Implement VGG-19 on mnist dataset

In [1]:
```
import matplotlib.pyplot as plt
import numpy as np
import tensorflow as tf
from tensorflow import keras
from tensorflow.keras import layers
from tensorflow.keras.layers import Flatten,Dense,Conv2D,MaxPooling2D,Input
from tensorflow.keras.models import Sequential,Model
from tensorflow.keras.applications import VGG19
from tensorflow.image import resize,grayscale_to_rgb
from tensorflow.keras.utils import to_categorical
from tensorflow.keras.datasets import mnist,fashion_mnist,cifar10
```

```
WARNING:tensorflow:From D:\JUPYTER FOLDER\Lib\site-packages\keras\src\losses.py:2976: The name tf.losses.sparse_softmax_cross
_entropy is deprecated. Please use tf.compat.v1.losses.sparse_softmax_cross_entropy instead.
```

In [2]:
```
(train_images,train_labels),(test_images,test_labels)=mnist.load_data()
train_images=(train_images.astype('float32')/255.0).reshape(-1,28,28,1)
test_images=(test_images.astype('float32')/255.0).reshape(-1,28,28,1)
train_labels,test_labels=to_categorical(train_labels),to_categorical(test_labels)
```

In [3]:
```
#base_model
base_model=VGG19(weights='imagenet',include_top=False,input_shape=(48,48,3))
for layer in base_model.layers:
    layer.trainable=False
```

```
WARNING:tensorflow:From D:\JUPYTER FOLDER\Lib\site-packages\keras\src\backend.py:1398: The name tf.executing_eagerly_outside_
functions is deprecated. Please use tf.compat.v1.executing_eagerly_outside_functions instead.

WARNING:tensorflow:From D:\JUPYTER FOLDER\Lib\site-packages\keras\src\layers\pooling\max_pooling2d.py:161: The name tf.nn.max
_pool is deprecated. Please use tf.nn.max_pool2d instead.
```

In [4]:
```
model=Model(inputs=base_model.input,outputs=Dense(10,activation='softmax')(Dense(1024,activation='relu')(Flatten()(base_model.c
```

In [5]:
```
model.compile(optimizer='adam',loss='categorical_crossentropy',metrics=['accuracy'])
```

```
WARNING:tensorflow:From D:\JUPYTER FOLDER\Lib\site-packages\keras\src\optimizers\__init__.py:309: The name tf.train.Optimizer
is deprecated. Please use tf.compat.v1.train.Optimizer instead.
```

In [6]:
```
train_images_vgg=grayscale_to_rgb(resize(train_images,(48,48),method='bicubic'))
test_images_vgg=grayscale_to_rgb(resize(test_images,(48,48),method='bicubic'))
```

In [7]:
```
history=model.fit(train_images_vgg,train_labels,epochs=1,validation_data=(test_images_vgg,test_labels))
```

```
WARNING:tensorflow:From D:\JUPYTER FOLDER\Lib\site-packages\keras\src\utils\tf_utils.py:492: The name tf.ragged.RaggedTensorV
alue is deprecated. Please use tf.compat.v1.ragged.RaggedTensorValue instead.

WARNING:tensorflow:From D:\JUPYTER FOLDER\Lib\site-packages\keras\src\engine\base_layer_utils.py:384: The name tf.executing_e
agerly_outside_functions is deprecated. Please use tf.compat.v1.executing_eagerly_outside_functions instead.

1875/1875 [==============================] - 412s 219ms/step - loss: 0.2094 - accuracy: 0.9374 - val_loss: 0.1118 - val_accur
acy: 0.9611
```

In [ ]:
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```
for _ in range(5):
    index = np.random.randint(0, len(test_images))


    # Preprocess the single test image to match the required input shape
    single_test_image = test_images[index].reshape(28, 28, 1)
    single_test_image_rgb = grayscale_to_rgb(resize(single_test_image, (48, 48), method='bicubic'))

    # Add an extra dimension to match the expected input shape
    single_test_image_rgb = single_test_image_rgb[np.newaxis, ...]

    predicted_label = np.argmax(model.predict(single_test_image_rgb))

    print(f' predicted_label: {predicted_label}')
    plt.imshow(test_images[index].reshape(28, 28), cmap='gray')  # Display the original grayscale image
    plt.show()
```

In [ ]: