MNIST_3

July 6, 2025

Creado por:

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Se pide crear un Clasificador para el MNIST dataset

que incluya imágenes:

- en blanco y negro
- de 10 dígitos (0-9)
- 28x28 pixels

(28,28,1)

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en este caso:

- (1) Dropout(0.5),

Ejecutar el script en Colab

1 IMPORTAMOS NUESTRAS DEPENDENCIAS

[1]:
```
from tensorflow.keras import Sequential
from tensorflow.keras.callbacks import EarlyStopping
from tensorflow.keras.datasets import mnist
from tensorflow.keras.layers import Conv2D, MaxPooling2D, Flatten, Dense,␣
↪Dropout
from tensorflow.keras.saving import load_model

from matplotlib import pyplot as plt
```

2 LEEMOS LOS DATOS

[2]:
```
# from keras.datasets import mnist

(x_train, y_train), (x_valid, y_valid) = mnist.load_data()
```

```
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-
datasets/mnist.npz
11490434/11490434              0s
0us/step
```

[3]:
```
# print(x_train)
# print(y_train)
# print(x_valid)
# print(y_valid)
```

[4]:
```
x_train.max(), x_valid.max(), x_train.min(), x_valid.min()
```

[4]:
```
(np.uint8(255), np.uint8(255), np.uint8(0), np.uint8(0))
```

3 NORMALIZAMOS LOS DATOS

/255

[5]:
```
x_train = x_train.astype('float32') / 255.0
x_valid = x_valid.astype('float32') / 255.0
```

[6]:
```
x_train.shape
```

[6]:
```
(60000, 28, 28)
```

[7]:
```
x_train.max(), x_valid.max(), x_train.min(), x_valid.min()

# se ve que está escalado entre 0 y 1
```

[7]:
```
(np.float32(1.0), np.float32(1.0), np.float32(0.0), np.float32(0.0))
```

4 reshape para x_train, x_valid

[8]:
```
x_train = x_train.reshape((-1, 28, 28, 1))
x_valid = x_valid.reshape((-1, 28, 28, 1))
```

[9]:
```
# print(x_train)
# print(x_valid)
```

5 MODELO

[10]:
```
model = Sequential([
        ␣
 ↪Conv2D(filters=32,kernel_size=(3,3),activation='relu',input_shape=(28,28,1)),
       MaxPooling2D(pool_size=(2, 2)),
       Conv2D(filters=64, kernel_size=(3, 3), activation='relu'),
```

```
        MaxPooling2D(pool_size=(2, 2)),
        Flatten(),
        Dense(units=128, activation='relu'),
        # aqui añadimos el Dropout
        Dropout(0.5),
        Dense(units=10, activation='softmax')
])
```

```
/usr/local/lib/python3.11/dist-
packages/keras/src/layers/convolutional/base_conv.py:107: 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__(activity_regularizer=activity_regularizer, **kwargs)
```

[11]:
```
model.compile(optimizer='adam',
              loss='sparse_categorical_crossentropy',
              metrics=['accuracy'])
```

[12]:
```
early_stop = EarlyStopping(monitor='val_accuracy',
                           patience=5,
                           min_delta=0.01,
                           verbose=1)
```

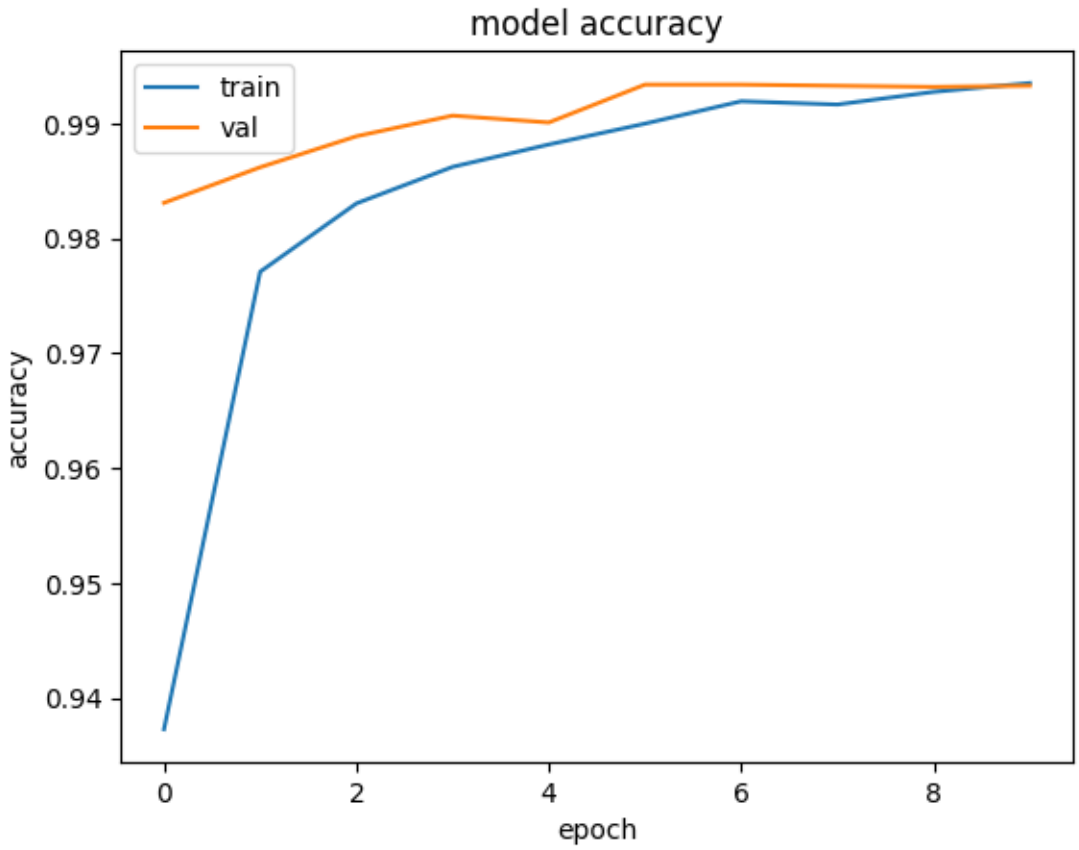
[13]:
```
history = model.fit(x=x_train, y=y_train,
                    epochs=10,
                    validation_data=(x_valid, y_valid),
                    callbacks=[early_stop])
```

```
Epoch 1/10
1875/1875             59s 30ms/step -
accuracy: 0.8671 - loss: 0.4146 - val_accuracy: 0.9831 - val_loss: 0.0531
Epoch 2/10
1875/1875             81s 30ms/step -
accuracy: 0.9759 - loss: 0.0800 - val_accuracy: 0.9862 - val_loss: 0.0409
Epoch 3/10
1875/1875             81s 30ms/step -
accuracy: 0.9825 - loss: 0.0579 - val_accuracy: 0.9889 - val_loss: 0.0311
Epoch 4/10
1875/1875             82s 30ms/step -
accuracy: 0.9866 - loss: 0.0461 - val_accuracy: 0.9907 - val_loss: 0.0245
Epoch 5/10
1875/1875             81s 30ms/step -
accuracy: 0.9888 - loss: 0.0377 - val_accuracy: 0.9901 - val_loss: 0.0282
Epoch 6/10
1875/1875             82s 30ms/step -
accuracy: 0.9904 - loss: 0.0324 - val_accuracy: 0.9934 - val_loss: 0.0210
Epoch 7/10
```

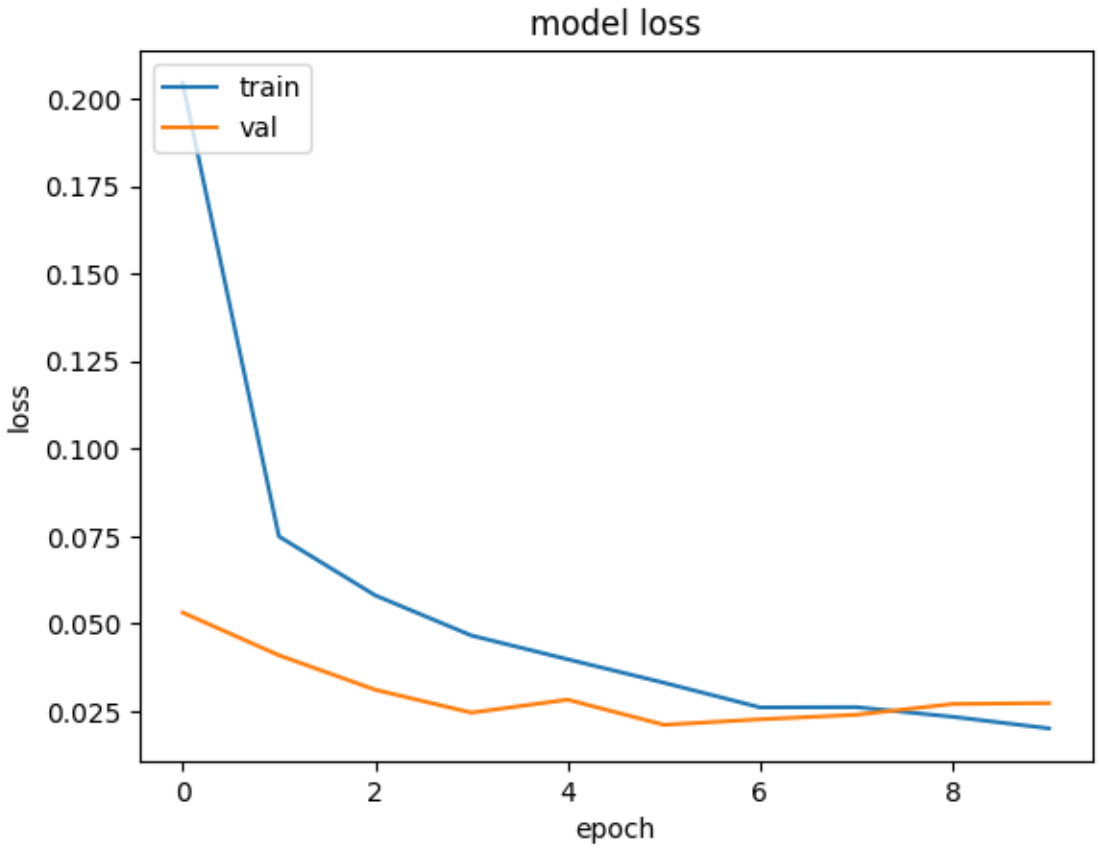
```
1875/1875              82s 30ms/step -
accuracy: 0.9928 - loss: 0.0251 - val_accuracy: 0.9934 - val_loss: 0.0226
Epoch 8/10
1875/1875              82s 30ms/step -
accuracy: 0.9919 - loss: 0.0248 - val_accuracy: 0.9933 - val_loss: 0.0239
Epoch 9/10
1875/1875              83s 30ms/step -
accuracy: 0.9928 - loss: 0.0224 - val_accuracy: 0.9932 - val_loss: 0.0270
Epoch 10/10
1875/1875              81s 30ms/step -
accuracy: 0.9932 - loss: 0.0198 - val_accuracy: 0.9933 - val_loss: 0.0273
```

6 GRÁFICAS DE ENTRENAMIENTO

[14]:
```
plt.plot(history.history['accuracy'])
plt.plot(history.history['val_accuracy'])
plt.title('model accuracy')
plt.ylabel('accuracy')
plt.xlabel('epoch')
plt.legend(['train', 'val'], loc='upper left')
plt.show()
```



[15]:
```
plt.plot(history.history['loss'])
plt.plot(history.history['val_loss'])
plt.title('model loss')
plt.ylabel('loss')
plt.xlabel('epoch')
plt.legend(['train', 'val'], loc='upper left')
plt.show()
```



[16]:
```
# model.evaluate(x_valid, y_valid)
```

7 GUARDAMOS EL MODELO

[17]:
```
model.save("model_3.h5")
```

```
WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
```

`model.save('my_model.keras')` or `keras.saving.save_model(model, 'my_model.keras')`.

8 CARGAMOS EL MODELO

[18]:
```
model = load_model("model_3.h5")
```

```
WARNING:absl:Compiled the loaded model, but the compiled metrics have yet to be built. `model.compile_metrics` will be empty until you train or evaluate the model.
```

9 RESUMEN

[19]:
```
model.summary()
```

Model: "sequential"

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 26, 26, 32)	320
max_pooling2d (MaxPooling2D)	(None, 13, 13, 32)	0
conv2d_1 (Conv2D)	(None, 11, 11, 64)	18,496
max_pooling2d_1 (MaxPooling2D)	(None, 5, 5, 64)	0
flatten (Flatten)	(None, 1600)	0
dense (Dense)	(None, 128)	204,928
dropout (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 10)	1,290

Total params: 225,036 (879.05 KB)

Trainable params: 225,034 (879.04 KB)

Non-trainable params: 0 (0.00 B)

Optimizer params: 2 (12.00 B)

10 Evaluate

[20]:
```
model.evaluate(x_valid, y_valid)
```

```
313/313             4s 12ms/step -
accuracy: 0.9911 - loss: 0.0344
```

[20]:
```
[0.027253305539488792, 0.9933000206947327]
```

[21]:
```
loss, accuracy = model.evaluate(x_valid, y_valid)
print('\n')
print('loss:', loss)
print('accuracy:', accuracy)
```

```
313/313             3s 9ms/step -
accuracy: 0.9911 - loss: 0.0344


loss: 0.027253305539488792
accuracy: 0.9933000206947327
```

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