

[\(../index.html\)](#)

Previous topic

[scipy.misc.lena](#)
([scipy.misc.lena.html](#))

Next topic

[scipy.misc.pade](#)
([scipy.misc.pade.html](#))

scipy.misc.logsumexp

scipy.misc.logsumexp(*a*, *axis=None*, *b=None*)
(<http://github.com/scipy/scipy/blob/v0.14.0/scipy/misc/common.py#L18>)

[\[source\]](#)

Compute the log of the sum of exponentials of input elements.

Parameters : *a* : *array_like*

Input array.

axis : *int, optional*

Axis over which the sum is taken. By default *axis* is None, and all elements are summed.

New in version 0.11.0.

b : *array-like, optional*

Scaling factor for $\exp(a)$ must be of the same shape as *a* or broadcastable to *a*.

New in version 0.12.0.

Returns : *res* : *ndarray*

The result, $\text{np.log}(\text{np.sum}(\text{np.exp}(a)))$ calculated in a numerically more stable way. If *b* is given then $\text{np.log}(\text{np.sum}(b * \text{np.exp}(a)))$ is returned.

See also:

[numpy.logaddexp](#)

(<http://jiffyclub.github.io/numpy/reference/generated/numpy.logaddexp.html#numpy.logaddexp>),

[numpy.logaddexp2](#)

(<http://jiffyclub.github.io/numpy/reference/generated/numpy.logaddexp2.html#numpy.logaddexp2>)

Notes

Numpy has a `logaddexp` function which is very similar to `logsumexp`, but only handles two arguments. `logaddexp.reduce` is similar to this function, but may be less stable.

Examples

```
>>> from scipy.misc import logsumexp
>>> a = np.arange(10)
>>> np.log(np.sum(np.exp(a)))
9.4586297444267107
>>> logsumexp(a)
9.4586297444267107
```

With weights

```
>>> a = np.arange(10)
>>> b = np.arange(10, 0, -1)
>>> logsumexp(a, b=b)
9.9170178533034665
>>> np.log(np.sum(b*np.exp(a)))
9.9170178533034647
```