



# TensorFlow

## 索引与切片- I

---

主讲人：龙良曲

# Indexing

- Basic indexing
    - `[idx][idx][idx]`
  - Same with Numpy
  - `[idx, idx,...]`
  - `start:end`
  - `start:end:step`
  - ...
-

# Basic indexing

```
In [4]: a=tf.ones([1,5,5,3])
```

```
In [5]: a[0][0]
```

```
<tf.Tensor: id=16, shape=(5, 3), dtype=float32, numpy=
array([[1., 1., 1.],
       [1., 1., 1.],
       [1., 1., 1.],
       [1., 1., 1.],
       [1., 1., 1.]], dtype=float32)>
```

```
In [6]: a[0][0][0]
```

```
Out[6]: <tf.Tensor: id=29, shape=(3,), dtype=float32, numpy=array([1., 1., 1.],
dtype=float32)>
```

```
In [7]: a[0][0][0][2]
```

```
Out[7]: <tf.Tensor: id=46, shape=(), dtype=float32, numpy=1.0>
```

# Numpy-style indexing



```
In [8]: a=tf.random.normal([4,28,28,3])
```

```
In [9]: a[1].shape
```

```
Out[9]: TensorShape([28, 28, 3])
```

```
In [10]: a[1,2].shape
```

```
Out[10]: TensorShape([28, 3])
```

```
In [11]: a[1,2,3].shape
```

```
Out[11]: TensorShape([3])
```

```
In [12]: a[1,2,3,2].shape
```

```
Out[12]: TensorShape([])
```

# start:end



```
In [8]: a=tf.range(10)
```

```
Out[9]: <tf.Tensor: numpy=array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9])>
```

```
In [14]: a[-1:]
```

```
Out[14]: <tf.Tensor: id=48, shape=(1,), dtype=int32, numpy=array([9])>
```

```
In [15]: a[-2:]
```

```
Out[15]: <tf.Tensor: id=53, shape=(2,), dtype=int32, numpy=array([8, 9])>
```

```
In [16]: a[:2]
```

```
Out[16]: <tf.Tensor: id=58, shape=(2,), dtype=int32, numpy=array([0, 1])>
```

```
In [17]: a[:-1]
```

```
Out[17]: <tf.Tensor: id=63, shape=(9,), dtype=int32, numpy=array([0, 1, 2, 3, 4, 5, 6, 7, 8])>
```

# Indexing by :



```
In [14]: a.shape #TensorShape([4, 28, 28, 3])
```

```
In [15]: a[0].shape #TensorShape([28, 28, 3])
```

```
In [16]: a[0,:,:,:].shape
```

```
Out[16]: TensorShape([28, 28, 3])
```

```
In [17]: a[0,1,:,:].shape
```

```
Out[17]: TensorShape([28, 3])
```

```
In [18]: a[:, :, :, 0].shape
```

```
Out[18]: TensorShape([4, 28, 28])
```

```
In [19]: a[:, :, :, 2].shape
```

```
Out[19]: TensorShape([4, 28, 28])
```

```
In [20]: a[:, 0, :, :].shape
```

```
Out[20]: TensorShape([4, 28, 3])
```

# Indexing by ::

- start:end:step
  - ::step
- 

```
In [21]: a.shape  
Out[21]: TensorShape([4, 28, 28, 3])
```

```
In [22]: a[0:2, :, :, :].shape  
Out[22]: TensorShape([2, 28, 28, 3])
```

```
In [23]: a[:, 0:28:2, 0:28:2, :].shape  
Out[23]: TensorShape([4, 14, 14, 3])
```

```
In [24]: a[:, :, 14:, 14:, :].shape  
Out[24]: TensorShape([4, 14, 14, 3])
```

```
In [25]: a[:, 14:, 14:, :].shape  
Out[25]: TensorShape([4, 14, 14, 3])
```

```
In [26]: a[:, ::2, ::2, :].shape  
Out[26]: TensorShape([4, 14, 14, 3])
```

::-1



```
In [27]: a=tf.range(4)
```

```
Out[28]: <tf.Tensor: id=118, shape=(4,), dtype=int32, numpy=array([0, 1, 2, 3],  
dtype=int32)>
```

```
In [29]: a[::-1]
```

```
Out[29]: <tf.Tensor: id=123, shape=(4,), dtype=int32, numpy=array([3, 2, 1, 0],  
dtype=int32)>
```

```
In [30]: a[::-2]
```

```
Out[30]: <tf.Tensor: id=128, shape=(2,), dtype=int32, numpy=array([3, 1], dtype=int32)>
```

```
In [31]: a[2::-2]
```

```
Out[31]: <tf.Tensor: id=133, shape=(2,), dtype=int32, numpy=array([2, 0], dtype=int32)>
```



...



```
In [36]: a=tf.random.normal([2,4,28,28,3])
```

```
In [37]: a[0].shape
```

```
Out[37]: TensorShape([4, 28, 28, 3])
```

```
In [38]: a[0,:,:,:].shape
```

```
Out[38]: TensorShape([4, 28, 28, 3])
```

```
In [39]: a[0,...].shape
```

```
Out[39]: TensorShape([4, 28, 28, 3])
```

```
In [40]: a[:, :, :, :, 0].shape
```

```
Out[40]: TensorShape([2, 4, 28, 28])
```

```
In [41]: a[...,0].shape
```

```
Out[41]: TensorShape([2, 4, 28, 28])
```

```
In [42]: a[0,...,2].shape
```

```
Out[42]: TensorShape([4, 28, 28])
```

```
In [43]: a[1,0,...,0].shape
```

```
Out[43]: TensorShape([28, 28])
```

# 下一课时

---

Selective  
Indexing

**Thank You.**

---