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Topic: ML in Finance Assignment 5

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import numpy as np
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import MinMaxScaler
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Conv1D, MaxPooling1D, Flatten, Dense, Dropout
from tensorflow.keras.optimizers import Adam
from tensorflow.keras.callbacks import CSVLogger

df = pd.read_csv('/content/EURUSD_tick_OK-2 (1).csv')
features = ['Bid_N_200_3', 'Ask_N_200_3']
data = df[features].values

scaler = MinMaxScaler(feature_range=(0, 1))
scaled_data = scaler.fit_transform(data)

def create_sequences(data, seq_length):
    X, y = [], []
    for i in range(len(data) - seq_length):
        X.append(data[i:(i + seq_length), :])
        y.append(data[i + seq_length, :])
    return np.array(X), np.array(y)

seq_length = 50
X, y = create_sequences(scaled_data, seq_length)

X_train, X_test, y_train, y_test = train_test_split(
    X, y, test_size=0.2, shuffle=False
)

csv_logger = CSVLogger("training_log.csv", append=False)

model = Sequential([
    Conv1D(filters=32, kernel_size=5, activation='relu', input_shape=(seq_length, 2)),
])

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model = Sequential([
    Conv1D(filters=32, kernel_size=5, activation='relu', input_shape=(seq_length, 2)),
    MaxPooling1D(pool_size=2),
    Conv1D(filters=64, kernel_size=5, activation='relu'),
    MaxPooling1D(pool_size=2),
    Flatten(),
    Dense(64, activation='relu'),
    Dropout(0.3),
    Dense(2)
])

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

model.summary()

history = model.fit(
    X_train, y_train,
    epochs=10,
    batch_size=50,
    validation_data=(X_test, y_test),
    callbacks=[csv_logger],
    verbose=1
)

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

```

```
super().__init__(optimizer=self.optimizer, verbose=1)
Model: "sequential_2"
```

Layer (type)	Output Shape	Param #
conv1d_4 (Conv1D)	(None, 46, 32)	352
max_pooling1d_4 (MaxPooling1D)	(None, 23, 32)	0
conv1d_5 (Conv1D)	(None, 19, 64)	10,304
max_pooling1d_5 (MaxPooling1D)	(None, 9, 64)	0
flatten_2 (Flatten)	(None, 576)	0
dense_4 (Dense)	(None, 64)	36,928
dropout_2 (Dropout)	(None, 64)	0
dense_5 (Dense)	(None, 2)	130

Total params: 47,714 (186.38 KB)  
Trainable params: 47,714 (186.38 KB)  
Non-trainable params: 0 (0.00 B)

```
Epoch 1/10
17600/17600 — 158s 9ms/step - loss: 0.0083 - mae: 0.0662 - val_loss: 0.0033 - val_mae: 0.0427
Epoch 2/10
17600/17600 — 157s 9ms/step - loss: 0.0055 - mae: 0.0566 - val_loss: 0.0031 - val_mae: 0.0406
Epoch 3/10
17600/17600 — 150s 9ms/step - loss: 0.0054 - mae: 0.0559 - val_loss: 0.0031 - val_mae: 0.0404
Epoch 4/10
17600/17600 — 151s 9ms/step - loss: 0.0054 - mae: 0.0557 - val_loss: 0.0035 - val_mae: 0.0443
Epoch 5/10
17600/17600 — 148s 8ms/step - loss: 0.0053 - mae: 0.0554 - val_loss: 0.0030 - val_mae: 0.0401
```



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Epoch 5/10
17600/17600 — 148s 8ms/step - loss: 0.0053 - mae: 0.0554 - val_loss: 0.0030 - val_mae: 0.0401
Epoch 6/10
17600/17600 — 147s 8ms/step - loss: 0.0053 - mae: 0.0551 - val_loss: 0.0030 - val_mae: 0.0391
Epoch 7/10
17600/17600 — 150s 9ms/step - loss: 0.0053 - mae: 0.0550 - val_loss: 0.0031 - val_mae: 0.0400
Epoch 8/10
17600/17600 — 153s 9ms/step - loss: 0.0052 - mae: 0.0549 - val_loss: 0.0029 - val_mae: 0.0378
Epoch 9/10
17600/17600 — 159s 9ms/step - loss: 0.0052 - mae: 0.0545 - val_loss: 0.0030 - val_mae: 0.0399
Epoch 10/10
17598/17600 — 0s 8ms/step - loss: 0.0052 - mae: 0.0545
```