```
import tensorflow as tf
from keras.models import Sequential
from keras.layers import Dense, Conv2D, Dropout, Flatten, MaxPooling2D
import matplotlib.pyplot as plt
import numpy as np

mnist = tf.keras.datasets.mnist
(x_train,y_train),(x_test,y_test) = mnist.load_data()
input_shape = (28,28,1)

x_train = x_train.reshape(x_train.shape[0],28,28,1)
x_test = x_test.reshape(x_test.shape[0],28,28,1)

x_train = x_train.astype('float32')
x_test = x_test.astype('float32')

x_train = x_train / 255
x_test = x_test / 255
print("shape of training : ",x_train.shape)
print("shape of testing : ",x_test.shape)
```

```
shape of training :  (60000, 28, 28, 1)
shape of testing :  (10000, 28, 28, 1)
```

```
model = Sequential()
model.add(Conv2D(28, kernel_size=(3,3), input_shape=input_shape))
model.add(MaxPooling2D(pool_size=(2,2)))
model.add(Flatten())
model.add(Dense(200,activation = "relu"))
model.add(Dropout(0.3))
model.add(Dense(10,activation = "softmax"))

model.summary()
```

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #   
=================================================================
 conv2d (Conv2D)             (None, 26, 26, 28)        280       
                                                                 
 max_pooling2d (MaxPooling2  (None, 13, 13, 28)        0         
 D)                                                              
                                                                 
 flatten (Flatten)           (None, 4732)              0         
                                                                 
 dense (Dense)               (None, 200)               946600    
                                                                 
 dropout (Dropout)           (None, 200)               0         
                                                                 
 dense_1 (Dense)             (None, 10)                2010      
```

```
=================================================================
Total params: 948890 (3.62 MB)
Trainable params: 948890 (3.62 MB)
Non-trainable params: 0 (0.00 Byte)
_________________________________________________________________
```

```
model.compile(optimizer='adam',loss='sparse_categorical_crossentropy',
metrics=['accuracy'])
model.fit(x_train,y_train, epochs=2)
```

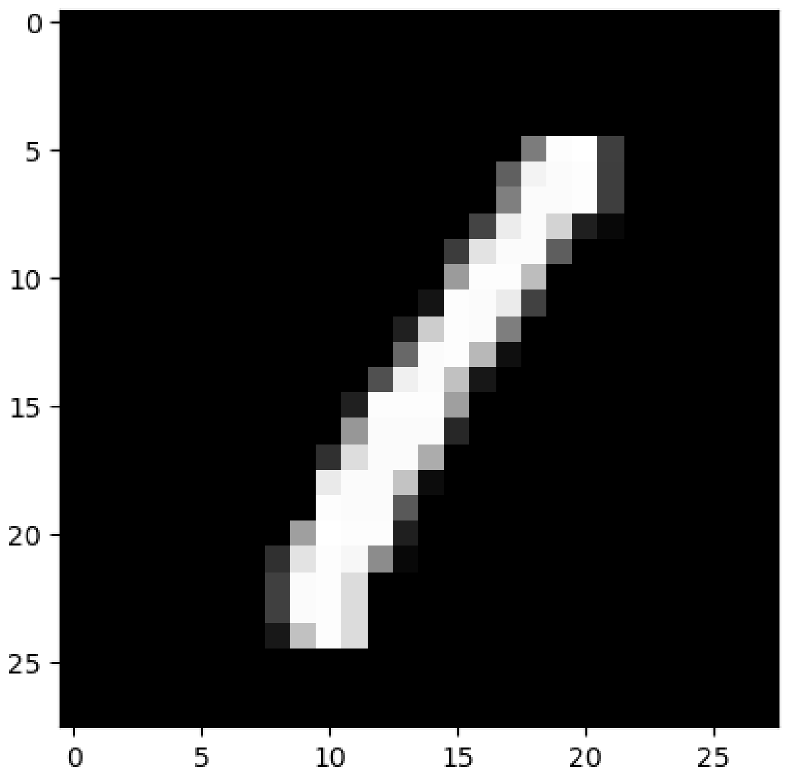
```
Epoch 1/2
1875/1875 [==============================] - 42s 21ms/step - loss:
0.1975 - accuracy: 0.9402
Epoch 2/2
1875/1875 [==============================] - 40s 21ms/step - loss:
0.0812 - accuracy: 0.9746
```

```
<keras.src.callbacks.History at 0x246ba848d30>
```

```
test_loss, test_acc = model.evaluate(x_test,y_test)
print("Loss=%.3f"%test_loss)
print("Accuracy=%.3f"%test_acc)
```

```
313/313 [==============================] - 3s 7ms/step - loss: 0.0616
- accuracy: 0.9799
Loss=0.062
Accuracy=0.980
```

```
image=x_train[3]
plt.imshow(np.squeeze(image),cmap='gray')
plt.show()
```



```
image = image.reshape(1,image.shape[0], image.shape[1],
image.shape[2])
predict_model = model.predict([image])
print("predict class: {}".format(np.argmax(predict_model)))
```

```
1/1 [==============================] - 0s 196ms/step
predict class: 1
```