TensorFlow

张量排序

主讲：龙良曲

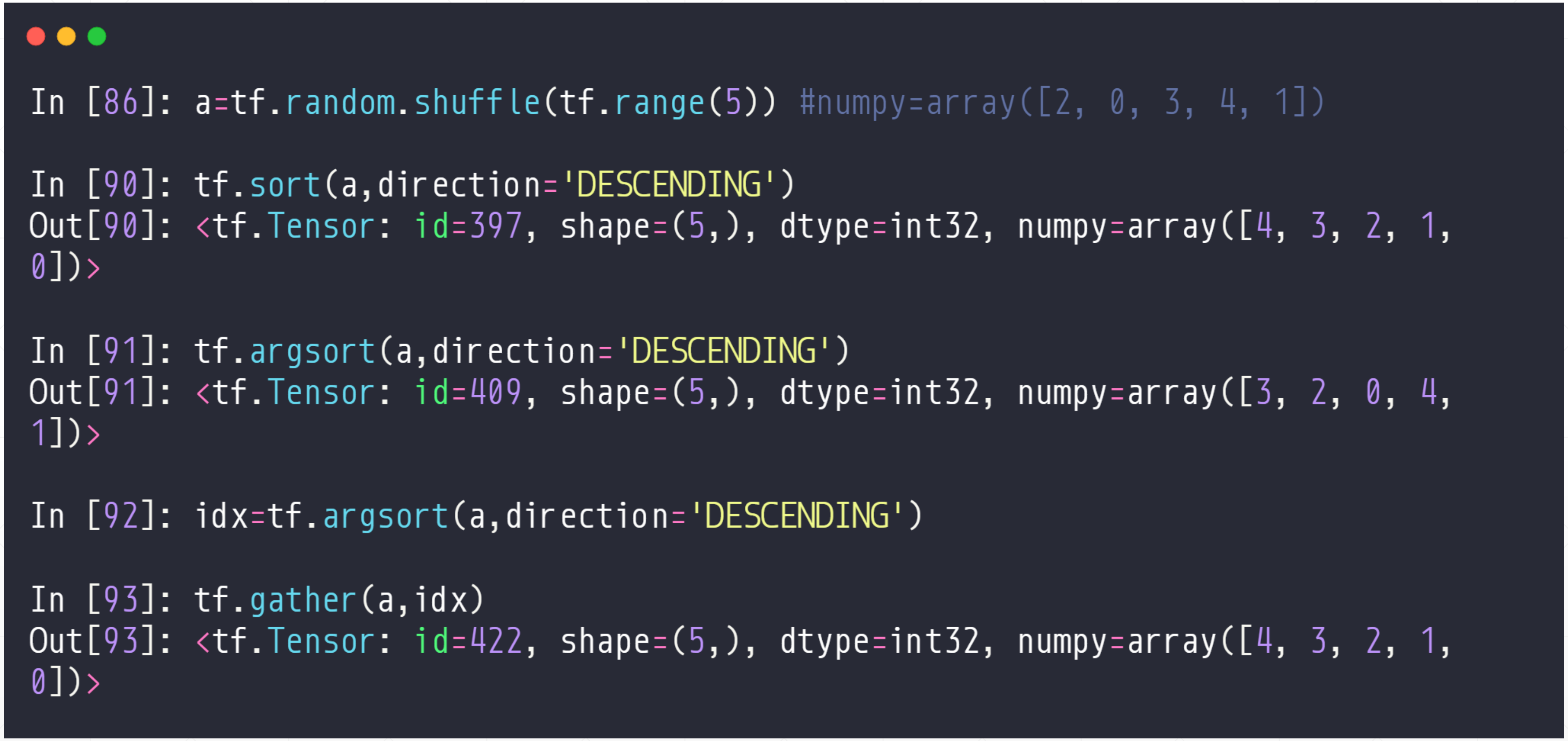
Outline

- Sort/argsort

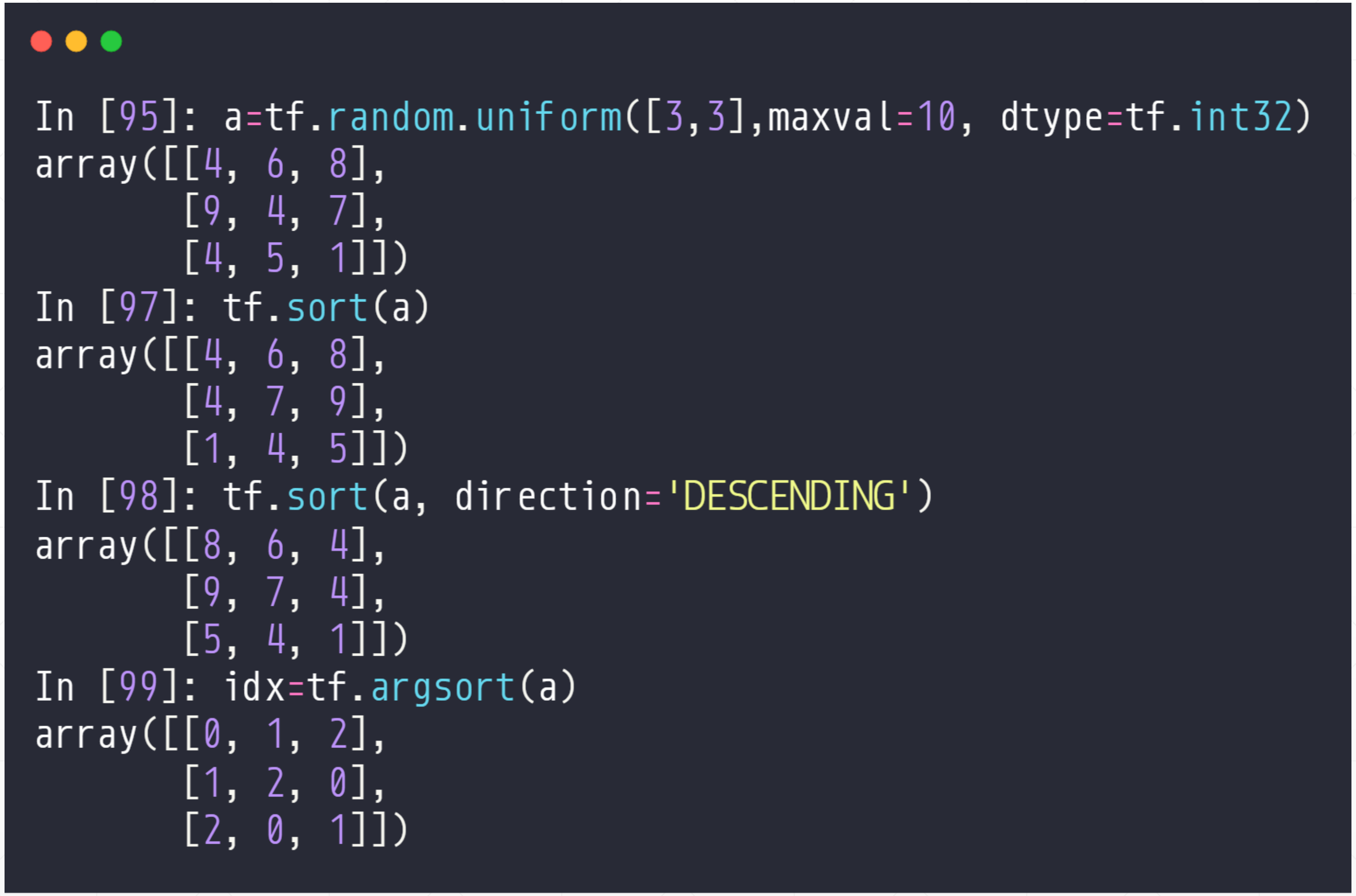
- Topk

- Top-5 Acc.

Sort, argsort



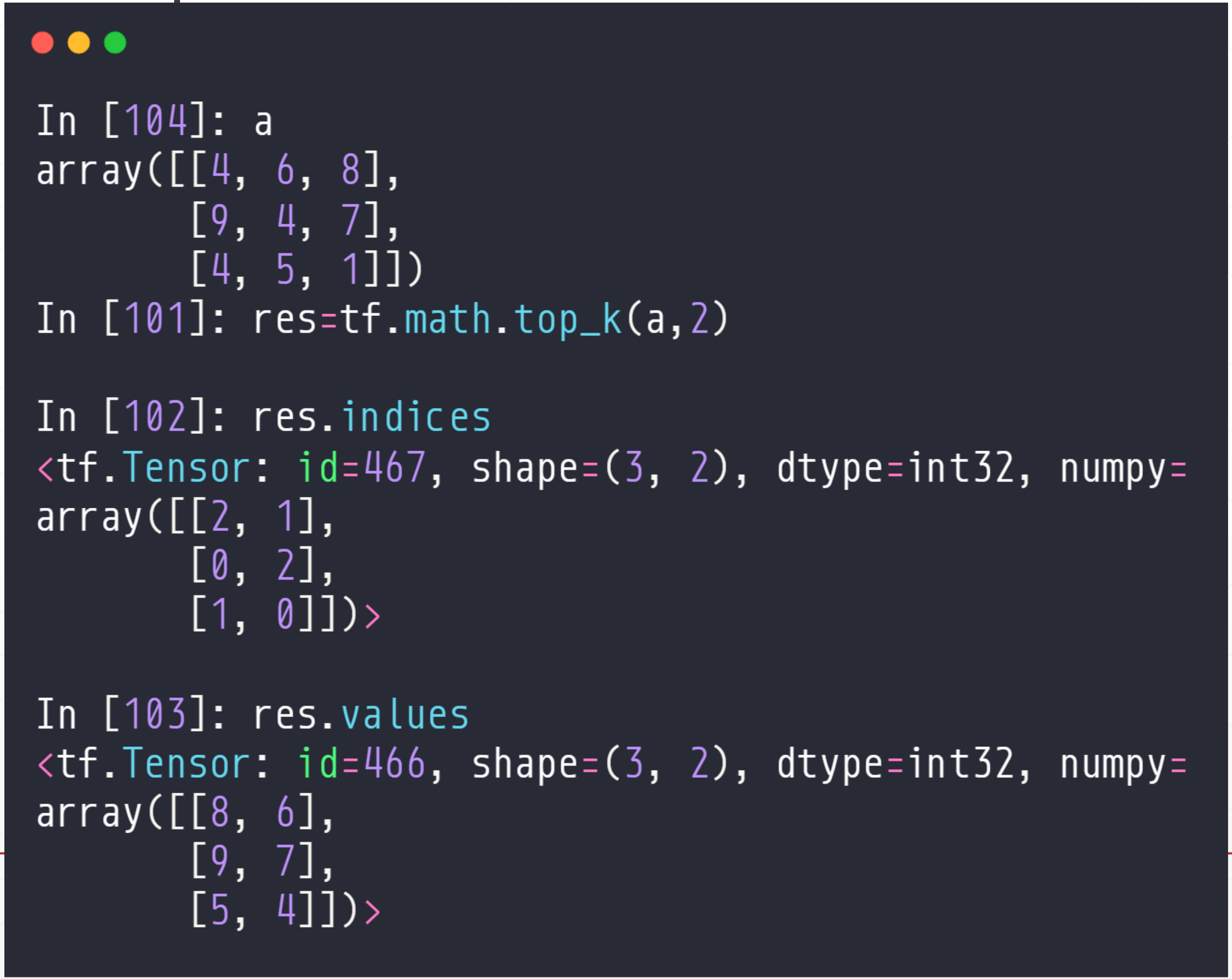
```
In [86]: a=tf.random.shuffle(tf.range(5)) #numpy=array([2, 0, 3, 4, 1])

In [90]: tf.sort(a,direction='DESCENDING')
Out[90]: <tf.Tensor: id=397, shape=(5,), dtype=int32, numpy=array([4, 3, 2, 1,
0])>

In [91]: tf.argsort(a,direction='DESCENDING')
Out[91]: <tf.Tensor: id=409, shape=(5,), dtype=int32, numpy=array([3, 2, 0, 4,
1])>

In [92]: idx=tf.argsort(a,direction='DESCENDING')

In [93]: tf.gather(a,idx)
Out[93]: <tf.Tensor: id=422, shape=(5,), dtype=int32, numpy=array([4, 3, 2, 1,
0])>
```



```
In [95]: a=tf.random.uniform([3,3],maxval=10, dtype=tf.int32)
array([[4, 6, 8],
       [9, 4, 7],
       [4, 5, 1]])
In [97]: tf.sort(a)
array([[4, 6, 8],
       [4, 7, 9],
       [1, 4, 5]])
In [98]: tf.sort(a, direction='DESCENDING')
array([[8, 6, 4],
       [9, 7, 4],
       [5, 4, 1]])
In [99]: idx=tf.argsort(a)
array([[0, 1, 2],
       [1, 2, 0],
       [2, 0, 1]])
```

Top_k

- Only return top-k values and indices



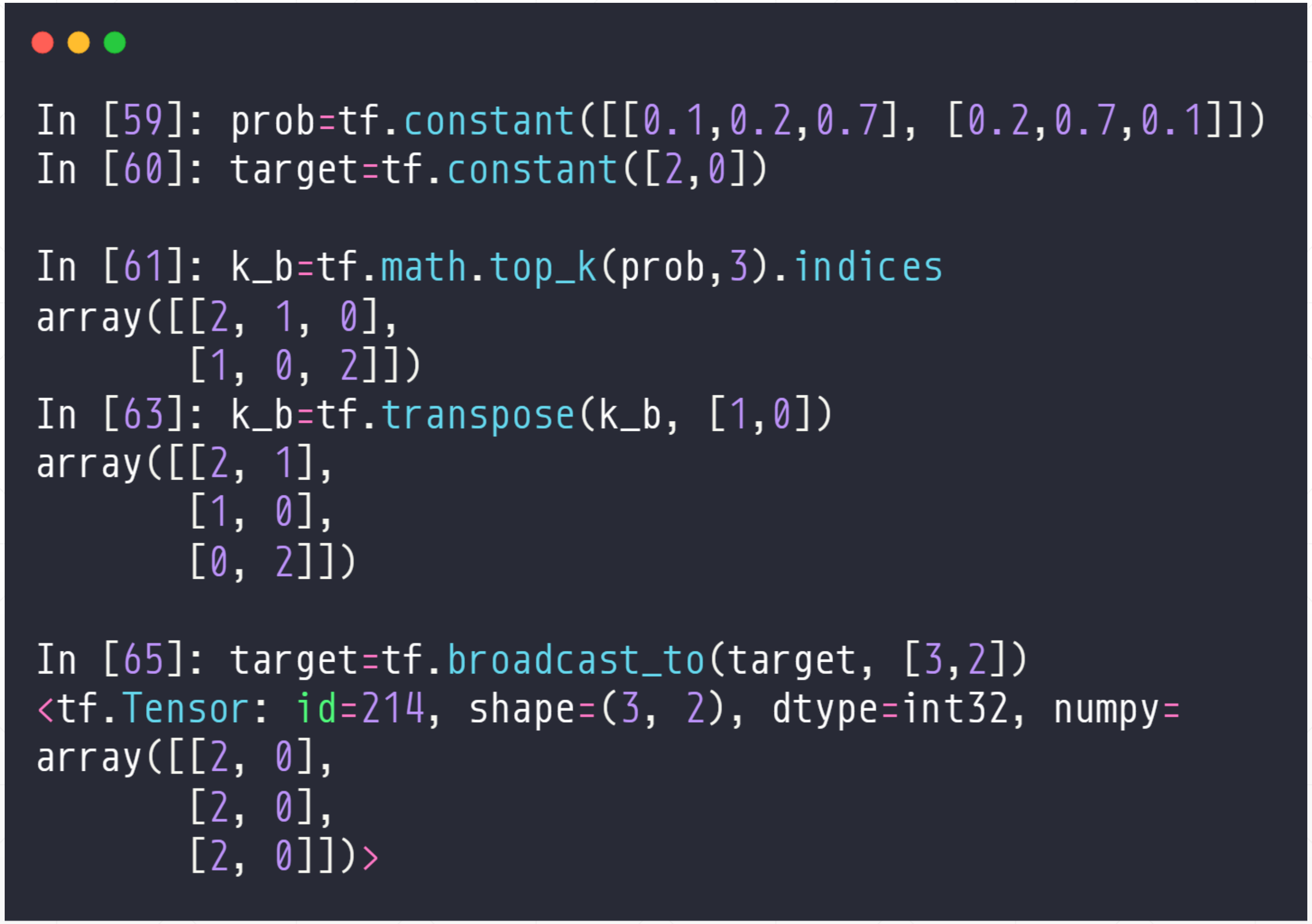
```
In [104]: a
array([[4, 6, 8],
       [9, 4, 7],
       [4, 5, 1]])
In [101]: res=tf.math.top_k(a,2)

In [102]: res.indices
<tf.Tensor: id=467, shape=(3, 2), dtype=int32, numpy=
array([[2, 1],
       [0, 2],
       [1, 0]])>

In [103]: res.values
<tf.Tensor: id=466, shape=(3, 2), dtype=int32, numpy=
array([[8, 6],
       [9, 7],
       [5, 4]])>
```

Top-k accuracy

- Prob:[0.1, 0.2, 0.3, 0.4]

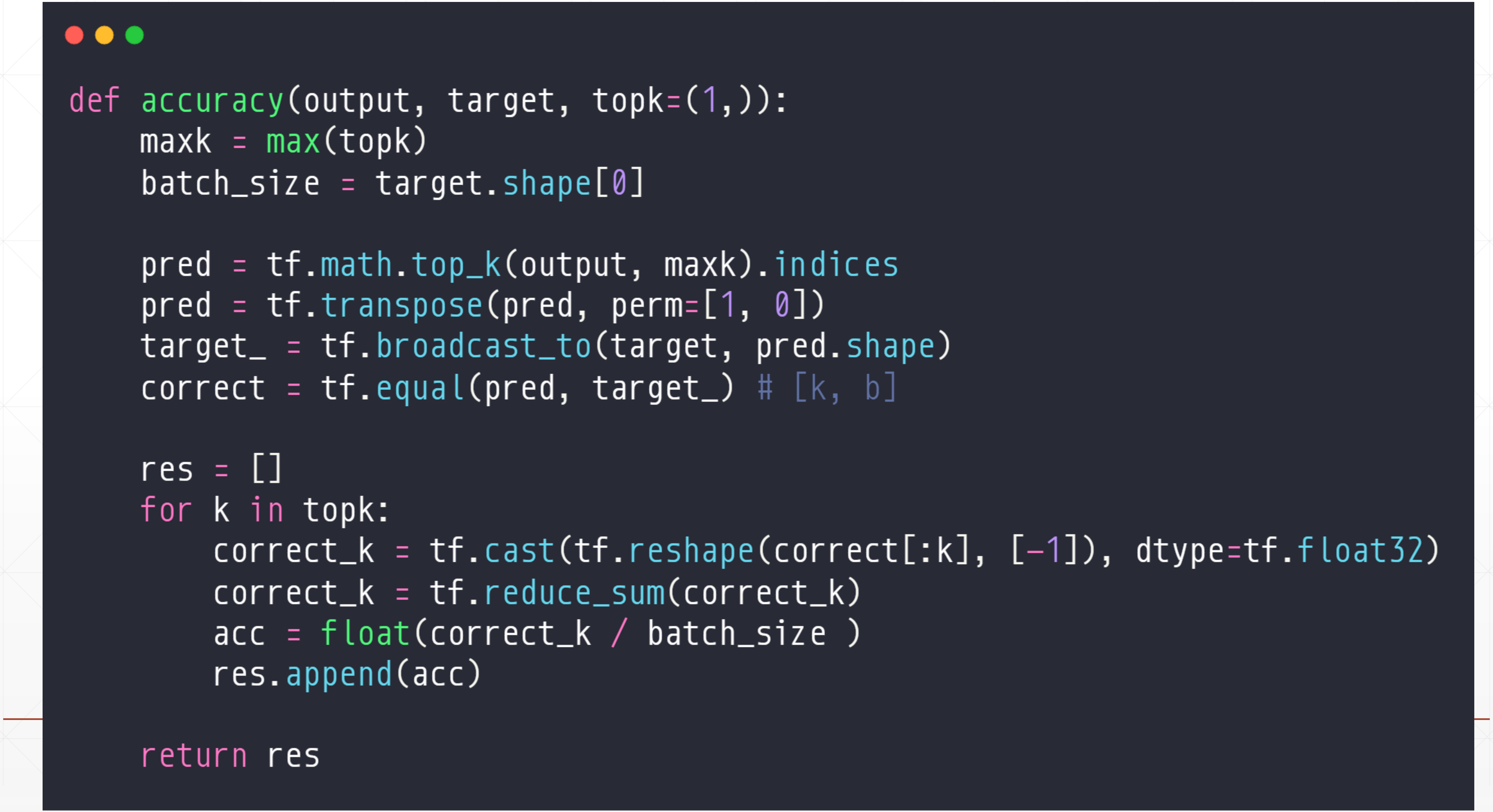
- Label:[2]

- Only consider top-1 prediction: [3]
- Only consider top-2 prediction: [3, 2]
- Only consider top-3 prediction: [3, 2, 1]



```
In [59]: prob=tf.constant([[0.1,0.2,0.7], [0.2,0.7,0.1]])
In [60]: target=tf.constant([2,0])

In [61]: k_b=tf.math.top_k(prob,3).indices
array([[2, 1, 0],
       [1, 0, 2]])
In [63]: k_b=tf.transpose(k_b, [1,0])
array([[2, 1],
       [1, 0],
       [0, 2]])

In [65]: target=tf.broadcast_to(target, [3,2])
<tf.Tensor: id=214, shape=(3, 2), dtype=int32, numpy=
array([[2, 0],
       [2, 0],
       [2, 0]])>
```

Top-k Accuracy



```python
def accuracy(output, target, topk=(1,)):
    maxk = max(topk)
    batch_size = target.shape[0]

    pred = tf.math.top_k(output, maxk).indices
    pred = tf.transpose(pred, perm=[1, 0])
    target_ = tf.broadcast_to(target, pred.shape)
    correct = tf.equal(pred, target_) # [k, b]

    res = []
    for k in topk:
        correct_k = tf.cast(tf.reshape(correct[:k], [-1]), dtype=tf.float32)
        correct_k = tf.reduce_sum(correct_k)
        acc = float(correct_k / batch_size )
        res.append(acc)

    return res
```

JUST
DO
IT.

下一课时

填充与复制

Thank You.