

# Package ‘sabre’

July 23, 2025

**Version** 0.4.3

**Title** Spatial Association Between Regionalizations

**Description** Calculates a degree of spatial association between regionalizations or categorical maps using the information-theoretical V-measure (Nowosad and Stepinski (2018) <[doi:10.1080/13658816.2018.1511794](https://doi.org/10.1080/13658816.2018.1511794)>). It also offers an R implementation of the MapCurve method (Hargrove et al. (2006) <[doi:10.1007/s10109-006-0025-x](https://doi.org/10.1007/s10109-006-0025-x)>).

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**Encoding** UTF-8

**LazyData** true

**ByteCompile** true

**Suggests** testthat, covr, knitr, rmarkdown, methods

**RoxygenNote** 7.2.1

**Depends** R (>= 3.3.0)

**Imports** dplyr, entropy, raster, rlang, sf, tibble, tidyr

**Enhances** stars, terra

**VignetteBuilder** knitr

**URL** <https://jakubnowosad.com/sabre/>

**BugReports** <https://github.com/Nowosad/sabre/issues>

**NeedsCompilation** no

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**Repository** CRAN

**Date/Publication** 2022-08-17 09:30:02 UTC

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| eco_us | <i>Ecoregions of the United States</i> |
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### Description

Bailey's Ecoregions of the Conterminous United States

### Usage

eco\_us

### Format

An object of class `sf` (inherits from `data.frame`) with 330 rows and 5 columns.

### Source

<https://www.sciencebase.gov/catalog/item/54244abde4b037b608f9e23d>

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| mapcurves | <i>Mapcurves</i> |
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### Description

Mapcurves: a quantitative method for comparing categorical maps.

### Usage

`mapcurves(x, y, z = NULL)`

**Arguments**

|   |  |
|---|--|
| x | A numeric vector, representing a categorical values.   |
| y | A numeric vector, representing a categorical values.   |
| z | A numeric matrix. The goodness of fit (GOF) value for each pair of classes in x and y. By default this argument is set to NULL, and the value of z is calculated based on x and y. |

**Value**

A list with two elements:

- "ref\_map" - the map to be used as reference ("x" or "y")
- "gof" - the Mapcurves's goodness of fit value

**References**

Hargrove, William W., Forrest M. Hoffman, and Paul F. Hessburg. "Mapcurves: a quantitative method for comparing categorical maps." *Journal of Geographical Systems* 8.2 (2006): 187.

**Examples**

```
set.seed(2018-03-21)
A = floor(matrix(runif(100, 0, 9), 10))
B = floor(matrix(runif(100, 0, 9), 10))
mapcurves(A, B)
```

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mapcurves\_calc

*Mapcurves calculation*

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**Description**

It calculates the Mapcurves's goodness-of-fit (GOF)

**Usage**

```
mapcurves_calc(x, y, x_name, y_name, precision = NULL)

## S3 method for class 'sf'
mapcurves_calc(x, y, x_name, y_name, precision = NULL)

## S3 method for class 'stars'
mapcurves_calc(x, y, x_name = NULL, y_name = NULL, precision = NULL)

## S3 method for class 'SpatRaster'
mapcurves_calc(x, y, x_name = NULL, y_name = NULL, precision = NULL)

## S3 method for class 'RasterLayer'
mapcurves_calc(x, y, x_name = NULL, y_name = NULL, precision = NULL)
```

**Arguments**

|           |  |
|-----------|--|
| x         | An object of class <code>sf</code> with a POLYGON or MULTIPOLYGON geometry type or a spatial raster object of class <code>RasterLayer</code> , <code>SpatRaster</code> , or <code>stars</code> . |
| y         | An object of class <code>sf</code> with a POLYGON or MULTIPOLYGON geometry type or a spatial raster object of class <code>RasterLayer</code> , <code>SpatRaster</code> , or <code>stars</code> . |
| x_name    | A name of the column with regions/clusters names.  |
| y_name    | A name of the column with regions/clusters names.  |
| precision | numeric, or object of class <code>units</code> with distance units (but see details); see <a href="#">st_as_binary</a> for how to do this.   |

**Value**

A list with four elements:

- "map1" - the `sf` object containing the first map used for calculation of GOF
- "map2" - the `sf` object containing the second map used for calculation of GOF
- "ref\_map" - the map used as a reference ("x" or "y")
- "gof" - the Mapcurves's goodness of fit value

**References**

Hargrove, William W., Forrest M. Hoffman, and Paul F. Hessburg. "Mapcurves: a quantitative method for comparing categorical maps." *Journal of Geographical Systems* 8.2 (2006): 187.

**Examples**

```
library(sf)
data("regions1")
data("regions2")

mc = mapcurves_calc(x = regions1, y = regions2, x_name = z, y_name = z)
mc

plot(mc$map1)
plot(mc$map2)

library(raster)
data("partitions1")
data("partitions2")
mc2 = mapcurves_calc(x = partitions1, y = partitions2)
mc2

plot(mc2$map1)
plot(mc2$map2)
```

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partitions1

*Red regionalization (raster version)*

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**Description**

Raster data of the red regionalization used in Figure 1 of Stepinski and Nowosad (2018)

**Usage**

partitions1

**Format**

An object of class RasterLayer of dimension 8 x 10 x 1.

**References**

Nowosad, Jakub, and Tomasz F. Stepinski. "Spatial association between regionalizations using the information-theoretical V-measure." *International Journal of Geographical Information Science* (2018). <https://doi.org/10.1080/13658816.2018.1511794>

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partitions2

*Blue regionalization (raster version)*

---

**Description**

Raster data of the blue regionalization used in Figure 1 of Stepinski and Nowosad (2018)

**Usage**

partitions2

**Format**

An object of class RasterLayer of dimension 8 x 10 x 1.

**References**

Nowosad, Jakub, and Tomasz F. Stepinski. "Spatial association between regionalizations using the information-theoretical V-measure." *International Journal of Geographical Information Science* (2018). <https://doi.org/10.1080/13658816.2018.1511794>

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regions1

*Red regionalization*

---

**Description**

Data of the red regionalization used in Figure 1 of Stepinski and Nowosad (2018)

**Usage**

regions1

**Format**

An object of class sf (inherits from data.frame) with 4 rows and 2 columns.

**References**

Nowosad, Jakub, and Tomasz F. Stepinski. "Spatial association between regionalizations using the information-theoretical V-measure." *International Journal of Geographical Information Science* (2018). <https://doi.org/10.1080/13658816.2018.1511794>

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regions2

*Blue regionalization*

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**Description**

Data of the blue regionalization used in Figure 1 of Stepinski and Nowosad (2018)

**Usage**

regions2

**Format**

An object of class sf (inherits from data.frame) with 3 rows and 2 columns.

**References**

Nowosad, Jakub, and Tomasz F. Stepinski. "Spatial association between regionalizations using the information-theoretical V-measure." *International Journal of Geographical Information Science* (2018). <https://doi.org/10.1080/13658816.2018.1511794>

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vmeasure

*V-measure*

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### Description

A conditional entropy-based external cluster evaluation measure.

### Usage

```
vmeasure(x, y, z = NULL, B = 1)
```

### Arguments

- |   |  |
|---|--|
| x | A numeric vector, representing a categorical values.   |
| y | A numeric vector, representing a categorical values.   |
| z | A numeric matrix. A contingency table of the counts at each combination of categorical levels. By default this argument is set to NULL, and the value of z is calculated based on x and y.         |
| B | A numeric value. If $B > 1$ then completeness is weighted more strongly than homogeneity, and if $B < 1$ then homogeneity is weighted more strongly than completeness. By default this value is 1. |

### Value

A list with three elements:

- "v\_measure"
- "homogeneity"
- "completeness"

### References

Rosenberg, Andrew, and Julia Hirschberg. "V-measure: A conditional entropy-based external cluster evaluation measure." Proceedings of the 2007 joint conference on empirical methods in natural language processing and computational natural language learning (EMNLP-CoNLL). 2007.

### Examples

```
x = c(1, 1, 1, 2, 2, 3, 3, 3, 1, 1, 2, 2, 2, 3, 3)
y = c(rep(1, 5), rep(2, 5), rep(3, 5))
vmeasure(x, y)
```

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|               |                              |
|---------------|------------------------------|
| vmeasure_calc | <i>V-measure calculation</i> |
|---------------|------------------------------|

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### Description

It calculates a degree of spatial association between regionalizations using an information-theoretical measure called the V-measure

### Usage

```
vmeasure_calc(x, y, x_name, y_name, B = 1, precision = NULL)

## S3 method for class 'sf'
vmeasure_calc(x, y, x_name, y_name, B = 1, precision = NULL)

## S3 method for class 'stars'
vmeasure_calc(x, y, x_name = NULL, y_name = NULL, B = 1, precision = NULL)

## S3 method for class 'SpatRaster'
vmeasure_calc(x, y, x_name = NULL, y_name = NULL, B = 1, precision = NULL)

## S3 method for class 'RasterLayer'
vmeasure_calc(x, y, x_name = NULL, y_name = NULL, B = 1, precision = NULL)
```

### Arguments

|           |  |
|-----------|--|
| x         | An object of class sf with a POLYGON or MULTIPOLYGON geometry type or a spatial raster object of class RasterLayer, SpatRaster, or stars.  |
| y         | An object of class sf with a POLYGON or MULTIPOLYGON geometry type or a spatial raster object of class RasterLayer, SpatRaster, or stars.  |
| x_name    | A name of the column with regions/clusters names.  |
| y_name    | A name of the column with regions/clusters names.  |
| B         | A numeric value. If $B > 1$ then completeness is weighted more strongly than homogeneity, and if $B < 1$ then homogeneity is weighted more strongly than completeness. By default this value is 1. |
| precision | numeric, or object of class units with distance units (but see details); see <a href="#">st_as_binary</a> for how to do this.  |

### Value

A list with five elements:

- "map1" - the sf object containing the first preprocessed map used for calculation of GOF with two attributes - map1 (name of the category) and rih (region inhomogeneity)
- "map2" - the sf object containing the second preprocessed map used for calculation of GOF with two attributes - map1 (name of the category) and rih (region inhomogeneity)



- "v\_measure"
- "homogeneity"
- "completeness"

## References

Nowosad, Jakub, and Tomasz F. Stepinski. "Spatial association between regionalizations using the information-theoretical V-measure." *International Journal of Geographical Information Science* (2018). <https://doi.org/10.1080/13658816.2018.1511794>

Rosenberg, Andrew, and Julia Hirschberg. "V-measure: A conditional entropy-based external cluster evaluation measure." *Proceedings of the 2007 joint conference on empirical methods in natural language processing and computational natural language learning (EMNLP-CoNLL)*. 2007.

## Examples

```
library(sf)
data("regions1")
data("regions2")
vm = vmeasure_calc(x = regions1, y = regions2, x_name = z, y_name = z)
vm
```

```
plot(vm$map1["rih"])
plot(vm$map2["rih"])
```

```
library(raster)
data("partitions1")
data("partitions2")
vm2 = vmeasure_calc(x = partitions1, y = partitions2)
vm2
```

```
plot(vm2$map1[["rih"]])
plot(vm2$map2[["rih"]])
```

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