Image Classification using Tensor flow

In [1]:

```
# importing the necessary libraries

import tensorflow as tf
from tensorflow import keras
import numpy as np
import matplotlib.pyplot as plt
```

In [2]:

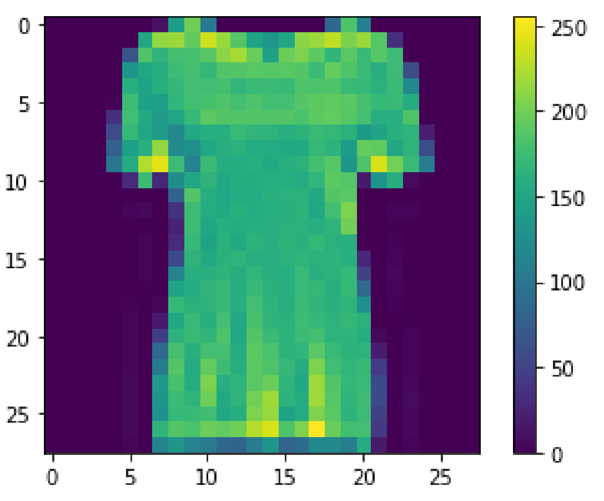
```
# importing fashion MNIST dataset

f_data = keras.datasets.fashion_mnist
(train_img, train_lbl), (test_img, test_lbl) = f_data.load_data()
```

In [3]:

```
# The class names are not stored in the dataset so it is defined a list below

names = ["T-shirt/ Top",'Trouser','Pullover','Dress','Coat','Sandal','Shirt', 'Sneaker','Bag','Ankle Boot']
```

In [4]:

```
# Preprocessing the data : Let a sample image be taken from the dataset and visualize it


plt.figure()
plt.imshow(train_img[10])
plt.colorbar()
plt.grid(False)
plt.show()
```



In [5]:

```
# The image is converted to Grey scale image by dividing with 255 and is checked whether the conversion is succcessful or not

train_img = train_img/255.0
test_img = test_img/255.0

plt.figure(figsize=(7,7))
for i in range(20):
    plt.subplot(4, 5, i+1)
    plt.xticks([])
    plt.yticks([])
    plt.grid(False)
    plt.imshow(train_img[i], cmap=plt.cm.binary)
    plt.xlabel(names[train_lbl[i]])
plt.show()
```

In [6]:

```
# Building the model with different input layers

model = keras.Sequential([keras.layers.Flatten(input_shape=(28,28)),
                          keras.layers.Dense(128, activation = 'relu'),
                          keras.layers.Dense(10)])

# compiling the model

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

In [7]:

```
# testing the model and making predictions on it

model.fit(train_img, train_lbl, epochs=7)

# Evaluating the accuracy

test_loss, test_acc = model.evaluate(test_img, test_lbl, verbose=2)
print("Test accuracy for given dataset: ", test_acc)
```

```
Epoch 1/7
1875/1875 [==============================] - 7s 3ms/step - loss: 0.4993 - accuracy: 0.8228
Epoch 2/7
1875/1875 [==============================] - 6s 3ms/step - loss: 0.3761 - accuracy: 0.8633
Epoch 3/7
1875/1875 [==============================] - 6s 3ms/step - loss: 0.3387 - accuracy: 0.8753
Epoch 4/7
1875/1875 [==============================] - 6s 3ms/step - loss: 0.3128 - accuracy: 0.8838
Epoch 5/7
1875/1875 [==============================] - 6s 3ms/step - loss: 0.2940 - accuracy: 0.8914
Epoch 6/7
1875/1875 [==============================] - 6s 3ms/step - loss: 0.2810 - accuracy: 0.8957
Epoch 7/7
1875/1875 [==============================] - 6s 3ms/step - loss: 0.2679 - accuracy: 0.9000
313/313 - 1s - loss: 0.3641 - accuracy: 0.8702
Test accuracy for given dataset:  0.870199978351593
```

In [8]:

```
# predictions

p_model = tf.keras.Sequential([model, tf.keras.layers.Softmax()])
predictions = p_model.predict(test_img)
predictions[1]
```

Out[8]:

```
array([1.9273639e-03, 5.5255261e-10, 8.7925637e-01, 1.3375480e-07,
       5.7370007e-02, 2.3384594e-10, 6.1446011e-02, 1.7141849e-10,
       5.4130805e-08, 2.0218753e-12], dtype=float32)
```

In [9]:

```
np.argmax(predictions[0])
```

Out[9]:

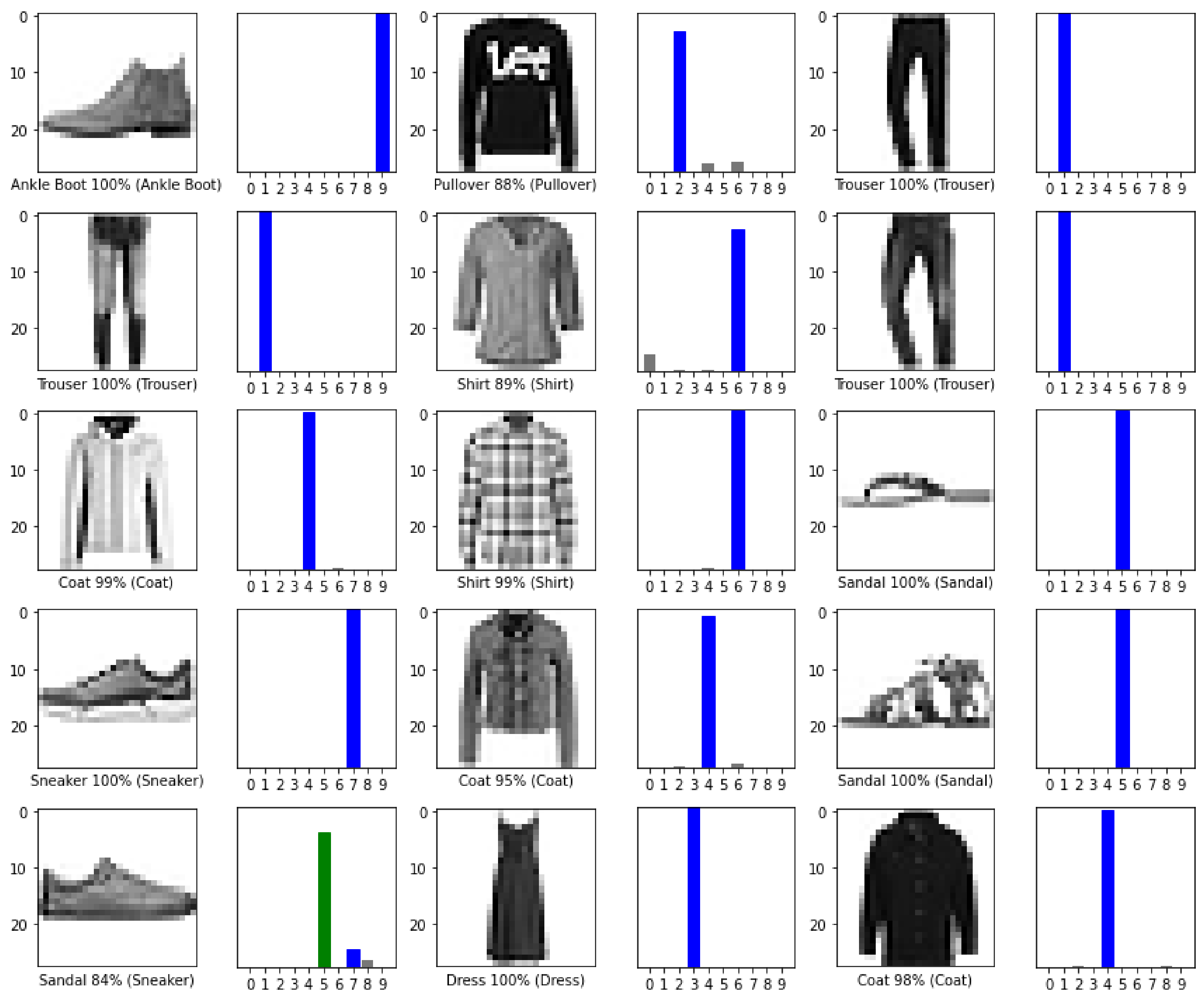
```
9
```

In [10]:

```
# Plotting the predictions

def plot_image(i, predictions_array, true_label, img):
    true_label, img = true_label[i], img[i]
    plt.grid(False)
    plt.xticks([])
    plt.xticks([])

    plt.imshow(img, cmap=plt.cm.binary)

    p_label = np.argmax(predictions_array)
    if p_label == true_label:
        color = 'blue'
    else:
        color = 'green'

    plt.xlabel("{} {:2.0f}% ({})".format(names[p_label], 100*np.max(predictions_array), names[true_label], color= color))

def plot_array(i, predictions_array, true_label):
    true_label = true_label[i]
    plt.grid(False)
    plt.xticks(range(10))
    plt.yticks([])
    tplot = plt.bar(range(10),predictions_array, color='#777777')
    plt.ylim([0,1])
    p_label= np.argmax(predictions_array)

    tplot[p_label].set_color('green')
    tplot[true_label].set_color('blue')
```

In [11]:

```
# Checking whether the images are classified correctly or incorrectly

n_rows=5
n_cols=3
n_images=n_rows*n_cols
plt.figure(figsize=(2*2*n_cols, 2*n_rows))
for i in range(n_images):
    plt.subplot(n_rows, 2*n_cols, 2*i+1)
    plot_image(i, predictions[i], test_lbl, test_img)
    plt.subplot(n_rows, 2*n_cols, 2*i+2)
    plot_array(i, predictions[i], test_lbl)
plt.tight_layout()
plt.savefig('Img_classification.jpg')
plt.show()
```



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