```
from google.colab import drive
```

```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
import tensorflow as tf
import numpy as np
import matplotlib.pyplot as plt
print(tf.__version__)
```

```
2.19.0
```

```
fashion_mnist = tf.keras.datasets.fashion_mnist

(train_images, train_labels), (test_images, test_labels) = fashion_mnist.load_data()

class_names = ['T-shirt/top', 'Trouser', 'Pullover', 'Dress', 'Coat',
               'Sandal', 'Shirt', 'Sneaker', 'Bag', 'Ankle boot']
```

```
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/train-labels-idx1-ubyte.gz
29515/29515 ━━━━━━━━━━━━━━━━━━━━ 0s 0us/step
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/train-images-idx3-ubyte.gz
26421880/26421880 ━━━━━━━━━━━━━━━━━━━━ 0s 0us/step
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/t10k-labels-idx1-ubyte.gz
5148/5148 ━━━━━━━━━━━━━━━━━━━━ 0s 0us/step
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/t10k-images-idx3-ubyte.gz
4422102/4422102 ━━━━━━━━━━━━━━━━━━━━ 0s 0us/step
```

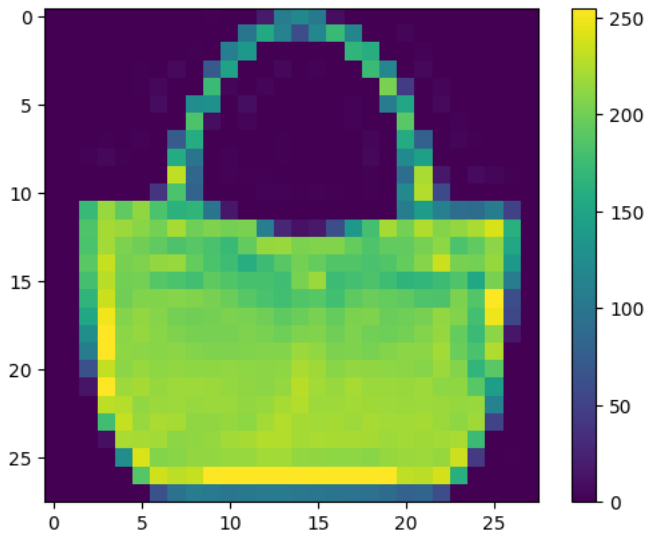
```
train_images.shape
```

```
(60000, 28, 28)
```

```
test_images.shape
```

```
(10000, 28, 28)
```

```
plt.figure()
plt.imshow(train_images[100])
plt.colorbar()
plt.grid(False)
plt.show()
```




```
train_images=train_images/255.0
test_images=test_images/255.0
```

```
plt.figure(figsize=(10,10))
for i in range(20):
    plt.subplot(5,5,i+1)
    plt.xticks([])
    plt.yticks([])
```

```
    plt.grid(False)
    plt.imshow(train_images[i], cmap=plt.cm.binary)
    plt.xlabel(class_names[train_labels[i]])
plt.show()
```


```
train_images = train_images.reshape(train_images.shape[0], 28, 28, 1).astype('float32')
test_images = test_images.reshape(test_images.shape[0], 28, 28, 1).astype('float32')


model=tf.keras.Sequential([
    tf.keras.layers.Conv2D(64,(3,3),activation='relu',input_shape=(28,28,1)),
    tf.keras.layers.MaxPooling2D(2,2),
    tf.keras.layers.Conv2D(64,(3,3),activation='relu'),
    tf.keras.layers.MaxPooling2D(2,2),
    tf.keras.layers.Flatten(),
    #tf.keras.layers.Dense(128,activation= tf.keras.layers.LeakyReLU(alpha=0.3)),
    tf.keras.layers.Dense(128,activation='relu'),
    tf.keras.layers.Dropout(0.5),
    tf.keras.layers.Dense(64,activation='relu'),
    tf.keras.layers.Dropout(0.5),
    tf.keras.layers.Dense(10,activation='softmax'),
])
```

```
/usr/local/lib/python3.11/dist-packages/keras/src/layers/convolutional/base_conv.py:113: UserWarning: Do not pass an `input_shape`/`
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
model.compile(optimizer='rmsprop',
              loss=tf.keras.losses.SparseCategoricalCrossentropy(from_logits=True),
              metrics=['accuracy'])


model.summary()
```

Model: "sequential"

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 26, 26, 64)	640
max_pooling2d (MaxPooling2D)	(None, 13, 13, 64)	0
conv2d_1 (Conv2D)	(None, 11, 11, 64)	36,928
max_pooling2d_1 (MaxPooling2D)	(None, 5, 5, 64)	0
flatten (Flatten)	(None, 1600)	0
dense (Dense)	(None, 128)	204,928
dropout (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 64)	8,256
dropout_1 (Dropout)	(None, 64)	0
dense_2 (Dense)	(None, 10)	650

Total params: 251,402 (982.04 KB)
Trainable params: 251,402 (982.04 KB)

```
model.fit(train_images, train_labels, epochs=5)
```

```
Epoch 1/5
/usr/local/lib/python3.11/dist-packages/keras/src/backend/tensorflow/nn.py:717: UserWarning: "`sparse_categorical_crossentropy` rece
  output, from_logits = _get_logits(
1875/1875 ━━━━━━━━━━━━━━━━━━━━ 91s 48ms/step - accuracy: 0.6566 - loss: 0.9631
Epoch 2/5
1875/1875 ━━━━━━━━━━━━━━━━━━━━ 89s 48ms/step - accuracy: 0.8555 - loss: 0.4385
Epoch 3/5
1875/1875 ━━━━━━━━━━━━━━━━━━━━ 90s 48ms/step - accuracy: 0.8677 - loss: 0.3998
Epoch 4/5
1875/1875 ━━━━━━━━━━━━━━━━━━━━ 139s 47ms/step - accuracy: 0.8750 - loss: 0.3928
Epoch 5/5
1875/1875 ━━━━━━━━━━━━━━━━━━━━ 141s 46ms/step - accuracy: 0.8716 - loss: 0.4069
<keras.src.callbacks.history.History at 0x784c6614c790>
```

```
test_loss, test_acc = model.evaluate(test_images,  test_labels, verbose=1)

print('\nTest accuracy:', test_acc)
```

```
313/313 ━━━━━━━━━━━━━━━━━━━━ 4s 12ms/step - accuracy: 0.8858 - loss: 0.3735

Test accuracy: 0.8812000155448914
```