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Class: MSc Computer Science

Subject: Machine Learning in Finance

 Topic: Lab Logbook Week 4

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```python
import pandas as pd
import numpy as np
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import MinMaxScaler
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, Input
from tensorflow.keras.metrics import MeanAbsoluteError

df = pd.read_csv("data_stocks.csv")
```

```python
if 'DATE' in df.columns:
    df = df.drop(columns=['DATE'])

df = df.replace([np.inf, -np.inf], np.nan)
df = df.dropna()

X = df.iloc[:, :-1].values
y = df.iloc[:, -1].values

X_scaler = MinMaxScaler()
y_scaler = MinMaxScaler()
```

```python
X_scaled = X_scaler.fit_transform(X)
y_scaled = y_scaler.fit_transform(y.reshape(-1, 1))

X_train, X_test, y_train, y_test = train_test_split(X_scaled, y_scaled, test_size=0.2, random_state=42)

model = Sequential([
    Input(shape=(X_train.shape[1],)),
    Dense(693, activation='relu'),
    Dense(346, activation='relu'),
    Dense(1, activation='linear')
])
```

```python
model.compile(optimizer='adam', loss='mean_absolute_error', metrics=[MeanAbsoluteError()])

model.summary()

history = model.fit(
    X_train, y_train,
    epochs=10,
    batch_size=32,
    validation_split=0.2,
    verbose=1
)

test_loss, test_mae = model.evaluate(X_test, y_test, verbose=1)
print(f"\nFinal Test MAE: {test_mae:.6f}")
```

```python
test_loss, test_mae = model.evaluate(X_test, y_test, verbose=1)
print(f"\nFinal Test MAE: {test_mae:.6f}")

previous_mae = 0.0123
print(f"Previous Practical MAE: {previous_mae}")
print(f"Your Custom MLP MAE: {test_mae}")

if test_mae < previous_mae:
    print("Your custom MLP performed better!")
else:
    print("Your custom MLP performed worse than the practical model.")
```

```
Model: "sequential_2"
```

Layer (type)	Output Shape	Param #
dense_6 (Dense)	(None, 693)	347,193
dense_7 (Dense)	(None, 346)	240,124
dense_8 (Dense)	(None, 1)	347

```
 Total params: 587,664 (2.24 MB)
 Trainable params: 587,664 (2.24 MB)
 Non-trainable params: 0 (0.00 B)
Epoch 1/10
233/233 ──────────────── 4s 14ms/step - loss: 0.1724 - mean_absolute_error: 0.1724 - val_loss: 0.0293 - val_mean_absolute_error: 0.0293
Epoch 2/10
233/233 ──────────────── 4s 10ms/step - loss: 0.0241 - mean_absolute_error: 0.0241 - val_loss: 0.0234 - val_mean_absolute_error: 0.0234
Epoch 3/10
233/233 ──────────────── 3s 11ms/step - loss: 0.0206 - mean_absolute_error: 0.0206 - val_loss: 0.0148 - val_mean_absolute_error: 0.0148
Epoch 4/10
233/233 ──────────────── 3s 12ms/step - loss: 0.0192 - mean_absolute_error: 0.0192 - val_loss: 0.0165 - val_mean_absolute_error: 0.0165
Epoch 5/10
233/233 ──────────────── 4s 17ms/step - loss: 0.0170 - mean_absolute_error: 0.0170 - val_loss: 0.0299 - val_mean_absolute_error: 0.0299
Epoch 6/10
233/233 ──────────────── 3s 12ms/step - loss: 0.0179 - mean_absolute_error: 0.0179 - val_loss: 0.0157 - val_mean_absolute_error: 0.0157
```

```
Epoch 4/10
233/233 ──────────────── 3s 12ms/step - loss: 0.0192 - mean_absolute_error: 0.0192 - val_loss: 0.0165 - val_mean_absolute_error: 0.0165
Epoch 5/10
233/233 ──────────────── 4s 17ms/step - loss: 0.0170 - mean_absolute_error: 0.0170 - val_loss: 0.0299 - val_mean_absolute_error: 0.0299
Epoch 6/10
233/233 ──────────────── 3s 12ms/step - loss: 0.0179 - mean_absolute_error: 0.0179 - val_loss: 0.0157 - val_mean_absolute_error: 0.0157
Epoch 7/10
233/233 ──────────────── 3s 12ms/step - loss: 0.0161 - mean_absolute_error: 0.0161 - val_loss: 0.0147 - val_mean_absolute_error: 0.0147
Epoch 8/10
233/233 ──────────────── 2s 10ms/step - loss: 0.0152 - mean_absolute_error: 0.0152 - val_loss: 0.0145 - val_mean_absolute_error: 0.0145
Epoch 9/10
233/233 ──────────────── 3s 15ms/step - loss: 0.0147 - mean_absolute_error: 0.0147 - val_loss: 0.0257 - val_mean_absolute_error: 0.0257
Epoch 10/10
233/233 ──────────────── 3s 11ms/step - loss: 0.0149 - mean_absolute_error: 0.0149 - val_loss: 0.0166 - val_mean_absolute_error: 0.0166
73/73 ──────────────── 0s 3ms/step - loss: 0.0166 - mean_absolute_error: 0.0166

Final Test MAE: 0.016447
Previous Practical MAE: 0.0123
Your Custom MLP MAE: 0.016446536406874657
Your custom MLP performed worse than the practical model.
```