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ASSIGNMENT -07

```
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import LSTM, Dense
from tensorflow.keras.callbacks import EarlyStopping

model = Sequential()
model.add(LSTM(92, input_shape=(X_train.shape[1], X_train.shape[2])))
model.add(Dense(1))

model.compile(
    optimizer='adam',
    loss='mse',
    metrics=['mae']
)

model.summary()
```

Model: "sequential_1"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 92)	40,848
dense_1 (Dense)	(None, 1)	93

Total params: 40,941 (159.93 KB)

Trainable params: 40,941 (159.93 KB)

Non-trainable params: 0 (0.00 B)

```
5]: early_stop = EarlyStopping(
        monitor='val_loss',
        patience=3,
        restore_best_weights=True
    )

    history = model.fit(
        X_train,
        y_train,
        epochs=10,
        batch_size=32,          # same as practical
        validation_split=0.2,   # same as practical
        callbacks=[early_stop],
        verbose=1
    )
```

```
Epoch 1/10
674/674 ━━━━━━━━━━━━━━━━━━━━ 26s 35ms/step - loss: 0.0219 - mae: 0.0331 - val_loss: 3.9536e-04 - val_mae: 0.0178
Epoch 2/10
674/674 ━━━━━━━━━━━━━━━━━━━━ 24s 36ms/step - loss: 1.4500e-04 - mae: 0.0097 - val_loss: 2.9307e-04 - val_mae: 0.0156
Epoch 3/10
674/674 ━━━━━━━━━━━━━━━━━━━━ 20s 30ms/step - loss: 1.1901e-04 - mae: 0.0088 - val_loss: 2.1663e-04 - val_mae: 0.0134
Epoch 4/10
674/674 ━━━━━━━━━━━━━━━━━━━━ 23s 34ms/step - loss: 6.4360e-05 - mae: 0.0064 - val_loss: 6.2025e-05 - val_mae: 0.0072
Epoch 5/10
674/674 ━━━━━━━━━━━━━━━━━━━━ 24s 36ms/step - loss: 1.9286e-05 - mae: 0.0034 - val_loss: 6.8714e-06 - val_mae: 0.0021
Epoch 6/10
674/674 ━━━━━━━━━━━━━━━━━━━━ 25s 37ms/step - loss: 6.9402e-06 - mae: 0.0021 - val_loss: 1.2336e-05 - val_mae: 0.0032
Epoch 7/10
674/674 ━━━━━━━━━━━━━━━━━━━━ 23s 35ms/step - loss: 8.3215e-06 - mae: 0.0023 - val_loss: 2.1071e-05 - val_mae: 0.0043
Epoch 8/10
674/674 ━━━━━━━━━━━━━━━━━━━━ 24s 36ms/step - loss: 1.0770e-05 - mae: 0.0026 - val_loss: 4.4715e-05 - val_mae: 0.0065
```

```python
test_mse, test_mae = model.evaluate(X_test, y_test, verbose=0)

print("Test MSE:", test_mse)
print("Test MAE:", test_mae)
```

```
Test MSE: 1.8981515950144967e-06
Test MAE: 0.0010705400491133332
```

```python
plt.figure()
plt.plot(history.history['mae'], label='Training MAE')
plt.plot(history.history['val_mae'], label='Validation MAE')
plt.xlabel('Epochs')
plt.ylabel('MAE')
plt.legend()
plt.show()
```