TensorFlow

填充与复制

主讲：龙良曲

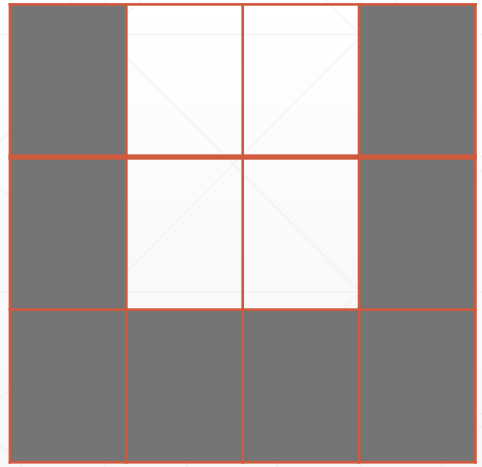
Outline

- pad
- tile
- broadcast_to

Pad

[[1,2]]

[[0,1],[1,1]]



Pad

pad 出来是 0

```
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)>

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)>
```

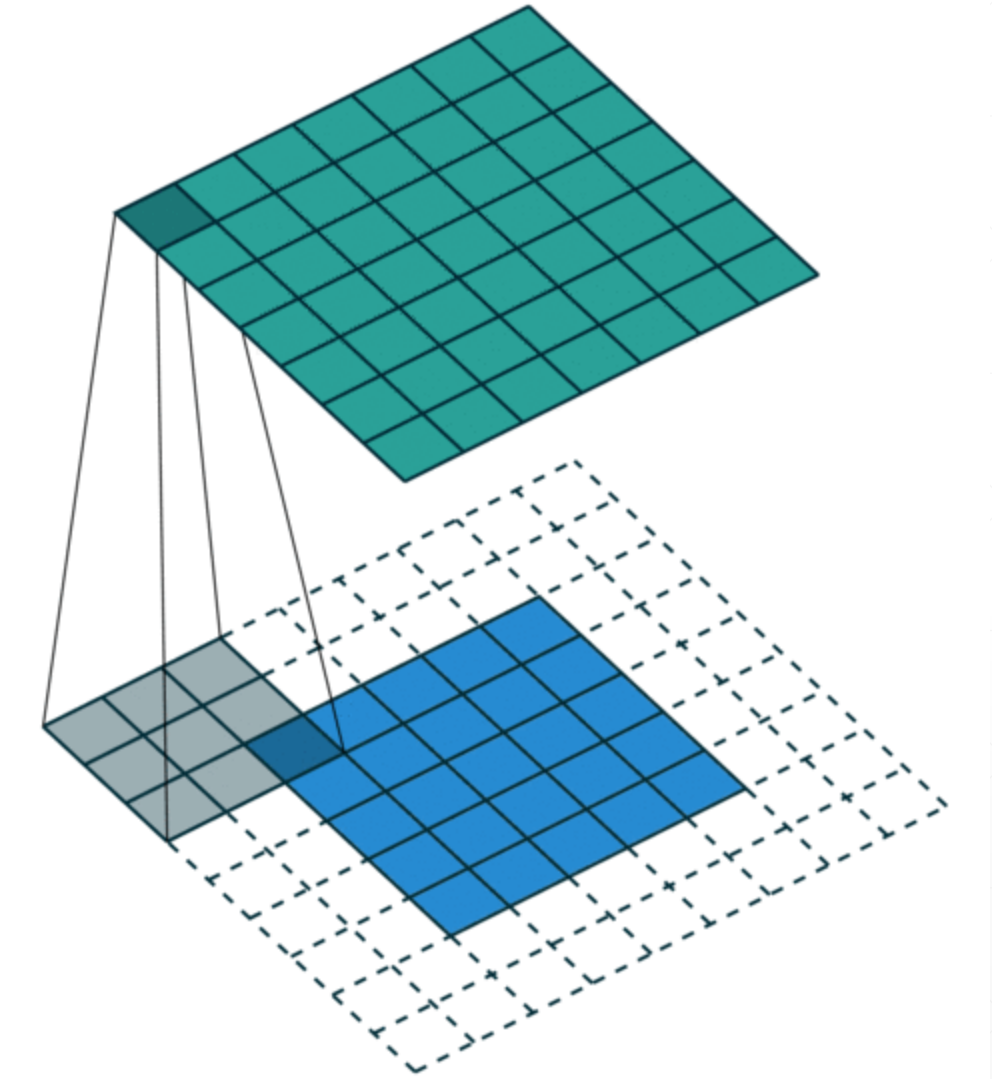
Image padding

```
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])
```

Image padding



tile

数据真实在内存里复制

- repeat data along dim n times
- [a, b, c] , 2
- → [a, b, c, a, b, c]

- broadcast_to　并没有在内存里复制

Inner dim first

```
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

张量限幅

Thank You.