



# TensorFlow

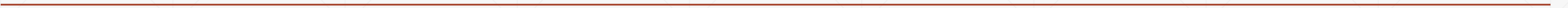
## 填充与复制

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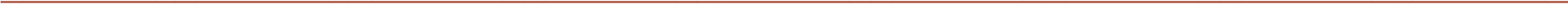
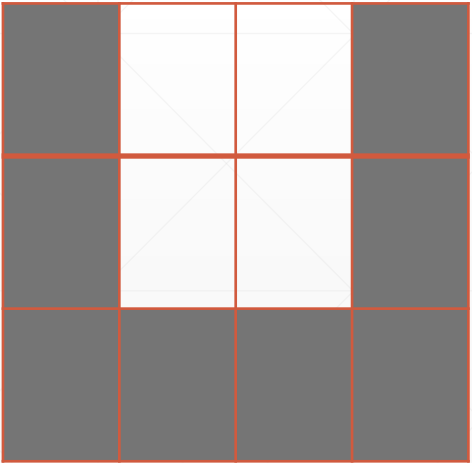
主讲：龙良曲

# Outline

- pad
- tile
- broadcast\_to



# Pad



# Pad

```
In [120]: a=tf.reshape(tf.range(9), [3,3])  
<tf.Tensor: id=365, shape=(3, 3), dtype=int32, numpy=  
array([[0, 1, 2],  
       [3, 4, 5],  
       [6, 7, 8]], dtype=int32)>
```

```
In [123]: tf.pad(a,[[0,0],[0,0]])  
Out[123]:  
<tf.Tensor: id=369, shape=(3, 3), dtype=int32, numpy=  
array([[0, 1, 2],  
       [3, 4, 5],  
       [6, 7, 8]], dtype=int32)>  
行(左右) 列(上下)
```

```
In [124]: tf.pad(a,[[1,0],[0,0]])  
Out[124]:  
<tf.Tensor: id=372, shape=(4, 3), dtype=int32, numpy=  
array([[0, 0, 0],  
       [0, 1, 2],  
       [3, 4, 5],  
       [6, 7, 8]], dtype=int32)>
```

```
● ● ●  
In [125]: tf.pad(a,[[1,1],[0,0]])  
<tf.Tensor: id=375, shape=(5, 3), dtype=int32, numpy=  
array([[0, 0, 0],  
       [0, 1, 2],  
       [3, 4, 5],  
       [6, 7, 8],  
       [0, 0, 0]], dtype=int32)>
```

```
In [126]: tf.pad(a,[[1,1],[1,0]])  
<tf.Tensor: id=378, shape=(5, 4), dtype=int32, numpy=  
array([[0, 0, 0, 0],  
       [0, 0, 1, 2],  
       [0, 3, 4, 5],  
       [0, 6, 7, 8],  
       [0, 0, 0, 0]], dtype=int32)>
```

```
In [127]: tf.pad(a,[[1,1],[1,1]])  
<tf.Tensor: id=381, shape=(5, 5), dtype=int32, numpy=  
array([[0, 0, 0, 0, 0],  
       [0, 0, 1, 2, 0],  
       [0, 3, 4, 5, 0],  
       [0, 6, 7, 8, 0],  
       [0, 0, 0, 0, 0]], dtype=int32)>
```

# Image padding



```
In [128]: a=tf.random.normal([4,28,28,3])
```

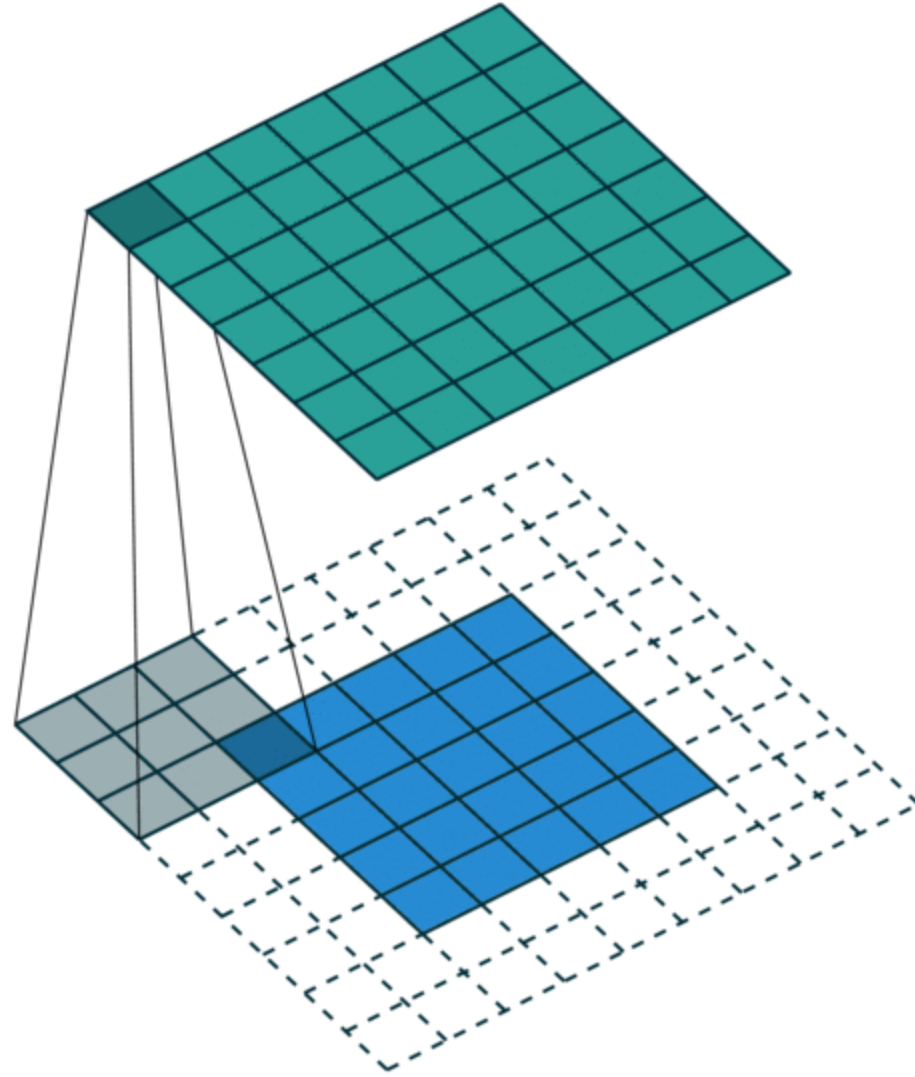
```
In [129]: b=tf.pad(a,[[0,0],[2,2],[2,2],[0,0]])
```

```
In [130]: b.shape
```

```
Out[130]: TensorShape([4, 32, 32, 3])
```

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# Image padding



# tile

- repeat data along dim **n** times
  - $[a, b, c], 2$
  - $\rightarrow [a, b, c, a, b, c]$
  - broadcast\_to
-



# Inner dim first

[1,2]表示各个维度复制次数

```
In [132]: a
<tf.Tensor: id=396, shape=(3, 3), dtype=int32, numpy=
array([[0, 1, 2],
       [3, 4, 5],
       [6, 7, 8]], dtype=int32)>
```

```
In [133]: tf.tile(a,[1,2])
<tf.Tensor: id=399, shape=(3, 6), dtype=int32, numpy=
array([[0, 1, 2, 0, 1, 2],
       [3, 4, 5, 3, 4, 5],
       [6, 7, 8, 6, 7, 8]], dtype=int32)>
```

```
In [134]: tf.tile(a,[2,1])
<tf.Tensor: id=402, shape=(6, 3), dtype=int32, numpy=
array([[0, 1, 2],
       [3, 4, 5],
       [6, 7, 8],
       [0, 1, 2],
       [3, 4, 5],
       [6, 7, 8]], dtype=int32)>
```

```
In [135]: tf.tile(a,[2,2])
<tf.Tensor: id=405, shape=(6, 6), dtype=int32, numpy=
array([[0, 1, 2, 0, 1, 2],
       [3, 4, 5, 3, 4, 5],
       [6, 7, 8, 6, 7, 8],
       [0, 1, 2, 0, 1, 2],
       [3, 4, 5, 3, 4, 5],
       [6, 7, 8, 6, 7, 8]], dtype=int32)>
```

# tile VS broadcast\_to

```
In [139]: aa=tf.expand_dims(a,axis=0) # TensorShape([1, 3, 3])
<tf.Tensor: id=410, shape=(1, 3, 3), dtype=int32, numpy=
array([[0, 1, 2],
       [3, 4, 5],
       [6, 7, 8]]], dtype=int32)>
```

```
In [142]: tf.tile(aa,[2,1,1])
<tf.Tensor: id=413, shape=(2, 3, 3), dtype=int32, numpy=
array([[0, 1, 2],
       [3, 4, 5],
       [6, 7, 8]],

       [[0, 1, 2],
        [3, 4, 5],
        [6, 7, 8]]], dtype=int32)>
```

```
In [143]: tf.broadcast_to(aa,[2,3,3])
<tf.Tensor: id=416, shape=(2, 3, 3), dtype=int32, numpy=
array([[0, 1, 2],
       [3, 4, 5],
       [6, 7, 8]],

       [[0, 1, 2],
        [3, 4, 5],
        [6, 7, 8]]], dtype=int32)>
```

下一课时

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张量限幅

**Thank You.**

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