



8.6 使用GPU

■ 导入TensorFlow, 查看版本

```
In [1]: import tensorflow as tf
        print(tf.__version__)

2.0.0
```

■ 查看当前主机上的运算设备

```
In [2]: gpus = tf.config.experimental.list_physical_devices(device_type='GPU')
        cpus = tf.config.experimental.list_physical_devices(device_type='CPU')
        print(gpus)
        print(cpus)

[PhysicalDevice(name='/physical_device:GPU:0', device_type='GPU')]
[PhysicalDevice(name='/physical_device:CPU:0', device_type='CPU')]
```



■ 指定在CPU上执行

```
In [3]: # 指定在CPU上执行
        with tf.device('/cpu:0'):
            cpu_a = tf.random.normal([10000, 1000])
            cpu_b = tf.random.normal([1000, 2000])
            cpu_c = tf.matmul(cpu_a, cpu_b)

In [4]: print("cpu_a:", cpu_a.device)
        print("cpu_b:", cpu_b.device)
        print("cpu_c:", cpu_c.device)

cpu_a: /job:localhost/replica:0/task:0/device:CPU:0
cpu_b: /job:localhost/replica:0/task:0/device:CPU:0
cpu_c: /job:localhost/replica:0/task:0/device:CPU:0
```



■ 指定在GPU上执行

```
In [5]: #查看GPU是否可用  
tf.test.is_gpu_available()
```

```
Out[5]: True
```

```
In [6]: # 指定在GPU上执行随机数操作  
with tf.device('/gpu:0'):  
    gpu_a = tf.random.normal([10000, 1000])  
    gpu_b = tf.random.normal([1000, 2000])  
    gpu_c = tf.matmul(gpu_a, gpu_b)
```

```
In [7]: print("gpu_a:", gpu_a.device)  
        print("gpu_b:", gpu_b.device)  
        print("gpu_c:", gpu_c.device)  
  
gpu_a: /job:localhost/replica:0/task:0/device:GPU:0  
gpu_b: /job:localhost/replica:0/task:0/device:GPU:0  
gpu_c: /job:localhost/replica:0/task:0/device:GPU:0
```



■ 创建函数cpu_run()和gpu_run()

```
In [8]: # 函数cpu_run()
def cpu_run():
    with tf.device('/cpu:0'):
        cpu_a = tf.random.normal([10000, 1000])
        cpu_b = tf.random.normal([1000, 2000])
        c = tf.matmul(cpu_a, cpu_b)
    return c
```

```
In [9]: # 函数gpu_run()
def gpu_run():
    with tf.device('/gpu:0'):
        gpu_a = tf.random.normal([10000, 1000])
        gpu_b = tf.random.normal([1000, 2000])
        c = tf.matmul(gpu_a, gpu_b)
    return c
```



■ 比较在CPU和GPU上执行乘法操作的时间

```
In [10]: import timeit # 导入timeit模块
```

```
In [11]: # 使用timeit工具来统计执行10次的时间  
cpu_time = timeit.timeit(cpu_run, number=10)  
gpu_time = timeit.timeit(gpu_run, number=10)  
print("cpu:", cpu_time, "gpu:", gpu_time)  
  
cpu: 1.6976891000000052 gpu: 0.002923800000004917
```

```
In [12]: # 使用timeit工具来统计执行100次的时间  
cpu_time = timeit.timeit(cpu_run, number=100)  
gpu_time = timeit.timeit(gpu_run, number=100)  
print("cpu:", cpu_time, "gpu:", gpu_time)  
  
cpu: 16.434056399999999 gpu: 0.02554969999999912
```



- 在TensorFlow中，张量可以运行在CPU、GPU或TPU上
- 一般无需指定设备，TensorFlow会自动调用所有可用资源进行计算，决定执行操作的设备，并在需要时将操作复制到该设备

