. <[doi:10.48550/arXiv.2208.13073](https://doi.org/10.48550/arXiv.2208.13073)>.

License GPL (>= 2)

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Compositionalzerocens-package

Modelling Zero Values in Compositional Data Using a Censored Model

Description

Modelling Zero Values in Compositional Data Using a Censored Model.

Details

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Maintainers

Michail Tsagris <mtsagris@uoc.gr>.

Author(s)

Michail Tsagris <mtsagris@uoc.gr>

References

Tsagris M. (2026). Modelling structural zeros in compositional data via a zero-censored multivariate normal model.

<https://arxiv.org/pdf/2208.13073>

rzerocens

Maximum likelihood estimation of the zero-censored model

Description

Maximum likelihood estimation of the zero-censored model.

Usage

```
rzerocens(n, mu, sigma)
```

Arguments

n	The sample size.
mu	The mean vector in R^{D-1} .
sigma	The covariance matrix in R^{D-1} .

Details

The function generates compositional data from the zero-censored model (Tsagris, 2026). The drawback is that only 1 zero, at most, is allowed in each compositional vector.

Value

A numerical matrix with compositional data.

Author(s)

R implementation and documentation: Michail Tsagris <mtsagris@uoc.gr>.

References

Tsagris M. (2026). Modelling structural zeros in compositional data via a zero-censored multivariate normal model.

<https://arxiv.org/pdf/2208.13073>

Examples

```
mu <- c(0.325, 0.121)
sigma <- matrix(c(0.149, -0.200,
                 -0.200, 0.323), 2, 2)
x <- rzerocens(1000, mu, sigma)
```

zerocens.em

Maximum likelihood estimation of the zero-censored model

Description

Maximum likelihood estimation of the zero-censored model.

Usage

```
zerocens.em(x, tol = 1e-6, maxit = 1000)
zerocens.mle(x)
```

Arguments

<code>x</code>	A numerical matrix with compositional data. Only one zero value is allowed in each row.
<code>tol</code>	The tolerance value to terminate the EM algorithm.
<code>maxit</code>	The maximum number of iterations allowed for the EM algorithm.

Details

The function fits the zero-censored model (Tsagris, 2026) to compositional data with zero values. The drawback is that only 1 zero, at most, is allowed in each compositional vector. The `zerocens.em()` function fits the model using the EM algorithm and it is quite efficient, whereas the second function, `zerocens.mle()` uses `optim()` and is quite slow.

Value

A list including:

<code>loglik</code>	The log-likelihood value.
<code>iters</code>	The number of iterations required by the EM algorithm.
<code>mu</code>	The estimated mean vector.
<code>sigma</code>	The estimated covariance matrix.

Author(s)

R implementation and documentation: Michail Tsagris <mtsagris@uoc.gr>.

References

Tsagris M. (2026). Modelling structural zeros in compositional data via a zero-censored multivariate normal model.

<https://arxiv.org/pdf/2208.13073>

Examples

```
mu <- c(0.325, 0.121)
sigma <- matrix(c(0.149, -0.200,
                 -0.200, 0.323), 2, 2)
x <- rzerocens(100, mu, sigma)
zerocens.em(x)
zerocens.mle(x)
```

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