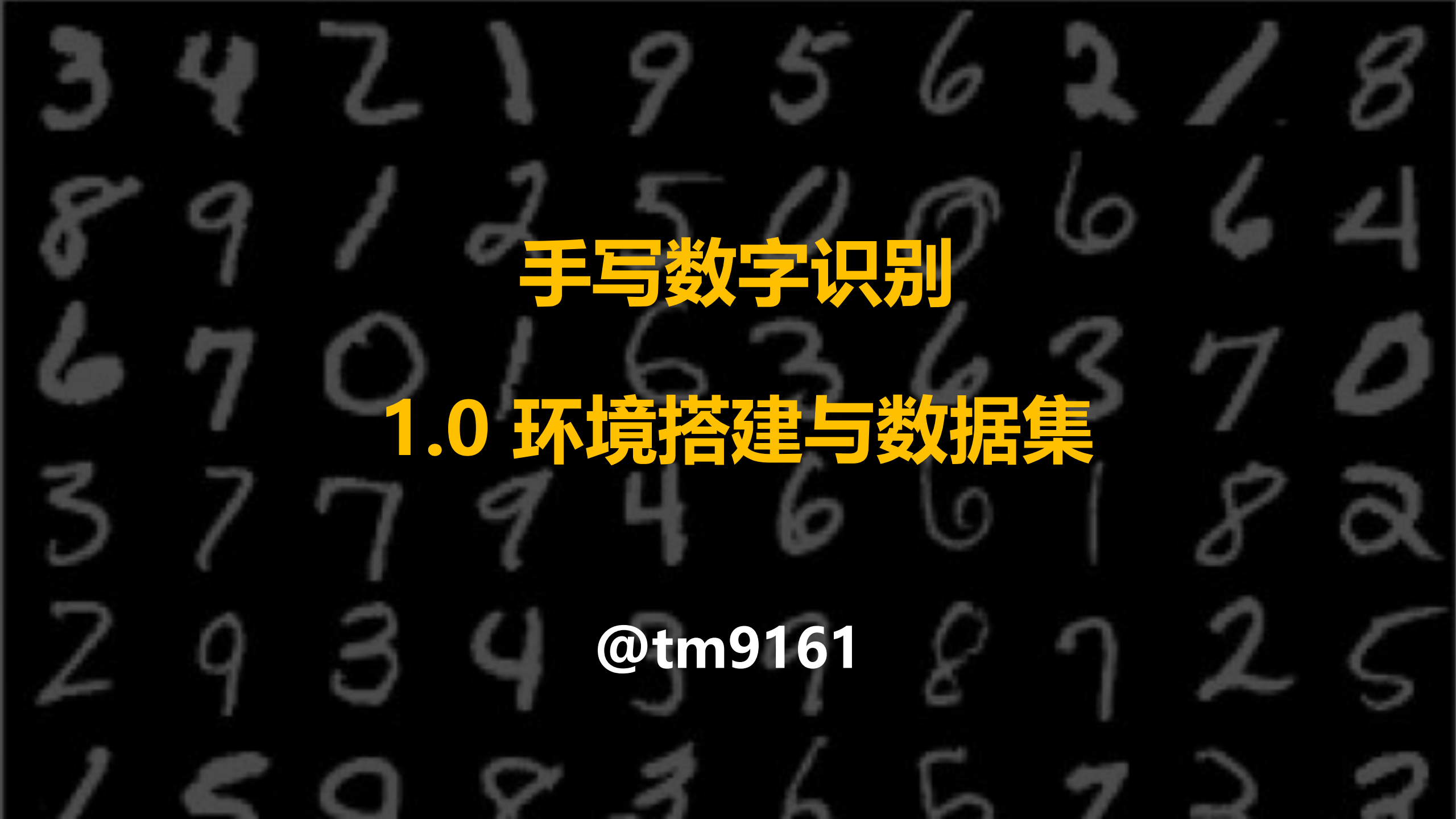
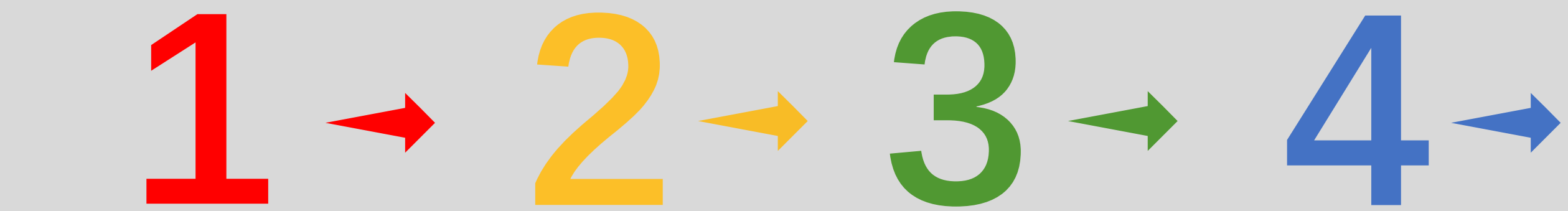


手写数字识别

1.0 环境搭建与数据集

@tm9161

手写数字识别



1.0环境与数据集 1.1最近邻分类 1.2神经网络 1.3卷积神经网络

L1

环境搭建与数据集

1.环境搭建

2.手写数字识别数据集

3.图像数据预处理

环境搭建

1. 下载并安装 Anaconda（安装时候勾选添加环境变量）

2. 使用pip安装Tensorflow（2.0以上、安装VC++包）

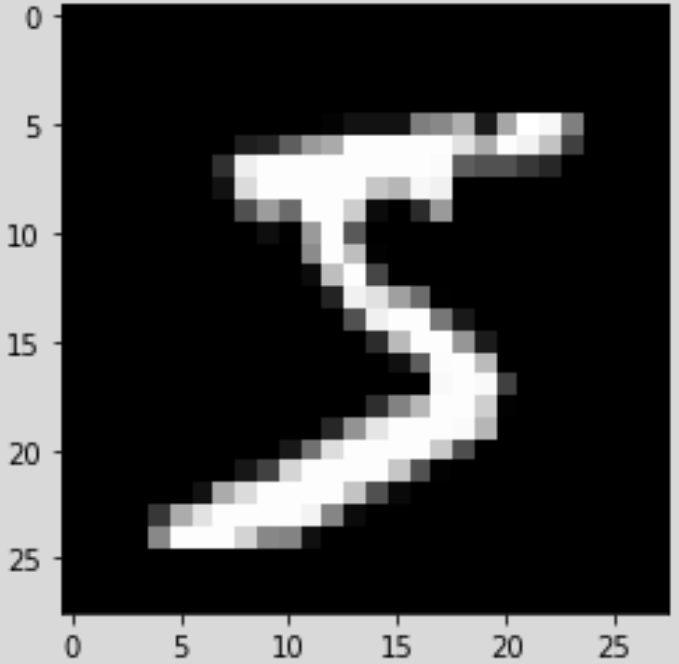
CPU版本：https://www.bilibili.com/read/cv8962053

GPU版本：https://www.bilibili.com/read/cv9003982

中央处理器（Central Processing Unit）

图形处理器（Graphics Processing Unit）

手写识别数据集



MNIST包含70000张手写数字图像：60000张用于训练；10000张用于测试。

28x28像素的灰度图。

验证集：
模拟题

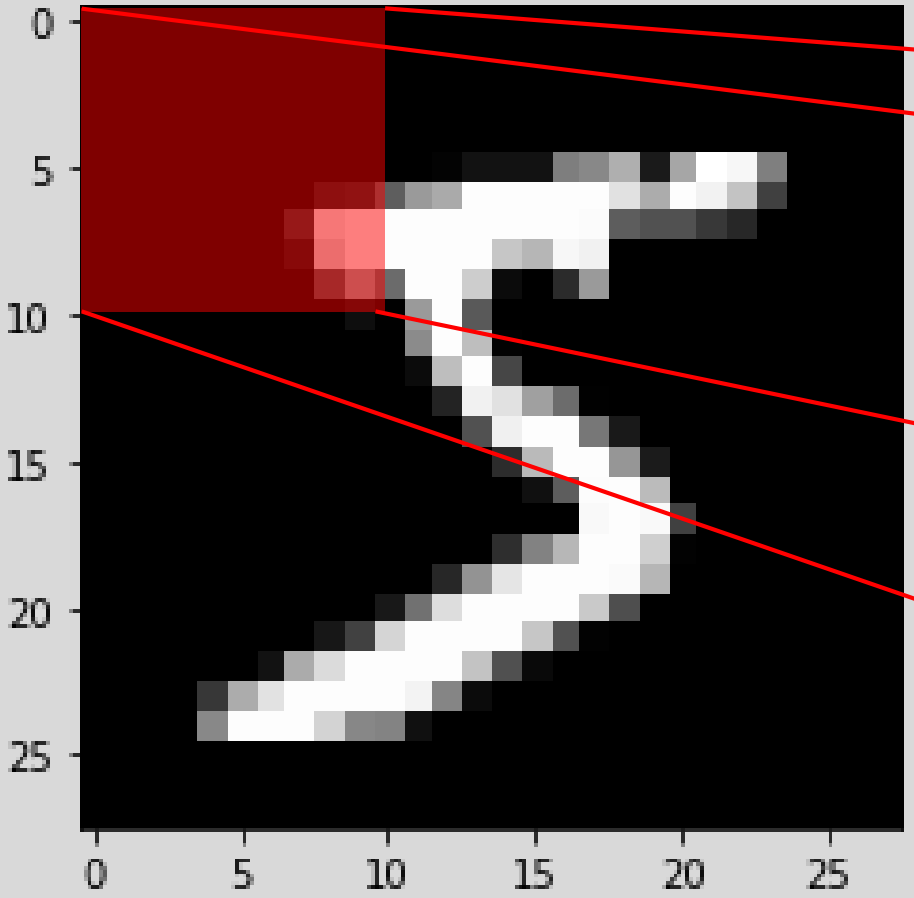
测试集：
考试题

训练集：练习题

训练集：60000

测试集：10000

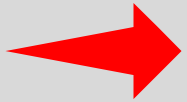
数字化 digitize




```
[[  0,   0,   0,   0,   0,   0,   0,   0,   0,   0],
 [  0,   0,   0,   0,   0,   0,   0,   0,   0,   0],
 [  0,   0,   0,   0,   0,   0,   0,   0,   0,   0],
 [  0,   0,   0,   0,   0,   0,   0,   0,   0,   0],
 [  0,   0,   0,   0,   0,   0,   0,   0,   0,   0],
 [  0,   0,   0,   0,   0,   0,   0,   0,   0,   0],
 [  0,   0,   0,   0,   0,   0,   0,   0,  30,  36],
 [  0,   0,   0,   0,   0,   0,   0,  49, 238, 253],
 [  0,   0,   0,   0,   0,   0,   0,  18, 219, 253],
 [  0,   0,   0,   0,   0,   0,   0,   0,  80, 156]],
```

矩阵变换 reshape

```
In [6]: train_images

Out[6]: array([[[0, 0, 0, ..., 0, 0, 0],
                [0, 0, 0, ..., 0, 0, 0],
                [0, 0, 0, ..., 0, 0, 0],
                ...,
                [0, 0, 0, ..., 0, 0, 0],
                [0, 0, 0, ..., 0, 0, 0],
                [0, 0, 0, ..., 0, 0, 0]],

               [[0, 0, 0, ..., 0, 0, 0],
                [0, 0, 0, ..., 0, 0, 0],
                [0, 0, 0, ..., 0, 0, 0],
                ...,
                [0, 0, 0, ..., 0, 0, 0],
                [0, 0, 0, ..., 0, 0, 0],
                [0, 0, 0, ..., 0, 0, 0]],

               [[0, 0, 0, ..., 0, 0, 0],
                [0, 0, 0, ..., 0, 0, 0],
                [0, 0, 0, ..., 0, 0, 0],
                ...,
                [0, 0, 0, ..., 0, 0, 0],
                [0, 0, 0, ..., 0, 0, 0],
                [0, 0, 0, ..., 0, 0, 0]],
```



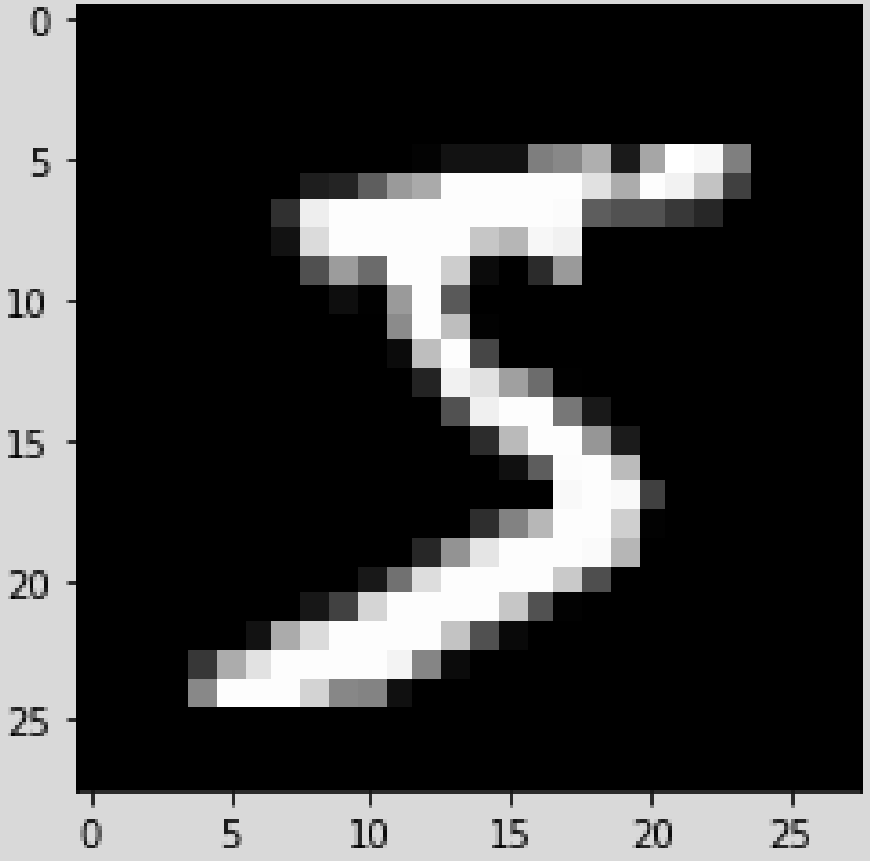
```
In [9]: train_images

Out[9]: array([[0, 0, 0, ..., 0, 0, 0],
               [0, 0, 0, ..., 0, 0, 0],
               [0, 0, 0, ..., 0, 0, 0],
               ...,
               [0, 0, 0, ..., 0, 0, 0],
               [0, 0, 0, ..., 0, 0, 0],
               [0, 0, 0, ..., 0, 0, 0]],
```

归一化 normalization

```
[[  0,   0,   0,   0,   0,   0,   0,   0,   0,   0],
 [  0,   0,   0,   0,   0,   0,   0,   0,   0,   0],
 [  0,   0,   0,   0,   0,   0,   0,   0,   0,   0],
 [  0,   0,   0,   0,   0,   0,   0,   0,   0,   0],
 [  0,   0,   0,   0,   0,   0,   0,   0,   0,   0],
 [  0,   0,   0,   0,   0,   0,   0,   0,   0,   0],
 [  0,   0,   0,   0,   0,   0,   0,   0,  30,  36],
 [  0,   0,   0,   0,   0,   0,   0,  49, 238, 253],
 [  0,   0,   0,   0,   0,   0,   0,  18, 219, 253],
 [  0,   0,   0,   0,   0,   0,   0,   0,  80, 156]],
```

```
[0.        , 0.        , 0.        , 0.        , 0.        ,
 0.        , 0.        , 0.        , 0.        , 0.        ],
[0.        , 0.        , 0.        , 0.        , 0.        ,
 0.        , 0.        , 0.        , 0.        , 0.        ],
[0.        , 0.        , 0.        , 0.        , 0.        ,
 0.        , 0.        , 0.        , 0.        , 0.        ],
[0.        , 0.        , 0.        , 0.        , 0.        ,
 0.        , 0.        , 0.        , 0.        , 0.        ],
[0.        , 0.        , 0.        , 0.        , 0.        ,
 0.        , 0.        , 0.        , 0.        , 0.        ],
[0.        , 0.        , 0.        , 0.        , 0.        ,
 0.        , 0.        , 0.        , 0.        , 0.        ],
[0.        , 0.        , 0.        , 0.        , 0.        ,
 0.        , 0.        , 0.        , 0.11764706, 0.14117647],
[0.        , 0.        , 0.        , 0.        , 0.        ,
 0.        , 0.        , 0.19215686, 0.93333333, 0.99215686],
[0.        , 0.        , 0.        , 0.        , 0.        ,
 0.        , 0.        , 0.07058824, 0.85882353, 0.99215686],
[0.        , 0.        , 0.        , 0.        , 0.        ,
 0.        , 0.        , 0.        , 0.31372549, 0.61176471]]
```

独热编码 one-hot




```
In  [10]: train_labels[0]
Out[10]: 5
```

```
In  [12]: train_labels[0]
Out[12]: array([0, 0, 0, 0, 0, 1, 0, 0, 0, 0],
```