

## Description

`spmatrix normalize` normalizes a spatial weighting matrix. It is mostly used after `spmatrix import`.

## Quick start

Normalize spatial weighting matrix `W` using the default spectral normalization

```
spmatrix normalize W
```

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## Syntax

```
spmatrix normalize spmatname [ , normalize(normalize) ]
```

*spmatname* is the name of an existing spatial weighting matrix stored in memory.

<i>normalize</i>	Description
<u>spectral</u>	spectral; the default
minmax	min–max
row	row
none	do not normalize; leave matrix as is

## Option

`normalize(normalize)` specifies how the resulting matrix is to be scaled. `normalize(spectral)` is the default. `normalize(minmax)`, `normalize(row)`, and `normalize(none)` are also allowed. See [SP] [spmatrix create](#) for full details of the option and *Choosing weighting matrices and their normalization* in [SP] [spregress](#) for details about normalization.

## Remarks and examples

Remarks are presented under the following headings:

- Using `spmatrix normalize` after `spmatrix import`*
- Using `spmatrix normalize` after other commands*
- Using `spmatrix normalize` to change normalization*

## Using spmatrix normalize after spmatrix import

With one exception, the commands that create spatial weighting matrices provide a `normalize()` option and default to `normalize(spectral)`. `spmatrix import` is the exception. You can use `spmatrix normalize` after importing; see [\[SP\] spmatrix import](#).

## Using spmatrix normalize after other commands

If you create a matrix using `normalize(none)`, you can use `spmatrix normalize` to normalize the matrix subsequently. For instance,

```
. spmatrix create contiguity Wc, normalize(none)
. spmatrix normalize Wc
```

## Using spmatrix normalize to change normalization

Sp provides three normalizations:

<code>normalize(spectral)</code>	the default
<code>normalize(minmax)</code>	min–max
<code>normalize(row)</code>	row

Concerning the first two, you can use `spmatrix normalize` to change the normalization.

1. If  $W$  is normalized spectrally, no matter how you created it, normalizing it again spectrally leaves the matrix unchanged.
2. The same applies to the min–max normalization. If  $W$  is normalized using min–max, normalizing it again leaves the matrix unchanged.
3. If  $W$  is normalized spectrally and you renormalize using min–max, the result is the same as you would have obtained had  $W$  been normalized using min–max at the outset.
4. The same applies if the roles of min–max and spectral are reversed. If  $W$  is normalized using min–max and you renormalize it spectrally, the result is the same as if you had normalized it spectrally at the outset.

Row normalization, meanwhile, is unique. You can apply row normalization repeatedly to an already row-normalized matrix and obtain the same results, but you cannot change normalizations.

See [Choosing weighting matrices and their normalization](#) in [\[SP\] spregress](#) for details about normalization.

## Also see

[\[SP\] spmatrix](#) — Categorical guide to the `spmatrix` command

[\[SP\] spmatrix import](#) — Import weighting matrix from text file

[\[SP\] Intro](#) — Introduction to spatial data and SAR models

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