

torch.Tensor

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master] [docs] [source] tensors.rst, line 1)

Unknown directive type "currentmodule".

```
.. currentmodule:: torch
```

A `:class:`torch.Tensor`` is a multi-dimensional matrix containing elements of a single data type.

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Data types

Torch defines 10 tensor types with CPU and GPU variants which are as follows:

Data type	dtype	CPU tensor	GPU tensor
32-bit floating point	<code>torch.float32</code> or <code>torch.float</code>	<code>:class:`torch.FloatTensor`</code> <div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master] [docs] [source] tensors.rst, line 21); backlink Unknown interpreted text role "class".</div>	<code>:class:`torch.cuda.FloatTensor`</code> <div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master] [docs] [source] tensors.rst, line 21); backlink Unknown interpreted text role "class".</div>
64-bit floating point	<code>torch.float64</code> or <code>torch.double</code>	<code>:class:`torch.DoubleTensor`</code> <div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master] [docs] [source] tensors.rst, line 22); backlink Unknown interpreted text role "class".</div>	<code>:class:`torch.cuda.DoubleTensor`</code> <div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master] [docs] [source] tensors.rst, line 22); backlink Unknown interpreted text role "class".</div>

Data type	dtype	CPU tensor	GPU tensor
16-bit floating point [1]	torch.float16 or torch.half	:class:`torch.HalfTensor` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master][docs][source] tensors.rst, line 23); backlink Unknown interpreted text role "class". </div>	:class:`torch.cuda.HalfTensor` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master][docs][source] tensors.rst, line 23); backlink Unknown interpreted text role "class". </div>
16-bit floating point [2]	torch.bfloat16	:class:`torch.BFloat16Tensor` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master][docs][source] tensors.rst, line 24); backlink Unknown interpreted text role "class". </div>	:class:`torch.cuda.BFloat16Tensor` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master][docs][source] tensors.rst, line 24); backlink Unknown interpreted text role "class". </div>
32-bit complex	torch.complex32		
64-bit complex	torch.complex64		
128-bit complex	torch.complex128 or torch.cdouble		
8-bit integer (unsigned)	torch.uint8	:class:`torch.ByteTensor` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master][docs][source] tensors.rst, line 28); backlink Unknown interpreted text role "class". </div>	:class:`torch.cuda.ByteTensor` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master][docs][source] tensors.rst, line 28); backlink Unknown interpreted text role "class". </div>

Data type	dtype	CPU tensor	GPU tensor
8-bit integer (signed)	torch.int8	:class:`torch.CharTensor` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master][docs][source] tensors.rst, line 29); backlink Unknown interpreted text role "class". </div>	:class:`torch.cuda.CharTensor` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master][docs][source] tensors.rst, line 29); backlink Unknown interpreted text role "class". </div>
16-bit integer (signed)	torch.int16 or torch.short	:class:`torch.ShortTensor` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master][docs][source] tensors.rst, line 30); backlink Unknown interpreted text role "class". </div>	:class:`torch.cuda.ShortTensor` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master][docs][source] tensors.rst, line 30); backlink Unknown interpreted text role "class". </div>
32-bit integer (signed)	torch.int32 or torch.int	:class:`torch.IntTensor` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master][docs][source] tensors.rst, line 31); backlink Unknown interpreted text role "class". </div>	:class:`torch.cuda.IntTensor` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master][docs][source] tensors.rst, line 31); backlink Unknown interpreted text role "class". </div>

Data type	dtype	CPU tensor	GPU tensor
64-bit integer (signed)	torch.int64 or torch.long	: class: 'torch.LongTensor' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master][docs][source] tensors.rst, line 32); backlink Unknown interpreted text role "class". </div>	: class: 'torch.cuda.LongTensor' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master][docs][source] tensors.rst, line 32); backlink Unknown interpreted text role "class". </div>
Boolean	torch.bool	: class: 'torch.BoolTensor' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master][docs][source] tensors.rst, line 33); backlink Unknown interpreted text role "class". </div>	: class: 'torch.cuda.BoolTensor' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master][docs][source] tensors.rst, line 33); backlink Unknown interpreted text role "class". </div>
quantized 8-bit integer (unsigned)	torch.quint8	: class: 'torch.ByteTensor' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master][docs][source] tensors.rst, line 34); backlink Unknown interpreted text role "class". </div>	/

Data type	dtype	CPU tensor	GPU tensor
quantized 8-bit integer (signed)	<code>torch.qint8</code>	<p><code>:class:'torch.CharTensor'</code></p> <div> <p>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master] [docs] [source] tensors.rst, line 35); backlink</p> <p>Unknown interpreted text role "class".</p> </div>	/
quantized 32-bit integer (signed)	<code>torch.qint32</code>	<p><code>:class:'torch.IntTensor'</code></p> <div> <p>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master] [docs] [source] tensors.rst, line 36); backlink</p> <p>Unknown interpreted text role "class".</p> </div>	/
quantized 4-bit integer (unsigned) [3]	<code>torch.quint4x2</code>	<p><code>:class:'torch.ByteTensor'</code></p> <div> <p>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\pytorch-master\docs\source\[pytorch-master] [docs] [source] tensors.rst, line 37); backlink</p> <p>Unknown interpreted text role "class".</p> </div>	/

- [1] Sometimes referred to as binary16: uses 1 sign, 5 exponent, and 10 significand bits. Useful when precision is important at the expense of range.
- [2] Sometimes referred to as Brain Floating Point: uses 1 sign, 8 exponent, and 7 significand bits. Useful when range is important, since it has the same number of exponent bits as `float32`
- [3] quantized 4-bit integer is stored as a 8-bit signed integer. Currently it's only supported in EmbeddingBag operator.

`:class:'torch.Tensor'` is an alias for the default tensor type (`:class:'torch.FloatTensor'`).

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Initializing and basic operations

A tensor can be constructed from a Python `:class:`list`` or sequence using the `:func:`torch.tensor`` constructor:

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```
>>> torch.tensor([[1., -1.], [1., -1.]])
tensor([[ 1.0000, -1.0000],
        [ 1.0000, -1.0000]])
>>> torch.tensor(np.array([[1, 2, 3], [4, 5, 6]]))
tensor([[ 1,  2,  3],
        [ 4,  5,  6]])
```

Warning

`:func:`torch.tensor`` always copies `:attr:`data``. If you have a Tensor `:attr:`data`` and just want to change its `requires_grad` flag, use `:meth:`~torch.Tensor.requires_grad_`` or `:meth:`~torch.Tensor.detach`` to avoid a copy. If you have a numpy array and want to avoid a copy, use `:func:`torch.as_tensor``.

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A tensor of specific data type can be constructed by passing a `:class:`torch.dtype`` and/or a `:class:`torch.device`` to a constructor or tensor creation op:

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Unknown interpreted text role "class".

```
>>> torch.zeros([2, 4], dtype=torch.int32)
tensor([[ 0,  0,  0,  0],
        [ 0,  0,  0,  0]], dtype=torch.int32)
>>> cuda0 = torch.device('cuda:0')
>>> torch.ones([2, 4], dtype=torch.float64, device=cuda0)
tensor([[ 1.0000,  1.0000,  1.0000,  1.0000],
        [ 1.0000,  1.0000,  1.0000,  1.0000]], dtype=torch.float64, device='cuda:0')
```

For more information about building Tensors, see `ref`tensor-creation-ops``

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The contents of a tensor can be accessed and modified using Python's indexing and slicing notation:

```
>>> x = torch.tensor([[1, 2, 3], [4, 5, 6]])
>>> print(x[1][2])
tensor(6)
>>> x[0][1] = 8
>>> print(x)
tensor([[ 1,  8,  3],
        [ 4,  5,  6]])
```

Use `meth:`torch.Tensor.item`` to get a Python number from a tensor containing a single value:

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Unknown interpreted text role "meth".

```
>>> x = torch.tensor([1])
>>> x
tensor([ 1])
>>> x.item()
1
>>> x = torch.tensor(2.5)
>>> x
tensor(2.5000)
>>> x.item()
2.5
```

For more information about indexing, see `ref`indexing-slicing-joining``

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A tensor can be created with `attr:`requires_grad=True`` so that `mod:`torch.autograd`` records operations on them for automatic differentiation.

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```
>>> x = torch.tensor([[1., -1.], [1., 1.]], requires_grad=True)
>>> out = x.pow(2).sum()
>>> out.backward()
>>> x.grad
tensor([[ 2.0000, -2.0000],
        [ 2.0000,  2.0000]])
```

Each tensor has an associated `:class:`torch.Storage``, which holds its data. The tensor class also provides multi-dimensional, [strided](#) view of a storage and defines numeric operations on it.

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Note

For more information on tensor views, see [:ref:`tensor-view-doc`](#).

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Note

For more information on the `:class:`torch.dtype``, `:class:`torch.device``, and `:class:`torch.layout`` attributes of a `:class:`torch.Tensor``, see [:ref:`tensor-attributes-doc`](#).

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Note

Methods which mutate a tensor are marked with an underscore suffix. For example, `:func:`torch.FloatTensor.abs_`` computes the absolute value in-place and returns the modified tensor, while `:func:`torch.FloatTensor.abs`` computes the result in a new tensor.

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[source] tensors.rst, line 148); [backlink](#)

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[source] tensors.rst, line 148); [backlink](#)

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Note

To change an existing tensor's `:class:`torch.device`` and/or `:class:`torch.dtype``, consider using `:meth:`~torch.Tensor.to`` method on the tensor.

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[source] tensors.rst, line 154); [backlink](#)

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[source] tensors.rst, line 154); [backlink](#)

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[source] tensors.rst, line 154); [backlink](#)

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Warning

Current implementation of `:class:`torch.Tensor`` introduces memory overhead, thus it might lead to unexpectedly high memory usage in the applications with many tiny tensors. If this is your case, consider using one large structure.

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[source] tensors.rst, line 158); [backlink](#)

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Tensor class reference

There are a few main ways to create a tensor, depending on your use case.

- To create a tensor with pre-existing data, use `:func:`torch.tensor``.

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- To create a tensor with specific size, use `torch.*` tensor creation ops (see [ref: tensor-creation-ops](#)).

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- To create a tensor with the same size (and similar types) as another tensor, use `torch.*_like` tensor creation ops (see [ref: tensor-creation-ops](#)).

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- To create a tensor with similar type but different size as another tensor, use `tensor.new_*` creation ops.

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Unknown directive type "autoattribute".

```
.. autoattribute:: Tensor.T
```

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Unknown directive type "autoattribute".

```
.. autoattribute:: Tensor.H
```

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Unknown directive type "autoattribute".

```
.. autoattribute:: Tensor.mT
```

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Unknown directive type "autoattribute".

```
.. autoattribute:: Tensor.mH
```

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Unknown directive type "autosummary".

```
.. autosummary::
   :toctree: generated
   :nosignatures:

   Tensor.new_tensor
   Tensor.new_full
   Tensor.new_empty
   Tensor.new_ones
   Tensor.new_zeros
```

Tensor.is_cuda
Tensor.is_quantized
Tensor.is_meta
Tensor.device
Tensor.grad
Tensor.ndim
Tensor.real
Tensor.imag

Tensor.abs
Tensor.abs_
Tensor.absolute
Tensor.absolute_
Tensor.acos
Tensor.acos_
Tensor.arccos
Tensor.arccos_
Tensor.add
Tensor.add_
Tensor.addbmm
Tensor.addbmm_
Tensor.addcddiv
Tensor.addcddiv_
Tensor.addcmul
Tensor.addcmul_
Tensor.addmm
Tensor.addmm_
Tensor.sspaddmm
Tensor.addmv
Tensor.addmv_
Tensor.addr
Tensor.addr_
Tensor.adjoint
Tensor.allclose
Tensor.amax
Tensor.amin
Tensor.aminmax
Tensor.angle
Tensor.apply_
Tensor.argmax
Tensor.argmin
Tensor.argsort
Tensor.argwhere
Tensor.asin
Tensor.asin_
Tensor.arcsin
Tensor.arcsin_
Tensor.as_strided
Tensor.atan
Tensor.atan_
Tensor.arctan
Tensor.arctan_
Tensor.atan2
Tensor.atan2_
Tensor.arctan2
Tensor.arctan2_
Tensor.all
Tensor.any
Tensor.backward
Tensor.baddbmm
Tensor.baddbmm_
Tensor.bernoulli
Tensor.bernoulli_
Tensor.bfloat16
Tensor.bincount
Tensor.bitwise_not
Tensor.bitwise_not_
Tensor.bitwise_and
Tensor.bitwise_and_
Tensor.bitwise_or
Tensor.bitwise_or_
Tensor.bitwise_xor
Tensor.bitwise_xor_
Tensor.bitwise_left_shift
Tensor.bitwise_left_shift_
Tensor.bitwise_right_shift
Tensor.bitwise_right_shift_
Tensor.bmm
Tensor.bool
Tensor.byte

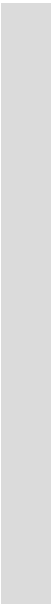

Tensor.broadcast_to
Tensor.cauchy_
Tensor.ceil
Tensor.ceil_
Tensor.char
Tensor.cholesky
Tensor.cholesky_inverse
Tensor.cholesky_solve
Tensor.chunk
Tensor.clamp
Tensor.clamp_
Tensor.clip
Tensor.clip_
Tensor.clone
Tensor.contiguous
Tensor.copy_
Tensor.conj
Tensor.conj_physical
Tensor.conj_physical_
Tensor.resolve_conj
Tensor.resolve_neg
Tensor.copysign
Tensor.copysign_
Tensor.cos
Tensor.cos_
Tensor.cosh
Tensor.cosh_
Tensor.corrcoef
Tensor.count_nonzero
Tensor.cov
Tensor.acosh
Tensor.acosh_
Tensor.arccosh
Tensor.arccosh_
Tensor.cpu
Tensor.cross
Tensor.cuda
Tensor.logcumsumexp
Tensor.cummax
Tensor.cummin
Tensor.cumprod
Tensor.cumprod_
Tensor.cumsum
Tensor.cumsum_
Tensor.data_ptr
Tensor.deg2rad
Tensor.dequantize
Tensor.det
Tensor.dense_dim
Tensor.detach
Tensor.detach_
Tensor.diag
Tensor.diag_embed
Tensor.diagflat
Tensor.diagonal
Tensor.diagonal_scatter
Tensor.fill_diagonal_
Tensor.fmax
Tensor.fmin
Tensor.diff
Tensor.digamma
Tensor.digamma_
Tensor.dim
Tensor.dist
Tensor.div
Tensor.div_
Tensor.divide
Tensor.divide_
Tensor.dot
Tensor.double
Tensor.dsplitt
Tensor.eig
Tensor.element_size
Tensor.eq
Tensor.eq_
Tensor.equal
Tensor.erf
Tensor.erf_
Tensor.erfc
Tensor.erfc_
Tensor.erfinv

Tensor.erfinv_
Tensor.exp
Tensor.exp_
Tensor.expm1
Tensor.expm1_
Tensor.expand
Tensor.expand_as
Tensor.exponential_
Tensor.fix
Tensor.fix_
Tensor.fill_
Tensor.flatten
Tensor.flip
Tensor.fliplr
Tensor.flipud
Tensor.float
Tensor.float_power
Tensor.float_power_
Tensor.floor
Tensor.floor_
Tensor.floor_divide
Tensor.floor_divide_
Tensor.fmod
Tensor.fmod_
Tensor.frac
Tensor.frac_
Tensor.frexp
Tensor.gather
Tensor.gcd
Tensor.gcd_
Tensor.ge
Tensor.ge_
Tensor.greater_equal
Tensor.greater_equal_
Tensor.geometric_
Tensor.geqrf
Tensor.ger
Tensor.get_device
Tensor.gt
Tensor.gt_
Tensor.greater
Tensor.greater_
Tensor.half
Tensor.hardshrink
Tensor.heaviside
Tensor.histc
Tensor.histogram
Tensor.hsplitt
Tensor.hypot
Tensor.hypot_
Tensor.i0
Tensor.i0_
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