TensorFlow

数据统计

主讲：龙良曲

Outline

- tf.norm
- tf.reduce_min/max
- tf.argmax/argmin
- tf.equal
- tf.unique

Vector Norm

Eukl. Norm	$\|x\|_2 = \left[\sum_k x_k^2\right]^{1/2}$
Max.norm	$\|x\|_\infty = \max_k \|x_k\|$
L_1**-Norm**	$\|x\|_1 = \sum_k \|x_k\|$

tf.norm

- Here talks about Vector Norm

```
In [50]: a=tf.ones([2,2])

In [52]: tf.norm(a)
Out[52]: <tf.Tensor: id=192, shape=(), dtype=float32, numpy=2.0>

In [54]: tf.sqrt(tf.reduce_sum(tf.square(a)))
Out[54]: <tf.Tensor: id=197, shape=(), dtype=float32, numpy=2.0>

In [55]: a=tf.ones([4,28,28,3])

In [56]: tf.norm(a)
Out[56]: <tf.Tensor: id=206, shape=(), dtype=float32, numpy=96.99484>

In [57]: tf.sqrt(tf.reduce_sum(tf.square(a)))
Out[57]: <tf.Tensor: id=211, shape=(), dtype=float32, numpy=96.99484>
```

L1 Norm

```
In [68]: b = tf.ones([2,2])

In [69]: tf.norm(b)
Out[69]: <tf.Tensor: id=250, shape=(), dtype=float32, numpy=2.0>

In [73]: tf.norm(b,ord=2,axis=1)
Out[73]: <tf.Tensor: id=271, shape=(2,), dtype=float32, numpy=array([1.4142135,
1.4142135], dtype=float32)>

In [70]: tf.norm(b,ord=1)
Out[70]: <tf.Tensor: id=255, shape=(), dtype=float32, numpy=4.0>

In [71]: tf.norm(b,ord=1,axis=0)
Out[71]: <tf.Tensor: id=260, shape=(2,), dtype=float32, numpy=array([2., 2.],
dtype=float32)>

In [72]: tf.norm(b,ord=1,axis=1)
Out[72]: <tf.Tensor: id=265, shape=(2,), dtype=float32, numpy=array([2., 2.],
dtype=float32)>
```

reduce_min/max/mean

```
In [76]: a=tf.random.normal([4,10])

In [78]: tf.reduce_min(a),tf.reduce_max(a),tf.reduce_mean(a)
Out[78]:
(<tf.Tensor: id=283, shape=(), dtype=float32, numpy=-1.1872448>,
 <tf.Tensor: id=285, shape=(), dtype=float32, numpy=2.1353827>,
 <tf.Tensor: id=287, shape=(), dtype=float32, numpy=0.3523524>)

In [79]: tf.reduce_min(a,axis=1),tf.reduce_max(a,axis=1),tf.reduce_mean(a,axis=1)
Out[79]:
(<tf.Tensor: id=292, shape=(4,), dtype=float32, numpy=array([-0.3937837,
-1.1872448, -1.0798895, -1.1366792], dtype=float32)>,
 <tf.Tensor: id=294, shape=(4,), dtype=float32, numpy=array([1.9718986, 1.1612172,
2.1353827, 2.0984378], dtype=float32)>,
 <tf.Tensor: id=296, shape=(4,), dtype=float32, numpy=array([ 0.61504304,
-0.01389184,  0.606747  ,  0.20151143], dtype=float32)>)
```

argmax/argmin

```
In [80]: a.shape
Out[80]: TensorShape([4, 10])

In [81]: tf.argmax(a).shape
Out[81]: TensorShape([10])

In [83]: tf.argmax(a)
Out[83]: <tf.Tensor: id=305, shape=(10,), dtype=int64, numpy=array([0, 0, 2, 3, 1,
3, 0, 1, 2, 0])>

In [82]: tf.argmin(a).shape
Out[82]: TensorShape([10])
```

tf.equal

```
In [44]: a=tf.constant([1,2,3,2,5])

In [45]: b=tf.range(5)

In [46]: tf.equal(a,b)
Out[46]: <tf.Tensor: id=170, shape=(5,), dtype=bool, numpy=array([False, False,
False, False, False])>

In [47]: res=tf.equal(a,b)

In [48]: tf.reduce_sum(tf.cast(res, dtype=tf.int32))
Out[48]: <tf.Tensor: id=175, shape=(), dtype=int32, numpy=0>
```

Accuracy

```
In [99]: a
<tf.Tensor: id=308, shape=(2, 3), dtype=float32, numpy=
array([[0.1 , 0.2 , 0.7 ],
       [0.9 , 0.05, 0.05]], dtype=float32)>

In [100]: pred=tf.cast(tf.argmax(a,axis=1), dtype=tf.int32)
Out[101]: <tf.Tensor: id=324, shape=(2,), dtype=int32, numpy=array([2, 0])>

In [110]: y
Out[110]: <tf.Tensor: id=328, shape=(2,), dtype=int32, numpy=array([2, 1],
dtype=int32)>

In [112]: tf.equal(y,pred)
Out[112]: <tf.Tensor: id=335, shape=(2,), dtype=bool, numpy=array([ True, False])>

In [113]: correct=tf.reduce_sum(tf.cast(tf.equal(y,pred),dtype=tf.int32))

In [114]: correct
Out[114]: <tf.Tensor: id=340, shape=(), dtype=int32, numpy=1>

In [115]: correct/2
Out[115]: <tf.Tensor: id=345, shape=(), dtype=float64, numpy=0.5>
```

tf.unique

```
In [116]: a=tf.range(5)

In [117]: tf.unique(a)
Out[117]: Unique(y=<tf.Tensor: id=351, shape=(5,), dtype=int32, numpy=array([0, 1,
2, 3, 4], dtype=int32)>, idx=<tf.Tensor: id=352, shape=(5,), dtype=int32,
numpy=array([0, 1, 2, 3, 4], dtype=int32)>)

In [118]: a=tf.constant([4,2,2,4,3])

In [119]: tf.unique(a)
Out[119]: Unique(y=<tf.Tensor: id=356, shape=(3,), dtype=int32, numpy=array([4, 2,
3], dtype=int32)>, idx=<tf.Tensor: id=357, shape=(5,), dtype=int32,
numpy=array([0, 1, 1, 0, 2], dtype=int32)>)
```

下一课时

数据排序

Thank You.