scipy.sparse.csr_matrix

class **scipy.sparse.csr_matrix(***arg1*, *shape=None*, *dtype=None*, *copy=False***)** **[source] (http://github.com/scipy/scipy/blob/v0.19.0/scipy/sparse/csr.py#L23-L456)**

Compressed Sparse Row matrix

This can be instantiated in several ways:

csr_matrix(D)

with a dense matrix or rank-2 ndarray D

csr_matrix(S)

with another sparse matrix S (equivalent to S.tocsr())

csr_matrix((M, N), [dtype])

to construct an empty matrix with shape (M, N) dtype is optional, defaulting to dtype='d'.

csr_matrix((data, (row_ind, col_ind)), [shape=(M, N)])

where `data`, `row_ind` and `col_ind` satisfy the relationship `a[row_ind[k], col_ind[k]] = data[k]`.

csr_matrix((data, indices, indptr), [shape=(M, N)])

is the standard CSR representation where the column indices for row i are stored in `indices[indptr[i]:indptr[i+1]]` and their corresponding values are stored in `data[indptr[i]:indptr[i+1]]`. If the shape parameter is not supplied, the matrix dimensions are inferred from the index arrays.

Notes

Sparse matrices can be used in arithmetic operations: they support addition, subtraction, multiplication, division, and matrix power.

Advantages of the CSR format

- efficient arithmetic operations CSR + CSR, CSR * CSR, etc.
- efficient row slicing
- fast matrix vector products

Disadvantages of the CSR format

- slow column slicing operations (consider CSC)
- changes to the sparsity structure are expensive (consider LIL or DOK)

Examples

```
>>> import numpy as np
>>> from scipy.sparse import csr_matrix
>>> csr_matrix((3, 4), dtype=np.int8).toarray()
array([[0, 0, 0, 0],
       [0, 0, 0, 0],
       [0, 0, 0, 0]], dtype=int8)
```

```
>>> row = np.array([0, 0, 1, 2, 2, 2])
>>> col = np.array([0, 2, 2, 0, 1, 2])
>>> data = np.array([1, 2, 3, 4, 5, 6])
>>> csr_matrix((data, (row, col)), shape=(3, 3)).toarray()
array([[1, 0, 2],
       [0, 0, 3],
       [4, 5, 6]])
```

```
>>> indptr = np.array([0, 2, 3, 6])
>>> indices = np.array([0, 2, 2, 0, 1, 2])
>>> data = np.array([1, 2, 3, 4, 5, 6])
>>> csr_matrix((data, indices, indptr), shape=(3, 3)).toarray()
array([[1, 0, 2],
       [0, 0, 3],
       [4, 5, 6]])
```

As an example of how to construct a CSR matrix incrementally, the following snippet builds a term-document matrix from texts:

>>>

```
>>> docs = [["hello", "world", "hello"], ["goodbye", "cruel", "world"]]
>>> indptr = [0]
>>> indices = []
>>> data = []
>>> vocabulary = {}
>>> for d in docs:
...     for term in d:
...         index = vocabulary.setdefault(term, len(vocabulary))
...         indices.append(index)
...         data.append(1)
...     indptr.append(len(indices))
...
>>> csr_matrix((data, indices, indptr), dtype=int).toarray()
array([[2, 1, 0, 0],
       [0, 1, 1, 1]])
```

Attributes

shape (scipy.sparse.csr_matrix.shape.html#scipy.sparse.csr_matrix.shape)	Get shape of a matrix.
nnz (scipy.sparse.csr_matrix.nnz.html#scipy.sparse.csr_matrix.nnz)	Number of stored values, including explicit zeros.
has_sorted_indices (scipy.sparse.csr_matrix.has_sorted_indices.html#scipy.sparse.csr_matrix.has_sorted_indices)	Determine whether the matrix has sorted indices

dtype	(dtype) Data type of the matrix
ndim	(int) Number of dimensions (this is always 2)
data	CSR format data array of the matrix
indices	CSR format index array of the matrix
indptr	CSR format index pointer array of the matrix

Methods

arcsin (scipy.sparse.csr_matrix.arcsin.html#scipy.sparse.csr_matrix.arcsin)()	Element-wise arcsin.
arcsinh (scipy.sparse.csr_matrix.arcsinh.html#scipy.sparse.csr_matrix.arcsinh)()	Element-wise arcsinh.
arctan (scipy.sparse.csr_matrix.arctan.html#scipy.sparse.csr_matrix.arctan)()	Element-wise arctan.
arctanh (scipy.sparse.csr_matrix.arctanh.html#scipy.sparse.csr_matrix.arctanh)()	Element-wise arctanh.
argmax (scipy.sparse.csr_matrix.argmax.html#scipy.sparse.csr_matrix.argmax)([axis, out])	Return indices of minimum elements along an axis.
argmin (scipy.sparse.csr_matrix.argmin.html#scipy.sparse.csr_matrix.argmin)([axis, out])	Return indices of minimum elements along an axis.
asformat (scipy.sparse.csr_matrix.asformat.html#scipy.sparse.csr_matrix.asformat)(format)	Return this matrix in a given sparse format
asfptype (scipy.sparse.csr_matrix.asfptype.html#scipy.sparse.csr_matrix.asfptype)()	Upcast matrix to a floating point format (if necessary)
astype (scipy.sparse.csr_matrix.astype.html#scipy.sparse.csr_matrix.astype)(t)	Cast the matrix elements to a specified type.
ceil (scipy.sparse.csr_matrix.ceil.html#scipy.sparse.csr_matrix.ceil)()	Element-wise ceil.
check_format (scipy.sparse.csr_matrix.check_format.html#scipy.sparse.csr_matrix.check_format)([full_check])	check whether the matrix format is valid
conj (scipy.sparse.csr_matrix.conj.html#scipy.sparse.csr_matrix.conj)()	Element-wise complex conjugation.
conjugate (scipy.sparse.csr_matrix.conjugate.html#scipy.sparse.csr_matrix.conjugate)()	Element-wise complex conjugation.
copy (scipy.sparse.csr_matrix.copy.html#scipy.sparse.csr_matrix.copy)()	Returns a copy of this matrix.
count_nonzero (scipy.sparse.csr_matrix.count_nonzero.html#scipy.sparse.csr_matrix.count_nonzero)()	Number of non-zero entries, equivalent to
deg2rad (scipy.sparse.csr_matrix.deg2rad.html#scipy.sparse.csr_matrix.deg2rad)()	Element-wise deg2rad.
diagonal (scipy.sparse.csr_matrix.diagonal.html#scipy.sparse.csr_matrix.diagonal)()	Returns the main diagonal of the matrix
dot (scipy.sparse.csr_matrix.dot.html#scipy.sparse.csr_matrix.dot)(other)	Ordinary dot product
eliminate_zeros (scipy.sparse.csr_matrix.eliminate_zeros.html#scipy.sparse.csr_matrix.eliminate_zeros)()	Remove zero entries from the matrix
expm1 (scipy.sparse.csr_matrix.expm1.html#scipy.sparse.csr_matrix.expm1)()	Element-wise expm1.
floor (scipy.sparse.csr_matrix.floor.html#scipy.sparse.csr_matrix.floor)()	Element-wise floor.
getH (scipy.sparse.csr_matrix.getH.html#scipy.sparse.csr_matrix.getH)()	Return the Hermitian transpose of this matrix.
get_shape (scipy.sparse.csr_matrix.get_shape.html#scipy.sparse.csr_matrix.get_shape)()	Get shape of a matrix.
getcol (scipy.sparse.csr_matrix.getcol.html#scipy.sparse.csr_matrix.getcol)(i)	Returns a copy of column i of the matrix, as a (m x 1) CSR matrix (column vector).
getformat (scipy.sparse.csr_matrix.getformat.html#scipy.sparse.csr_matrix.getformat)()	Format of a matrix representation as a string.
getmaxprint (scipy.sparse.csr_matrix.getmaxprint.html#scipy.sparse.csr_matrix.getmaxprint)()	Maximum number of elements to display when printed.
getnnz (scipy.sparse.csr_matrix.getnnz.html#scipy.sparse.csr_matrix.getnnz)([axis])	Number of stored values, including explicit zeros.
getrow (scipy.sparse.csr_matrix.getrow.html#scipy.sparse.csr_matrix.getrow)(i)	Returns a copy of row i of the matrix, as a (1 x n) CSR matrix (row vector).
log1p (scipy.sparse.csr_matrix.log1p.html#scipy.sparse.csr_matrix.log1p)()	Element-wise log1p.
max (scipy.sparse.csr_matrix.max.html#scipy.sparse.csr_matrix.max)([axis, out])	Return the maximum of the matrix or maximum along an axis.
maximum (scipy.sparse.csr_matrix.maximum.html#scipy.sparse.csr_matrix.maximum)(other)	Element-wise maximum between this and another matrix.
mean (scipy.sparse.csr_matrix.mean.html#scipy.sparse.csr_matrix.mean)([axis, dtype, out])	Compute the arithmetic mean along the specified axis.
min (scipy.sparse.csr_matrix.min.html#scipy.sparse.csr_matrix.min)([axis, out])	Return the minimum of the matrix or maximum along an axis.
minimum (scipy.sparse.csr_matrix.minimum.html#scipy.sparse.csr_matrix.minimum)(other)	Element-wise minimum between this and another matrix.

multiply (scipy.sparse.csr_matrix.multiply.html#scipy.sparse.csr_matrix.multiply)(other)	Point-wise multiplication by another matrix, vector, or scalar.
nonzero (scipy.sparse.csr_matrix.nonzero.html#scipy.sparse.csr_matrix.nonzero)()	nonzero indices
power (scipy.sparse.csr_matrix.power.html#scipy.sparse.csr_matrix.power)(n[, dtype])	This function performs element-wise power.
prune (scipy.sparse.csr_matrix.prune.html#scipy.sparse.csr_matrix.prune)()	Remove empty space after all non-zero elements.
rad2deg (scipy.sparse.csr_matrix.rad2deg.html#scipy.sparse.csr_matrix.rad2deg)()	Element-wise rad2deg.
reshape (scipy.sparse.csr_matrix.reshape.html#scipy.sparse.csr_matrix.reshape)(shape[, order])	Gives a new shape to a sparse matrix without changing its data.
rint (scipy.sparse.csr_matrix.rint.html#scipy.sparse.csr_matrix.rint)()	Element-wise rint.
set_shape (scipy.sparse.csr_matrix.set_shape.html#scipy.sparse.csr_matrix.set_shape)(shape)	See reshape (scipy.sparse.csr_matrix.reshape.html#scipy.sparse.csr_matrix.resha
setdiag (scipy.sparse.csr_matrix.setdiag.html#scipy.sparse.csr_matrix.setdiag)(values[, k])	Set diagonal or off-diagonal elements of the array.
sign (scipy.sparse.csr_matrix.sign.html#scipy.sparse.csr_matrix.sign)()	Element-wise sign.
sin (scipy.sparse.csr_matrix.sin.html#scipy.sparse.csr_matrix.sin)()	Element-wise sin.
sinh (scipy.sparse.csr_matrix.sinh.html#scipy.sparse.csr_matrix.sinh)()	Element-wise sinh.
sort_indices (scipy.sparse.csr_matrix.sort_indices.html#scipy.sparse.csr_matrix.sort_indices)()	Sort the indices of this matrix *in place*
sorted_indices (scipy.sparse.csr_matrix.sorted_indices.html#scipy.sparse.csr_matrix.sorted_indices)()	Return a copy of this matrix with sorted indices
sqrt (scipy.sparse.csr_matrix.sqrt.html#scipy.sparse.csr_matrix.sqrt)()	Element-wise sqrt.
sum (scipy.sparse.csr_matrix.sum.html#scipy.sparse.csr_matrix.sum)([axis, dtype, out])	Sum the matrix elements over a given axis.
sum_duplicates (scipy.sparse.csr_matrix.sum_duplicates.html#scipy.sparse.csr_matrix.sum_duplicates)()	Eliminate duplicate matrix entries by adding them together
tan (scipy.sparse.csr_matrix.tan.html#scipy.sparse.csr_matrix.tan)()	Element-wise tan.
tanh (scipy.sparse.csr_matrix.tanh.html#scipy.sparse.csr_matrix.tanh)()	Element-wise tanh.
toarray (scipy.sparse.csr_matrix.toarray.html#scipy.sparse.csr_matrix.toarray)([order, out])	See the docstring for spmatrix.toarray (scipy.sparse.spmatrix.toarray.html#scipy.sparse.spmatrix.toarray).
tobsr (scipy.sparse.csr_matrix.tobsr.html#scipy.sparse.csr_matrix.tobsr)([blocksize, copy])	Convert this matrix to Block Sparse Row format.
tocoo (scipy.sparse.csr_matrix.tocoo.html#scipy.sparse.csr_matrix.tocoo)([copy])	Convert this matrix to COOrdinate format.
tocsc (scipy.sparse.csr_matrix.tocsc.html#scipy.sparse.csr_matrix.tocsc)([copy])	Convert this matrix to Compressed Sparse Column format.
tocsr (scipy.sparse.csr_matrix.tocsr.html#scipy.sparse.csr_matrix.tocsr)([copy])	Convert this matrix to Compressed Sparse Row format.
todense (scipy.sparse.csr_matrix.todense.html#scipy.sparse.csr_matrix.todense)([order, out])	Return a dense matrix representation of this matrix.
todia (scipy.sparse.csr_matrix.todia.html#scipy.sparse.csr_matrix.todia)([copy])	Convert this matrix to sparse DIAgonal format.
todok (scipy.sparse.csr_matrix.todok.html#scipy.sparse.csr_matrix.todok)([copy])	Convert this matrix to Dictionary Of Keys format.
tolil (scipy.sparse.csr_matrix.tolil.html#scipy.sparse.csr_matrix.tolil)([copy])	Convert this matrix to LInked List format.
transpose (scipy.sparse.csr_matrix.transpose.html#scipy.sparse.csr_matrix.transpose)([axes, copy])	Reverses the dimensions of the sparse matrix.
trunc (scipy.sparse.csr_matrix.trunc.html#scipy.sparse.csr_matrix.trunc)()	Element-wise trunc.

Previous topic

scipy.sparse.csc_matrix.trunc (scipy.sparse.csc_matrix.trunc.html)

Next topic

scipy.sparse.csr_matrix.shape (scipy.sparse.csr_matrix.shape.html)