dl_3

April 11, 2024

[1]:
```
import tensorflow as tf
from tensorflow import keras
import numpy as np
import matplotlib.pyplot as plt
```

```
C:\Users\Nimisha jadhav\anaconda3\lib\site-packages\scipy\__init__.py:155:
UserWarning: A NumPy version >=1.18.5 and <1.25.0 is required for this version
of SciPy (detected version 1.26.4
  warnings.warn(f"A NumPy version >={np_minversion} and <{np_maxversion}"
```

[3]:
```
fashion_mnist= keras.datasets.fashion_mnist
(train_images, train_labels), (test_images, test_labels)= fashion_mnist.
 ↪load_data()
#normalize the images
train_images= train_images / 255.0
test_images= test_images / 255.0
```

```
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-
datasets/train-labels-idx1-ubyte.gz
29515/29515             0s 5us/step
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-
datasets/train-images-idx3-ubyte.gz
26421880/26421880             40s
2us/step
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-
datasets/t10k-labels-idx1-ubyte.gz
5148/5148             0s 23us/step
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-
datasets/t10k-images-idx3-ubyte.gz
4422102/4422102             12s
3us/step
```

[5]:
```
#define the model
model= keras.Sequential([keras.layers.Conv2D(64,(3,3),␣
 ↪activation='relu',input_shape=(28,28,1)),
                         keras.layers.MaxPooling2D(2,2),
                         keras.layers.Flatten(),
                         keras.layers.Dense(128,activation='relu'),
```

```
                        keras.layers.Dense(10,activation='softmax')])
```

```
C:\Users\Nimisha jadhav\anaconda3\lib\site-
packages\keras\src\layers\convolutional\base_conv.py:99: UserWarning: Do not
pass an `input_shape`/`input_dim` argument to a layer. When using Sequential
models, prefer using an `Input(shape)` object as the first layer in the model
instead.
  super().__init__(
```

[9]:
```
# Compile the model with the correct loss function
model.compile(optimizer='adam', loss='sparse_categorical_crossentropy',␣
 ↪metrics=['accuracy'])
```

[10]:
```
#train the model
model.fit(train_images, train_labels, epochs=10)
#evaluate the model
test_loss, test_acc=model.evaluate(test_images, test_labels)
print('Test accuracy', test_acc)
```

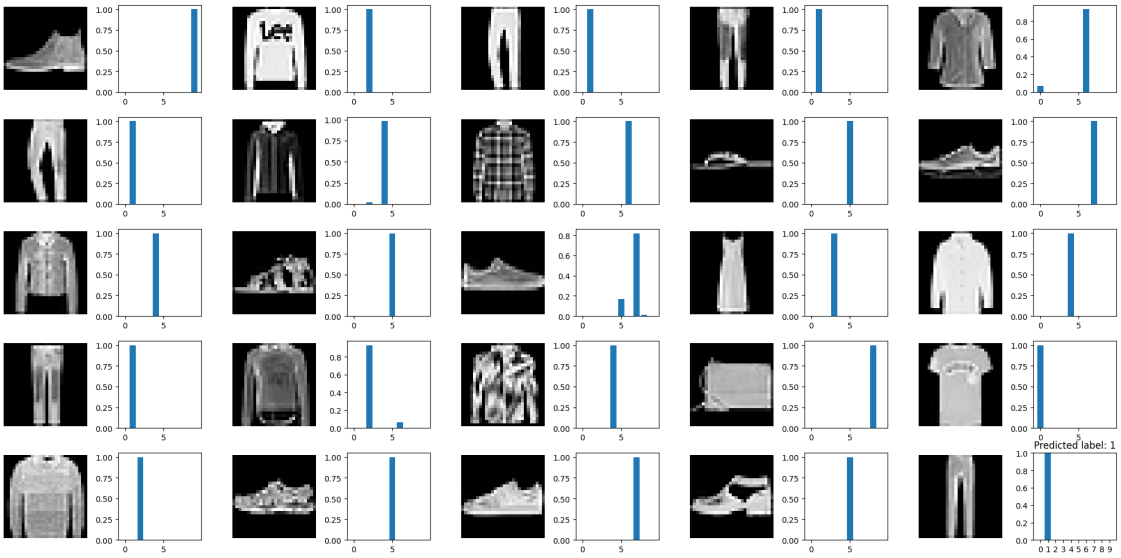
```
Epoch 1/10
1875/1875             34s 18ms/step -
accuracy: 0.8241 - loss: 0.5051
Epoch 2/10
1875/1875             36s 19ms/step -
accuracy: 0.9054 - loss: 0.2589
Epoch 3/10
1875/1875             37s 20ms/step -
accuracy: 0.9237 - loss: 0.2059
Epoch 4/10
1875/1875             36s 19ms/step -
accuracy: 0.9338 - loss: 0.1734
Epoch 5/10
1875/1875             36s 19ms/step -
accuracy: 0.9467 - loss: 0.1441
Epoch 6/10
1875/1875             36s 19ms/step -
accuracy: 0.9549 - loss: 0.1226
Epoch 7/10
1875/1875             36s 19ms/step -
accuracy: 0.9637 - loss: 0.1011
Epoch 8/10
1875/1875             36s 19ms/step -
accuracy: 0.9707 - loss: 0.0800
Epoch 9/10
1875/1875             36s 19ms/step -
accuracy: 0.9764 - loss: 0.0662
Epoch 10/10
1875/1875             36s 19ms/step -
```

```
accuracy: 0.9804 - loss: 0.0547
313/313             2s 5ms/step -
accuracy: 0.9179 - loss: 0.3547
Test accuracy 0.9182999730110168
```

[12]:
```
#make predictions
predictions= model.predict(test_images)
predicted_labels= np.argmax(predictions, axis=1)
```

```
313/313             2s 5ms/step
```

[18]:
```
num_rows=5
num_cols=5
num_images= num_rows * num_cols
plt.figure(figsize=(2 * 2 *num_cols, 2 * num_rows))
for i in range(num_images):
    plt.subplot(num_rows, 2* num_cols, 2 * i + 1)
    plt.imshow(test_images[i],cmap='gray')
    plt.axis('off')
    plt.subplot(num_rows, 2 * num_cols, 2* i + 2)
    plt.bar(range(10),
predictions[i])
plt.xticks(range(10))
plt.ylim([0, 1])
plt.tight_layout()
plt.title(f"Predicted label: {predicted_labels[i]}")
plt.show()
```



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