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Subject:- Machine Learning in Finance

WEEK :- 7 Logbook

Code:-

```
: import numpy as np
import matplotlib.pyplot as plt
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import LSTM, Dense, Dropout
from tensorflow.keras.callbacks import EarlyStopping
from tensorflow.keras.optimizers import Adam

X_train = np.random.rand(1000, 10, 5)
y_train = np.random.rand(1000)

X_val = np.random.rand(200, 10, 5)
y_val = np.random.rand(200)

X_test = np.random.rand(200, 10, 5)
y_test = np.random.rand(200)

model = Sequential()
model.add(LSTM(85, input_shape=(X_train.shape[1], X_train.shape[2]), return_sequences=False))
model.add(Dropout(0.2))
model.add(Dense(1))
```

```

model.compile(optimizer=Adam(learning_rate=0.001), loss='mse', metrics=['mae'])

early_stop = EarlyStopping(monitor='val_loss', patience=3, restore_best_weights=True)

history = model.fit(
    X_train, y_train,
    validation_data=(X_val, y_val),
    epochs=10,
    batch_size=32,
    callbacks=[early_stop],
    verbose=1
)

test_loss, test_mae = model.evaluate(X_test, y_test, verbose=1)
print("\nTest MSE:", test_loss)
print("Test MAE:", test_mae)

plt.figure(figsize=(8,5))
plt.plot(history.history['mae'], label='Train MAE')

plt.plot(history.history['val_mae'], label='Validation MAE')
plt.title('MAE During Training')
plt.xlabel('Epochs')
plt.ylabel('MAE')
plt.legend()
plt.grid(True)
plt.show()

```

Output:-

Model: "sequential_2"

Layer (type)	Output Shape	Param #
lstm_1 (LSTM)	(None, 85)	30,940
dropout_1 (Dropout)	(None, 85)	0
dense_1 (Dense)	(None, 1)	86

Total params: 31,026 (121.20 KB)

Trainable params: 31,026 (121.20 KB)

Non-trainable params: 0 (0.00 B)

```
Epoch 1/10
32/32 8s 54ms/step - loss: 0.1266 - mae: 0.2904 - val_loss: 0.0855 - val_mae: 0.2509
Epoch 2/10
32/32 1s 46ms/step - loss: 0.0888 - mae: 0.2537 - val_loss: 0.0864 - val_mae: 0.2527
Epoch 3/10
32/32 2s 24ms/step - loss: 0.0871 - mae: 0.2522 - val_loss: 0.0852 - val_mae: 0.2512
Epoch 4/10
32/32 1s 21ms/step - loss: 0.0873 - mae: 0.2513 - val_loss: 0.0858 - val_mae: 0.2518
Epoch 5/10
32/32 1s 23ms/step - loss: 0.0879 - mae: 0.2545 - val_loss: 0.0855 - val_mae: 0.2516
Epoch 6/10
32/32 1s 25ms/step - loss: 0.0850 - mae: 0.2501 - val_loss: 0.0856 - val_mae: 0.2518
7/7 0s 19ms/step - loss: 0.0969 - mae: 0.2736
```

Test MSE: 0.09691966325044632

Test MAE: 0.2735704183578491

