In [1]:
```
import tensorflow as tf
from tensorflow.keras.datasets import mnist
(x_train, y_train), (x_test, y_test) = mnist.load_data()
x_train = x_train.astype('float32') / 255.0
x_test = x_test.astype('float32') / 255.0
y_train = tf.keras.utils.to_categorical(y_train, num_classes=10)
y_test = tf.keras.utils.to_categorical(y_test, num_classes=10)
input_shape = (28, 28)
num_classes = 10
hidden_size = 128
batch_size = 128
epochs = 10
model = tf.keras.Sequential([
    tf.keras.layers.Input(shape=input_shape),
    tf.keras.layers.Reshape(target_shape=(input_shape[0], input_shape[1]*1)),
    tf.keras.layers.LSTM(units=hidden_size, activation='tanh'),
    tf.keras.layers.Dense(num_classes, activation='softmax')
])


model.compile(loss='categorical_crossentropy',
              optimizer=tf.keras.optimizers.Adam(),
              metrics=['accuracy'])

model.fit(x_train, y_train,
          batch_size=batch_size,
          epochs=epochs,
          validation_data=(x_test, y_test))
score = model.evaluate(x_test, y_test, verbose=0)
print('Test loss:', score[0])
print('Test accuracy:', score[1])
```

```
WARNING:tensorflow:From C:\Users\91707\anaconda3\lib\site-packages\keras\src\losses.py:2976: The name tf.losses.sparse_softmax_cross_entropy is deprecated. Please use tf.compat.v1.losses.sparse_softmax_cross_entropy instead.

WARNING:tensorflow:From C:\Users\91707\anaconda3\lib\site-packages\keras\src\backend.py:1398: The name tf.executing_eagerly_outside_functions is deprecated. Please use tf.compat.v1.executing_eagerly_outside_functions instead.

Epoch 1/10
WARNING:tensorflow:From C:\Users\91707\anaconda3\lib\site-packages\keras\src\utils\tf_utils.py:492: The name tf.ragged.RaggedTensorValue is deprecated. Please use tf.compat.v1.ragged.RaggedTensorValue instead.

WARNING:tensorflow:From C:\Users\91707\anaconda3\lib\site-packages\keras\src\engine\base_layer_utils.py:384: The name tf.executing_eagerly_outside_functions is deprecated. Please use tf.compat.v1.executing_eagerly_outside_functions instead.

469/469 [==============================] - 25s 48ms/step - loss: 0.5260 - accuracy: 0.8288 - val_loss: 0.1969 - val_accuracy: 0.9365
Epoch 2/10
469/469 [==============================] - 22s 47ms/step - loss: 0.1511 - accuracy: 0.9549 - val_loss: 0.1191 - val_accuracy: 0.9635
Epoch 3/10
469/469 [==============================] - 22s 46ms/step - loss: 0.1022 - accuracy: 0.9697 - val_loss: 0.0865 - val_accuracy: 0.9720
Epoch 4/10
469/469 [==============================] - 23s 50ms/step - loss: 0.0789 - accuracy: 0.9763 - val_loss: 0.0747 - val_accuracy: 0.9761
Epoch 5/10
469/469 [==============================] - 22s 47ms/step - loss: 0.0671 - accuracy: 0.9795 - val_loss: 0.0662 - val_accuracy: 0.9792
Epoch 6/10
469/469 [==============================] - 22s 48ms/step - loss: 0.0555 - accuracy: 0.9828 - val_loss: 0.0626 - val_accuracy: 0.9795
Epoch 7/10
469/469 [==============================] - 21s 45ms/step - loss: 0.0494 - accuracy: 0.9844 - val_loss: 0.0564 - val_accuracy: 0.9829
Epoch 8/10
469/469 [==============================] - 22s 47ms/step - loss: 0.0394 - accuracy: 0.9879 - val_loss: 0.0564 - val_accuracy: 0.9826
Epoch 9/10
469/469 [==============================] - 21s 46ms/step - loss: 0.0390 - accuracy: 0.9879 - val_loss: 0.0491 - val_accuracy: 0.9843
Epoch 10/10
469/469 [==============================] - 21s 44ms/step - loss: 0.0340 - accuracy: 0.9898 - val_loss: 0.0488 - val_accuracy: 0.9850
Test loss: 0.04882533848285675
Test accuracy: 0.9850000143051147
```