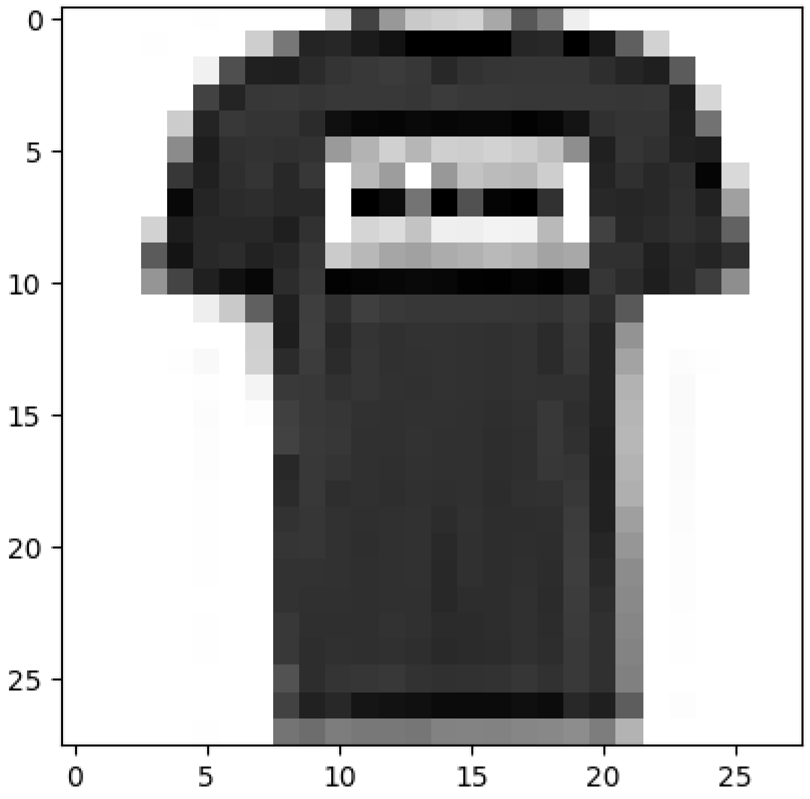
AIM :

<u>PROGRAM</u>

```
import pandas as pd
import matplotlib.pyplot as plt
import tensorflow as tf
from tensorflow import keras

np.random.seed(42)
# tf.set.random. seed(42)
fashion_mnist = keras.datasets.fashion_mnist
(X_train, y_train), (X_test, y_test) = fashion_mnist.load_data()
print(X_train.shape, X_test.shape)
X_train = X_train / 255.0
X_test = X_test / 255.0
plt.imshow(X_train[1], cmap='binary')
plt.show()
np.unique(y_test)

class_names = ['T-Shirt/Top", Trouser', 'Pullover', 'Dress', 'Coat', 'Sandal', 'Shirt', 'Sneaker', '8ag',
'Ankle Boot']
n_rows = 5
n_cols = 10
plt.figure(figsize=(n_cols * 1.4, n_rows * 1.6))
for row in range(n_rows):
  for col in range(n_cols):
      index = n_cols * row + col
      plt.subplot(n_rows, n_cols, index + 1)
      plt.imshow(X_train[index], cmap='binary', interpolation='nearest')
      plt.axis('off')
      plt.title(class_names[y_train[index]])
plt.show()
```



```
(60000, 28, 28) (10000, 28, 28)
```

```
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model_CNN = keras.models.Sequential()
model_CNN.add(keras.layers.Conv2D(filters=32, kernel_size=7, padding='same',
activation='relu', input_shape=[28, 28, 1]))
model_CNN.add(keras.layers.MaxPooling2D(pool_size=2))
model_CNN.add(keras.layers.Conv2D(filters=64, kernel_size=3, padding='same',
activation='relu'))
model_CNN.add(keras.layers.MaxPooling2D(pool_size=2))
model_CNN.add(keras.layers.Conv2D(filters=32, kernel_size=3, padding='same',
activation='relu'))
model_CNN.add(keras.layers.MaxPooling2D(pool_size=2))

model_CNN.summary()
model_CNN.add(keras.layers.Flatten())
model_CNN.add(keras.layers.Dense(units=128, activation='relu'))
model_CNN.add(keras.layers.Dense(units=64, activation='relu'))
model_CNN.add(keras.layers.Dense(units=10, activation='softmax'))

model_CNN.summary()

model_CNN.compile(loss='sparse_categorical_crossentropy', optimizer='adam',
metrics=['accuracy'])

X_train = X_train[..., np.newaxis]
X_test = X_test[..., np.newaxis]

history_CNN = model_CNN.fit(X_train, y_train, epochs=2, validation_split=0.1)
pd.DataFrame(history_CNN.history).plot()
plt.grid(True)
plt.xlabel('epochs')
plt.ylabel('loss/accuracy')
plt.title('Training and validation plot')
plt.show()
test_loss, test_accuracy = model_CNN.evaluate(X_test, y_test)
print(' Test Loss :{}, Test Accuracy : {}'.format(test_loss, test_accuracy))
```
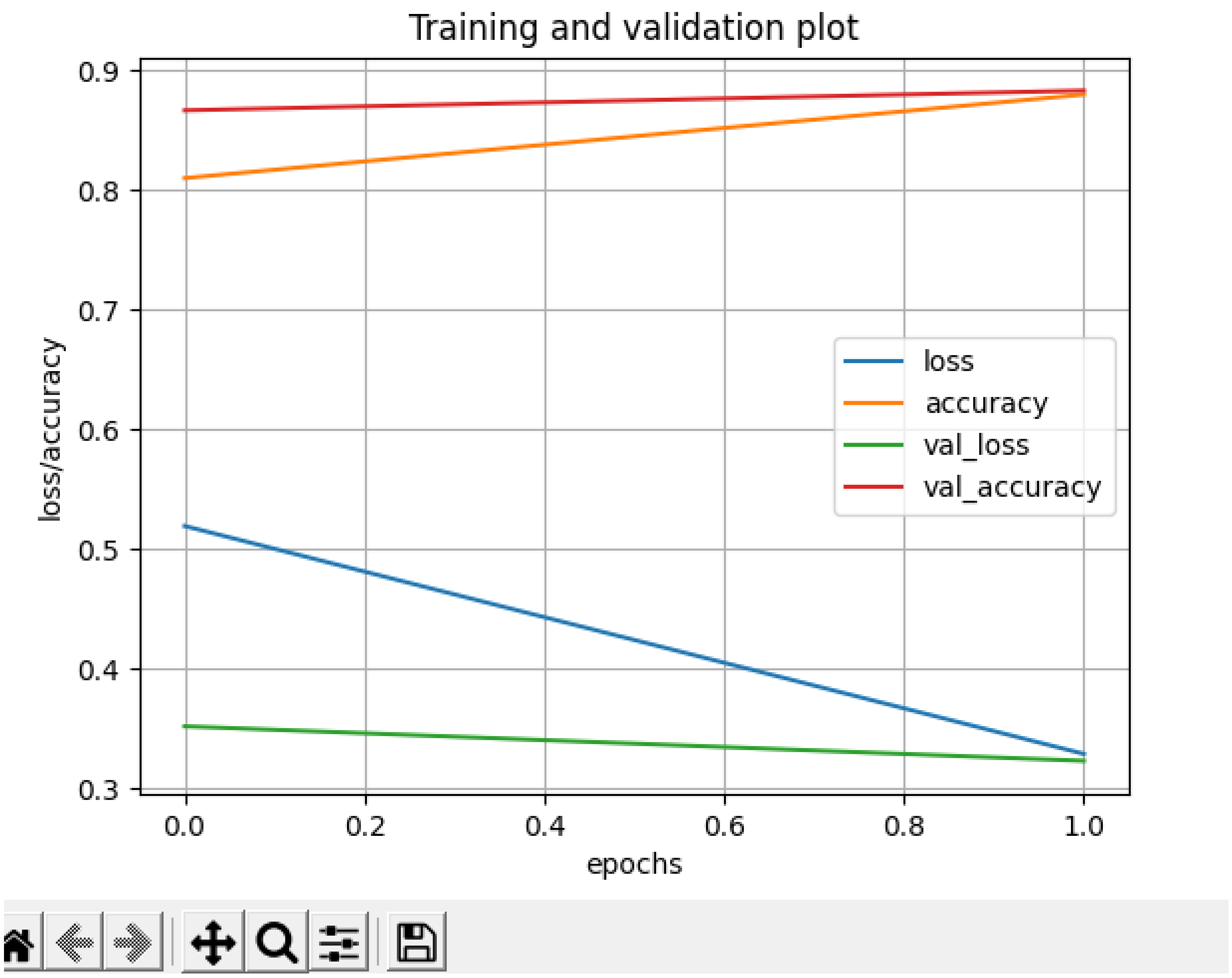

Ankle Boot
T-Shirt/Top
T-Shirt/Top
Dress
T-Shirt/Top
T-Shirt/Top
Ankle Boot
Sandal
Sandal
Sneaker
Dress
Trouser
Coat
Bag
Coat
Sandal
Dress
Shirt
Shirt
T-Shirt/Top
Shirt
Sneaker
Ankle Boot
Sandal
Ankle Boot


Training and validation plot
loss/accuracy
epochs
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.0
0.2
0.4
0.6
0.8
1.0
loss
accuracy
val_loss
val_accuracy