Fashion Mnist

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Libraries

```
import matplotlib.pyplot as plt
import numpy as np
import tensorflow as tf
from tensorflow.keras import datasets, layers, models
```

Preparing Fashion Mnist dataset

```
(train_images, train_labels), (test_images, test_labels) =
datasets.fashion_mnist.load_data()
```

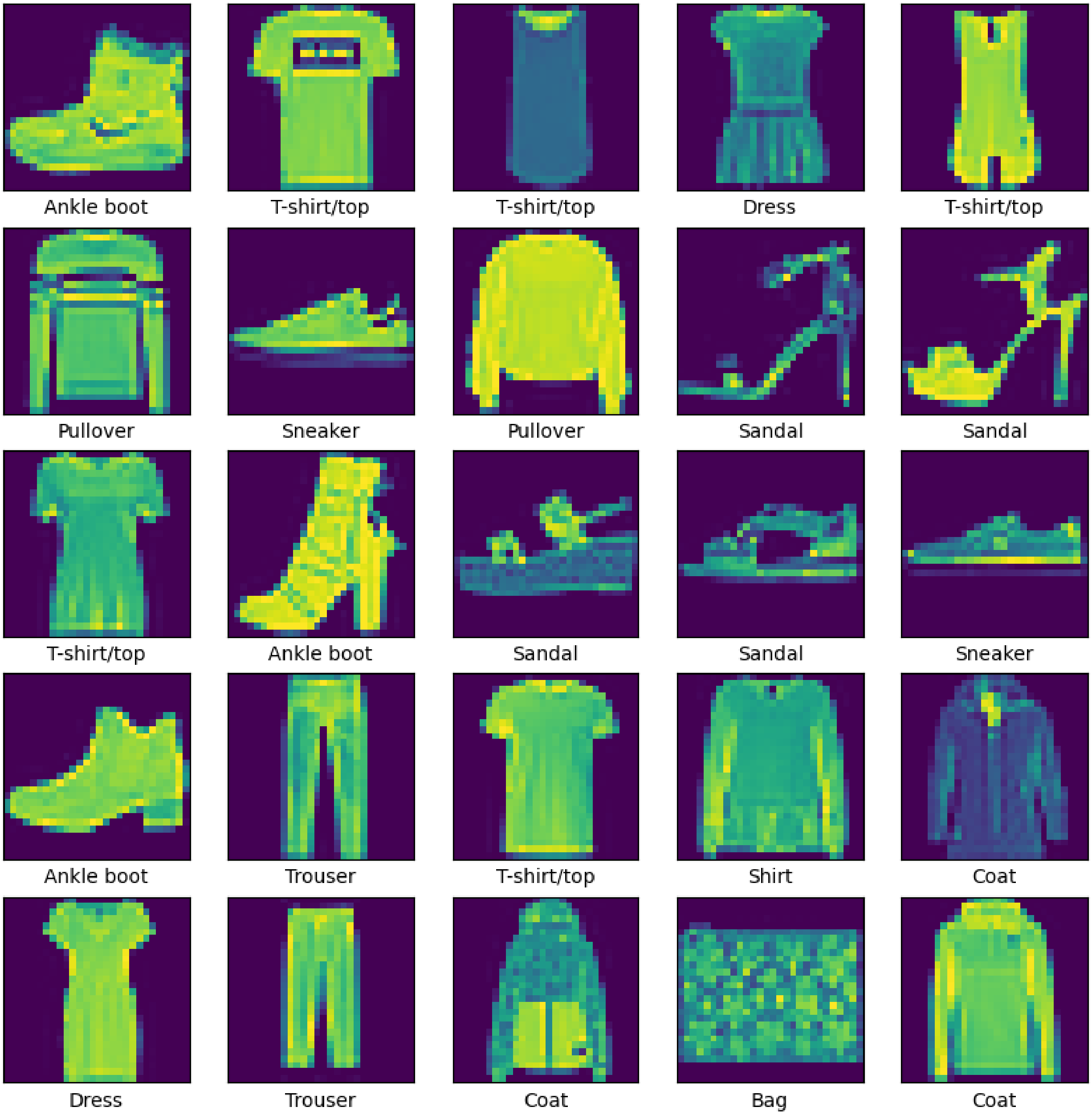
```
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/train-labels-idx1-ubyte.gz
29515/29515 [==============================] - 0s 0us/step
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/train-images-idx3-ubyte.gz
26421880/26421880 [==============================] - 0s 0us/step
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/t10k-labels-idx1-ubyte.gz
5148/5148 [==============================] - 0s 0us/step
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/t10k-images-idx3-ubyte.gz
4422102/4422102 [==============================] - 0s 0us/step
```

Normalize pixel values

```
train_images, test_images = train_images / 255.0, test_images / 255
```

Data Validation & ploting images and labels

```
class_names = ["T-shirt/top", "Trouser", "Pullover", "Dress", "Coat",
               "Sandal", "Shirt", "Sneaker", "Bag", "Ankle boot"]

plt.figure(figsize = (10, 10))

for i in range(25):
  plt.subplot(5, 5, i+1)
  plt.xticks([])
  plt.yticks([])
  plt.grid(False)
  plt.imshow(train_images[i])
  plt.xlabel(class_names[train_labels[i]])
plt.show()
```



Configuring Layers

```
model = models.Sequential()
model.add(layers.Flatten())
model.add(layers.Dense(64, activation = "relu")),
model.add(layers.Dense(128, activation = "sigmoid"))
```

Training

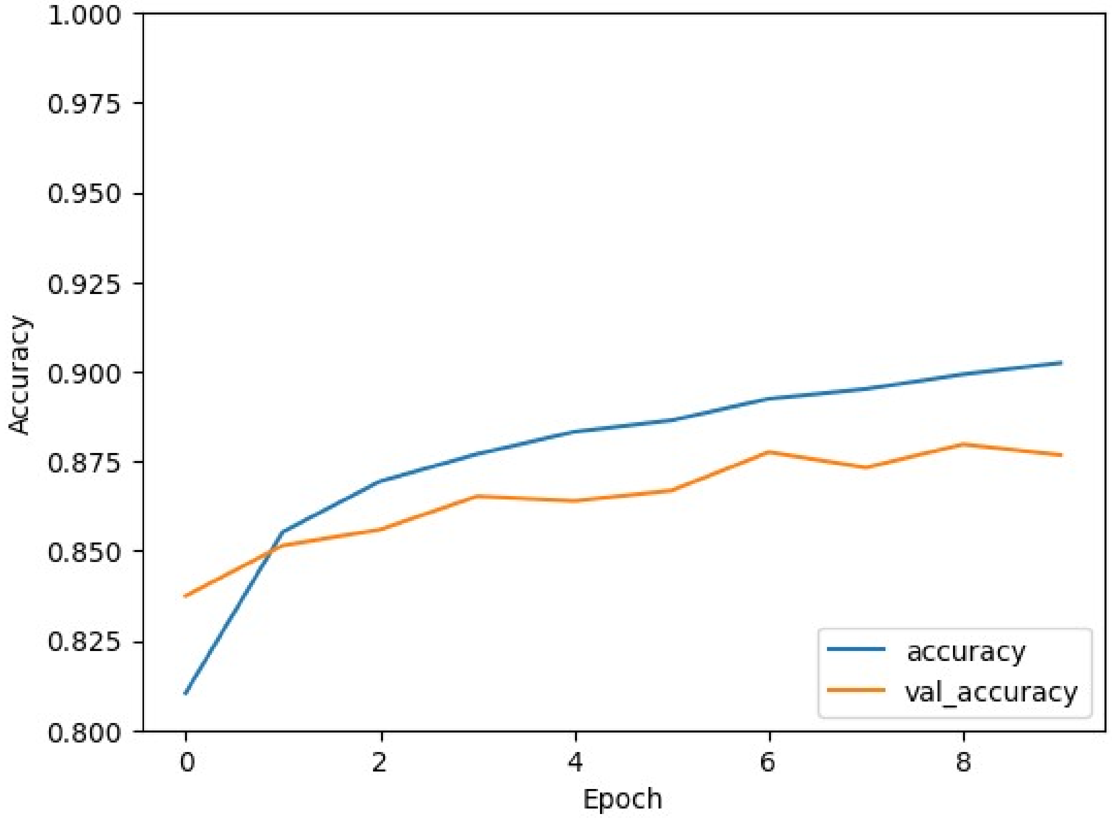
```
model.compile(optimizer="adam",
              loss =
tf.keras.losses.SparseCategoricalCrossentropy(from_logits=True),
              metrics = ["accuracy"])

history = model.fit(train_images, train_labels, epochs=10,
                    validation_data=(test_images, test_labels))

Epoch 1/10

/usr/local/lib/python3.10/dist-packages/keras/src/backend.py:5714:
UserWarning: "`sparse_categorical_crossentropy` received
`from_logits=True`, but the `output` argument was produced by a
Softmax activation and thus does not represent logits. Was this
intended?
  output, from_logits = _get_logits(

1875/1875 [==============================] - 6s 3ms/step - loss:
0.5690 - accuracy: 0.8103 - val_loss: 0.4551 - val_accuracy: 0.8374
Epoch 2/10
1875/1875 [==============================] - 5s 3ms/step - loss:
0.4069 - accuracy: 0.8553 - val_loss: 0.4162 - val_accuracy: 0.8515
Epoch 3/10
1875/1875 [==============================] - 7s 3ms/step - loss:
0.3653 - accuracy: 0.8694 - val_loss: 0.3984 - val_accuracy: 0.8559
Epoch 4/10
1875/1875 [==============================] - 7s 4ms/step - loss:
0.3393 - accuracy: 0.8770 - val_loss: 0.3746 - val_accuracy: 0.8652
Epoch 5/10
1875/1875 [==============================] - 5s 2ms/step - loss:
0.3203 - accuracy: 0.8832 - val_loss: 0.3829 - val_accuracy: 0.8639
Epoch 6/10
1875/1875 [==============================] - 5s 2ms/step - loss:
0.3081 - accuracy: 0.8864 - val_loss: 0.3609 - val_accuracy: 0.8668
Epoch 7/10
1875/1875 [==============================] - 5s 3ms/step - loss:
0.2928 - accuracy: 0.8924 - val_loss: 0.3488 - val_accuracy: 0.8775
Epoch 8/10
1875/1875 [==============================] - 5s 2ms/step - loss:
0.2845 - accuracy: 0.8951 - val_loss: 0.3626 - val_accuracy: 0.8732
Epoch 9/10
1875/1875 [==============================] - 6s 3ms/step - loss:
0.2730 - accuracy: 0.8992 - val_loss: 0.3405 - val_accuracy: 0.8797
Epoch 10/10
1875/1875 [==============================] - 5s 2ms/step - loss:
0.2651 - accuracy: 0.9024 - val_loss: 0.3455 - val_accuracy: 0.8767

print(model.summary())
```

```
Model: "sequential_4"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 flatten_4 (Flatten)         (None, 784)               0

 dense_8 (Dense)             (None, 64)                50240

 dense_9 (Dense)             (None, 128)               8320

=================================================================
Total params: 58560 (228.75 KB)
Trainable params: 58560 (228.75 KB)
Non-trainable params: 0 (0.00 Byte)
_________________________________________________________________
None
```

Evaluation

```
plt.plot(history.history["accuracy"], label = "accuracy")
plt.plot(history.history["val_accuracy"], label = "val_accuracy")
plt.xlabel("Epoch")
plt.ylabel("Accuracy")
plt.ylim([0.8, 1])
plt.legend(loc = "lower right")
```

```
<matplotlib.legend.Legend at 0x7d58dcd761d0>
```



```
test_loss, test_acc = model.evaluate(test_images, test_labels,
verbose=2)
```

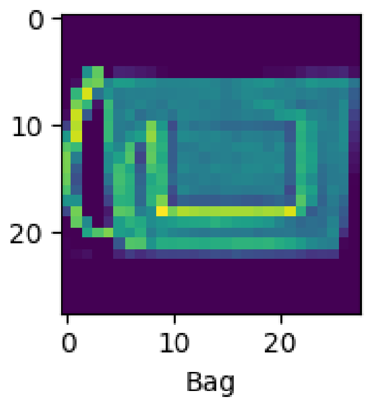
```
313/313 - 1s - loss: 0.3455 - accuracy: 0.8767 - 973ms/epoch -
3ms/step
```

Accuracy test

```
print(test_acc)
```

```
0.8766999840736389
```

```
n = 220 # Numero de imagen

plt.figure(figsize=(2, 2))
plt.imshow(test_images[n])
plt.xlabel(class_names[test_labels[n]])
plt.show()
```



```
predictions = model.predict(test_images)
print(predictions[n])

print(
    "This image most likely belongs to {} with a {:.2f} percent
confidence."
    .format(class_names[np.argmax(predictions[n])], 10 *
np.max(predictions[n]))
)

313/313 [==============================] - 1s 2ms/step
[6.5972105e-02 4.2391606e-05 8.0494338e-04 1.6842708e-06 1.0126979e-03
 4.5273378e-03 4.7756676e-02 2.4496231e-04 9.9991256e-01 1.4497159e-07
 1.6561316e-18 7.0824739e-21 2.9039970e-18 1.1920111e-19 9.7390113e-20
 2.7751586e-19 2.6956222e-18 1.1911118e-18 1.0972277e-19 7.8880088e-19
 1.1515528e-19 3.0233675e-18 1.9347817e-18 5.7144930e-19 6.9554593e-20
 8.9837786e-20 3.1769324e-19 2.6509265e-18 5.5234191e-20 2.7314683e-18
 4.6906389e-18 8.4078318e-19 1.4260846e-19 1.5853880e-18 4.9601999e-19
 2.7957940e-19 2.8790344e-19 2.0381106e-18 3.9191288e-19 2.1520415e-18
 1.0524358e-19 1.4046884e-18 1.8816025e-19 3.7896055e-19 9.4602858e-19
 1.1146430e-18 2.8392009e-21 3.7482730e-18 6.0283411e-20 1.5137799e-19
 2.4460718e-19 2.1507529e-18 8.7732598e-20 2.2852053e-19 6.3617137e-19
 4.6009998e-19 2.8991020e-20 1.4166935e-19 1.7212677e-21 4.4070359e-18
 1.4916142e-18 5.8846527e-20 1.4127160e-19 4.5198141e-18 6.9772540e-19
 8.7738334e-19 5.2709861e-20 1.7124811e-18 3.6516103e-18 6.3130254e-19
 2.0483512e-19 6.3297603e-19 4.4117099e-19 4.7872034e-19 6.7445490e-20
 3.7698521e-19 2.9903649e-20 7.5246048e-20 1.7715113e-18 1.9478589e-19
 2.1913736e-19 2.7650158e-18 1.8936493e-19 8.0934164e-19 6.9177823e-19
 3.7710047e-18 3.3986135e-19 1.7789605e-18 1.5011011e-18 4.4300730e-20
 9.6635995e-18 2.2577562e-18 1.3198847e-18 1.4425269e-18 2.0531153e-19
 8.6385982e-19 9.3267677e-20 2.6818870e-19 1.6158924e-18 1.4513534e-17
 1.2720789e-18 1.0608606e-18 6.0709918e-19 1.3599661e-17 1.9378239e-19
 2.5438521e-19 3.1239837e-18 6.9440629e-19 2.8529582e-20 2.2679669e-19
 5.0690772e-20 2.7961217e-21 2.9984307e-19 4.5653685e-19 9.0554874e-19
 1.3635393e-18 6.1379635e-19 1.2725934e-18 2.2918501e-18 2.6183051e-17
 3.5230979e-18 9.3663444e-20 4.4676661e-19 5.5740765e-18 1.8796379e-18
 2.4880158e-19 5.4781184e-19 9.9908332e-19]
This image most likely belongs to Bag with a 10.00 percent confidence.
```