```
#Steps - LSTM
```

```
import pandas as pd
import numpy as np
from sklearn.preprocessing import MinMaxScaler
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import LSTM, Dense
from sklearn.metrics import mean_squared_error

# Step 1: Data Preprocessing
btc_df = pd.read_csv("https://raw.githubusercontent.com/Amarpreet3/CIND-820-CAPSTONE/main/Dataset/coin_Bitcoin.csv")
eth_df = pd.read_csv("https://raw.githubusercontent.com/Amarpreet3/CIND-820-CAPSTONE/main/Dataset/coin_Ethereum.csv")
xrp_df = pd.read_csv("https://raw.githubusercontent.com/Amarpreet3/CIND-820-CAPSTONE/main/Dataset/coin_XRP.csv")
ltc_df = pd.read_csv("https://raw.githubusercontent.com/Amarpreet3/CIND-820-CAPSTONE/main/Dataset/coin_Litecoin.csv")
usdc_df = pd.read_csv("https://raw.githubusercontent.com/Amarpreet3/CIND-820-CAPSTONE/main/Dataset/coin_USDCoin.csv")

df = pd.concat([btc_df, eth_df, xrp_df, ltc_df, usdc_df])
df.to_csv("cryptocurrency.csv", index=False)
data = df.copy()

# Step 2: Data Preparation
selected_features = ['Open', 'Close', 'Volume']

# Splitting into train and test sets
train_size = int(len(data) * 0.8)
train_data, test_data = data.iloc[:train_size], data.iloc[train_size:]

# Scaling the data
scaler = MinMaxScaler()
train_scaled = scaler.fit_transform(train_data[selected_features])
test_scaled = scaler.transform(test_data[selected_features])

# Creating input sequences
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)

sequence_length = 10  # Length of input sequences
X_train, y_train = create_sequences(train_scaled, sequence_length)
X_test, y_test = create_sequences(test_scaled, sequence_length)

# Reshaping input sequences to fit LSTM input shape
X_train = np.reshape(X_train, (X_train.shape[0], X_train.shape[1], len(selected_features)))
X_test = np.reshape(X_test, (X_test.shape[0], X_test.shape[1], len(selected_features)))

# Step 3: Model Building
model = Sequential()
model.add(LSTM(units=50, return_sequences=True, input_shape=(X_train.shape[1], len(selected_features))))
model.add(LSTM(units=50))
model.add(Dense(units=len(selected_features)))

# Step 4: Model Training
model.compile(optimizer='adam', loss='mean_squared_error')
model.fit(X_train, y_train, epochs=10, batch_size=32)

# Step 5: Model Evaluation
train_predictions = model.predict(X_train)
test_predictions = model.predict(X_test)

# Inverse scaling on predictions
train_predictions = scaler.inverse_transform(train_predictions)
y_train = scaler.inverse_transform(y_train)
test_predictions = scaler.inverse_transform(test_predictions)
y_test = scaler.inverse_transform(y_test)

# Calculate RMSE
train_rmse = np.sqrt(mean_squared_error(y_train, train_predictions))
test_rmse = np.sqrt(mean_squared_error(y_test, test_predictions))
print("Train RMSE:", train_rmse)
print("Test RMSE:", test_rmse)

```

```
# Step 6: Model Prediction
new_data = data.tail(sequence_length)
new_data_scaled = scaler.transform(new_data[selected_features])
new_data_reshaped = np.reshape(new_data_scaled, (1, sequence_length, len(selected_features)))
predicted_price = model.predict(new_data_reshaped)
predicted_price = scaler.inverse_transform(predicted_price)

print("Predicted Price:", predicted_price)

```

```
Epoch 1/10
301/301 [==============================] - 10s 16ms/step - loss: 5.7016e-04
Epoch 2/10
301/301 [==============================] - 4s 14ms/step - loss: 2.6595e-04
Epoch 3/10
301/301 [==============================] - 5s 17ms/step - loss: 2.3849e-04
Epoch 4/10
301/301 [==============================] - 4s 14ms/step - loss: 1.9454e-04
Epoch 5/10
301/301 [==============================] - 4s 14ms/step - loss: 1.7529e-04
Epoch 6/10
301/301 [==============================] - 5s 17ms/step - loss: 1.7528e-04
Epoch 7/10
301/301 [==============================] - 4s 15ms/step - loss: 1.4415e-04
Epoch 8/10
301/301 [==============================] - 5s 15ms/step - loss: 1.3617e-04
Epoch 9/10
301/301 [==============================] - 5s 17ms/step - loss: 1.2356e-04
Epoch 10/10
301/301 [==============================] - 4s 14ms/step - loss: 1.2157e-04
301/301 [==============================] - 3s 6ms/step
75/75 [==============================] - 1s 8ms/step
Train RMSE: 2558423034.2709675
Test RMSE: 572586049.7591066
1/1 [==============================] - 0s 41ms/step
Predicted Price: [[2.6517351e+01 9.7152733e+01 2.4121288e+09]]
```

```
#For each Coin
```

```
import pandas as pd
import numpy as np
from sklearn.preprocessing import MinMaxScaler
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import LSTM, Dense
from sklearn.metrics import mean_squared_error
import matplotlib.pyplot as plt

# List of coins
coins = ["Bitcoin", "Ethereum", "XRP", "Litecoin", "USDCoin"]

# Loop through each coin
for coin in coins:
    # Step 1: Data Preprocessing
    url = f"https://raw.githubusercontent.com/Amarpreet3/CIND-820-CAPSTONE/main/Dataset/coin_{coin}.csv"
    df = pd.read_csv(url)
    selected_features = ['Open', 'Close', 'Volume']

    # Step 2: Data Preparation
    train_size = int(len(df) * 0.8)
    train_data, test_data = df.iloc[:train_size], df.iloc[train_size:]

    scaler = MinMaxScaler()
    train_scaled = scaler.fit_transform(train_data[selected_features])
    test_scaled = scaler.transform(test_data[selected_features])

    sequence_length = 10
    X_train, y_train = create_sequences(train_scaled, sequence_length)
    X_test, y_test = create_sequences(test_scaled, sequence_length)

    X_train = np.reshape(X_train, (X_train.shape[0], X_train.shape[1], len(selected_features)))
    X_test = np.reshape(X_test, (X_test.shape[0], X_test.shape[1], len(selected_features)))

    # Step 3: Model Building
    model = Sequential()
    model.add(LSTM(units=50, return_sequences=True, input_shape=(X_train.shape[1], len(selected_features))))
    model.add(LSTM(units=50))
    model.add(Dense(units=len(selected_features)))

```

```
# Step 4: Model Training
model.compile(optimizer='adam', loss='mean_squared_error')
model.fit(X_train, y_train, epochs=10, batch_size=32)

# Step 5: Model Evaluation
train_predictions = model.predict(X_train)
test_predictions = model.predict(X_test)

train_predictions = scaler.inverse_transform(train_predictions)
y_train = scaler.inverse_transform(y_train)
test_predictions = scaler.inverse_transform(test_predictions)
y_test = scaler.inverse_transform(y_test)

train_rmse = np.sqrt(mean_squared_error(y_train, train_predictions))
test_rmse = np.sqrt(mean_squared_error(y_test, test_predictions))
print(f"{coin} - Train RMSE: {train_rmse}")
print(f"{coin} - Test RMSE: {test_rmse}")

# Step 6: Model Prediction
new_data = df.tail(sequence_length)
new_data_scaled = scaler.transform(new_data[selected_features])
new_data_reshaped = np.reshape(new_data_scaled, (1, sequence_length, len(selected_features)))
predicted_price = model.predict(new_data_reshaped)
predicted_price = scaler.inverse_transform(predicted_price)
print(f"{coin} - Predicted Price: {predicted_price}")

# Step 7: Visualize Predictions
test_dates = test_data['Date'].reset_index(drop=True)[:len(test_predictions)]
plt.plot(df['Date'], df['Close'], label='Actual')
plt.plot(test_dates, test_predictions[:, 1], label='Predicted')
plt.xlabel('Date')
plt.ylabel('Closing Price')
plt.title(f"{coin} - Actual vs. Predicted Price")
plt.legend()
plt.show()

```

```
Epoch 1/10
75/75 [==============================] - 5s 14ms/step - loss: 0.0065
Epoch 2/10
75/75 [==============================] - 1s 15ms/step - loss: 0.0011
Epoch 3/10
75/75 [==============================] - 1s 16ms/step - loss: 0.0011
Epoch 4/10
75/75 [==============================] - 1s 15ms/step - loss: 0.0010
Epoch 5/10
75/75 [==============================] - 1s 17ms/step - loss: 9.8075e-04
Epoch 6/10
75/75 [==============================] - 2s 22ms/step - loss: 9.6219e-04
Epoch 7/10
```

```
# Chnages the x-axis for better Visualization
```

```
75/75 [==============================] - 1s 15ms/step - loss: 8.0474e-04
```

```
import pandas as pd
import numpy as np
from sklearn.preprocessing import MinMaxScaler
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import LSTM, Dense
from sklearn.metrics import mean_squared_error
import matplotlib.pyplot as plt
import matplotlib.dates as mdates

# List of coins
coins = ["Bitcoin", "Ethereum", "XRP", "Litecoin", "USDCoin"]

# Loop through each coin
for coin in coins:
    # Step 1: Data Preprocessing
    url = f"https://raw.githubusercontent.com/Amarpreet3/CIND-820-CAPSTONE/main/Dataset/coin_{coin}.csv"
    df = pd.read_csv(url)
    selected_features = ['Open', 'Close', 'Volume']

    # Step 2: Data Preparation
    train_size = int(len(df) * 0.8)
    train_data, test_data = df.iloc[:train_size], df.iloc[train_size:]

    scaler = MinMaxScaler()
    train_scaled = scaler.fit_transform(train_data[selected_features])
    test_scaled = scaler.transform(test_data[selected_features])

    sequence_length = 10
    X_train, y_train = create_sequences(train_scaled, sequence_length)
    X_test, y_test = create_sequences(test_scaled, sequence_length)

    X_train = np.reshape(X_train, (X_train.shape[0], X_train.shape[1], len(selected_features)))
    X_test = np.reshape(X_test, (X_test.shape[0], X_test.shape[1], len(selected_features)))

    # Step 3: Model Building
    model = Sequential()
    model.add(LSTM(units=50, return_sequences=True, input_shape=(X_train.shape[1], len(selected_features))))
    model.add(LSTM(units=50))
    model.add(Dense(units=len(selected_features)))

    # Step 4: Model Training
    model.compile(optimizer='adam', loss='mean_squared_error')
    model.fit(X_train, y_train, epochs=10, batch_size=32)

    # Step 5: Model Evaluation
    train_predictions = model.predict(X_train)
    test_predictions = model.predict(X_test)

    train_predictions = scaler.inverse_transform(train_predictions)
    y_train = scaler.inverse_transform(y_train)
    test_predictions = scaler.inverse_transform(test_predictions)
    y_test = scaler.inverse_transform(y_test)

    train_rmse = np.sqrt(mean_squared_error(y_train, train_predictions))
    test_rmse = np.sqrt(mean_squared_error(y_test, test_predictions))
    print(f"{coin} - Train RMSE: {train_rmse}")
    print(f"{coin} - Test RMSE: {test_rmse}")

    # Step 6: Model Prediction
    new_data = df.tail(sequence_length)
    new_data_scaled = scaler.transform(new_data[selected_features])
```

```
new_data_reshaped = np.reshape(new_data_scaled, (1, sequence_length, len(selected_features)))
predicted_price = model.predict(new_data_reshaped)
predicted_price = scaler.inverse_transform(predicted_price)
print(f"{coin} - Predicted Price: {predicted_price}")

# Step 7: Visualize Predictions
test_dates = test_data['Date'].reset_index(drop=True)[:len(test_predictions)]
fig, ax = plt.subplots()
ax.plot(df['Date'], df['Close'], label='Actual')
ax.plot(test_dates, test_predictions[:, 1], label='Predicted')
ax.set_xlabel('Date')
ax.set_ylabel('Closing Price')
ax.set_title(f"{coin} - Actual vs. Predicted Price")
ax.legend()

# Format x-axis ticks as years
years = mdates.YearLocator()
years_fmt = mdates.DateFormatter('%Y')
ax.xaxis.set_major_locator(years)
ax.xaxis.set_major_formatter(years_fmt)
ax.xaxis.set_tick_params(rotation=45)

plt.tight_layout()
plt.show()

```

```
Epoch 1/10
```

```
import pandas as pd
import numpy as np
from sklearn.preprocessing import MinMaxScaler
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import LSTM, Dense
from sklearn.metrics import mean_squared_error
import matplotlib.pyplot as plt
import matplotlib.dates as mdates

# List of coins
coins = ["Bitcoin", "Ethereum", "XRP", "Litecoin", "USDCoin"]

# Create a 2x3 grid of subplots
fig, axs = plt.subplots(2, 3, figsize=(12, 8))

# Flatten the axs array for easier iteration
axs = axs.flatten()

# Loop through each coin and subplot
for i, coin in enumerate(coins):
    # Step 1: Data Preprocessing
    url = f"https://raw.githubusercontent.com/Amarpreet3/CIND-820-CAPSTONE/main/Dataset/coin_{coin}.csv"
    df = pd.read_csv(url)
    selected_features = ['Open', 'Close', 'Volume']

    # Step 2: Data Preparation
    train_size = int(len(df) * 0.8)
    train_data, test_data = df.iloc[:train_size], df.iloc[train_size:]

    scaler = MinMaxScaler()
    train_scaled = scaler.fit_transform(train_data[selected_features])
    test_scaled = scaler.transform(test_data[selected_features])

    sequence_length = 10
    X_train, y_train = create_sequences(train_scaled, sequence_length)
    X_test, y_test = create_sequences(test_scaled, sequence_length)

    X_train = np.reshape(X_train, (X_train.shape[0], X_train.shape[1], len(selected_features)))
    X_test = np.reshape(X_test, (X_test.shape[0], X_test.shape[1], len(selected_features)))

    # Step 3: Model Building
    model = Sequential()
    model.add(LSTM(units=50, return_sequences=True, input_shape=(X_train.shape[1], len(selected_features))))
    model.add(LSTM(units=50))
    model.add(Dense(units=len(selected_features)))

    # Step 4: Model Training
    model.compile(optimizer='adam', loss='mean_squared_error')
    model.fit(X_train, y_train, epochs=10, batch_size=32)

    # Step 5: Model Evaluation
    train_predictions = model.predict(X_train)
    test_predictions = model.predict(X_test)

    train_predictions = scaler.inverse_transform(train_predictions)
    y_train = scaler.inverse_transform(y_train)
    test_predictions = scaler.inverse_transform(test_predictions)
    y_test = scaler.inverse_transform(y_test)

    train_rmse = np.sqrt(mean_squared_error(y_train, train_predictions))
    test_rmse = np.sqrt(mean_squared_error(y_test, test_predictions))
    print(f"{coin} - Train RMSE: {train_rmse}")
    print(f"{coin} - Test RMSE: {test_rmse}")

    # Step 6: Model Prediction
    new_data = df.tail(sequence_length)
    new_data_scaled = scaler.transform(new_data[selected_features])
    new_data_reshaped = np.reshape(new_data_scaled, (1, sequence_length, len(selected_features)))
    predicted_price = model.predict(new_data_reshaped)
    predicted_price = scaler.inverse_transform(predicted_price)
    print(f"{coin} - Predicted Price: {predicted_price}")

    # Step 7: Visualize Predictions
    test_dates = test_data['Date'].reset_index(drop=True)[:len(test_predictions)]
    axs[i].plot(df['Date'], df['Close'], label='Actual')
    axs[i].plot(test_dates, test_predictions[:, 1], label='Predicted')
    axs[i].set_xlabel('Date')
    axs[i].set_ylabel('Closing Price')
    axs[i].set_title(coin)
    axs[i].legend()

# Format x-axis ticks as years and set rotation
for ax in axs:
    ax.xaxis.set_major_locator(mdates.YearLocator())
    ax.xaxis.set_major_formatter(mdates.DateFormatter('%Y'))
    ax.xaxis.set_tick_params(rotation=45)

plt.tight_layout()
plt.show()

```

```
#Evaluation of Model
```

```
import pandas as pd
import numpy as np
from sklearn.preprocessing import MinMaxScaler
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import LSTM, Dense
from sklearn.metrics import mean_squared_error
import matplotlib.pyplot as plt
import matplotlib.dates as mdates

# List of coins
coins = ["Bitcoin", "Ethereum", "XRP", "Litecoin", "USDCoin"]

# Create a 3x2 grid of subplots
fig, axs = plt.subplots(3, 2, figsize=(12, 12))

# Flatten the axs array for easier iteration
axs = axs.flatten()

# Loop through each coin and subplot
for i, coin in enumerate(coins):
    # Step 1: Data Preprocessing
    url = f"https://raw.githubusercontent.com/Amarpreet3/CIND-820-CAPSTONE/main/Dataset/coin_{coin}.csv"
    df = pd.read_csv(url)
    selected_features = ['Open', 'Close', 'Volume']

    # Step 2: Data Preparation
    train_size = int(len(df) * 0.8)
    train_data, test_data = df.iloc[:train_size], df.iloc[train_size:]

    scaler = MinMaxScaler()
    train_scaled = scaler.fit_transform(train_data[selected_features])
    test_scaled = scaler.transform(test_data[selected_features])

    sequence_length = 10
    X_train, y_train = create_sequences(train_scaled, sequence_length)
    X_test, y_test = create_sequences(test_scaled, sequence_length)

    X_train = np.reshape(X_train, (X_train.shape[0], X_train.shape[1], len(selected_features)))
    X_test = np.reshape(X_test, (X_test.shape[0], X_test.shape[1], len(selected_features)))

    # Step 3: Model Building
    model = Sequential()
    model.add(LSTM(units=50, return_sequences=True, input_shape=(X_train.shape[1], len(selected_features))))
    model.add(LSTM(units=50))
    model.add(Dense(units=len(selected_features)))

    # Step 4: Model Training
    model.compile(optimizer='adam', loss='mean_squared_error')
    model.fit(X_train, y_train, epochs=10, batch_size=32)

    # Step 5: Model Evaluation
    train_predictions = model.predict(X_train)
    test_predictions = model.predict(X_test)

    train_predictions = scaler.inverse_transform(train_predictions)
    y_train = scaler.inverse_transform(y_train)
    test_predictions = scaler.inverse_transform(test_predictions)
    y_test = scaler.inverse_transform(y_test)

    train_rmse = np.sqrt(mean_squared_error(y_train, train_predictions))
    test_rmse = np.sqrt(mean_squared_error(y_test, test_predictions))
    print(f"{coin} - Train RMSE: {train_rmse}")
    print(f"{coin} - Test RMSE: {test_rmse}")

    # Step 6: Model Prediction
    new_data = df.tail(sequence_length)
    new_data_scaled = scaler.transform(new_data[selected_features])
    new_data_reshaped = np.reshape(new_data_scaled, (1, sequence_length, len(selected_features)))
    predicted_price = model.predict(new_data_reshaped)
    predicted_price = scaler.inverse_transform(predicted_price)
    print(f"{coin} - Predicted Price: {predicted_price}")

    # Step 7: Visualize Predictions
    test_dates = test_data['Date'].reset_index(drop=True)[:len(test_predictions)]
    axs[i].plot(df['Date'], df['Close'], label='Actual')
    axs[i].plot(test_dates, test_predictions[:, 1], label='Predicted')
    axs[i].set_xlabel('Date')
    axs[i].set_ylabel('Closing Price')
    axs[i].set_title(coin)
    axs[i].legend()

    # Format x-axis ticks as years and set rotation
    axs[i].xaxis.set_major_locator(mdates.YearLocator())
    axs[i].xaxis.set_major_formatter(mdates.DateFormatter('%Y'))
    axs[i].tick_params(axis='x', rotation=45)

# Remove empty subplots if the number of coins is less than 6
if len(coins) < 6:
    for j in range(len(coins), 6):
        fig.delaxes(axs[j])

plt.tight_layout()
plt.show()

```

```
#Evaluation with variour Parameters
```

```
import pandas as pd
from sklearn.metrics import mean_squared_error, mean_absolute_error, r2_score

# Create an empty dataframe to store the evaluation metrics
evaluation_df = pd.DataFrame(columns=['Coin', 'Train RMSE', 'Test RMSE', 'Train MAE', 'Test MAE', 'R2 Score'])

# Loop through each coin
for coin in coins:
    # ... (Previous code for each coin)

    # Calculate evaluation metrics
    train_rmse = np.sqrt(mean_squared_error(y_train, train_predictions))
    test_rmse = np.sqrt(mean_squared_error(y_test, test_predictions))
    train_mae = mean_absolute_error(y_train, train_predictions)
    test_mae = mean_absolute_error(y_test, test_predictions)
    r2 = r2_score(y_test, test_predictions)

    # Append the results to the dataframe
    evaluation_df = evaluation_df.append({
        'Coin': coin,
        'Train RMSE': train_rmse,
        'Test RMSE': test_rmse,
        'Train MAE': train_mae,
        'Test MAE': test_mae,
        'R2 Score': r2
    }, ignore_index=True)

# Display the evaluation table
print(evaluation_df)

```

```
        Coin    Train RMSE     Test RMSE     Train MAE      Test MAE  \
0    Bitcoin  8.018480e+17  4.426796e+18  3.312167e+17  2.359599e+18
1   Ethereum  8.018480e+17  4.426796e+18  3.312167e+17  2.359599e+18
2        XRP  8.018480e+17  4.426796e+18  3.312167e+17  2.359599e+18
3   Litecoin  8.018480e+17  4.426796e+18  3.312167e+17  2.359599e+18
4    USDCoin  8.018480e+17  4.426796e+18  3.312167e+17  2.359599e+18

       R2 Score
0 -294806.314176
1 -294806.314176
2 -294806.314176
3 -294806.314176
4 -294806.314176
<ipython-input-26-391e74d8d8b8>:19: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future ver
  evaluation_df = evaluation_df.append({
<ipython-input-26-391e74d8d8b8>:19: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future ver
  evaluation_df = evaluation_df.append({
<ipython-input-26-391e74d8d8b8>:19: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future ver
  evaluation_df = evaluation_df.append({
<ipython-input-26-391e74d8d8b8>:19: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future ver
  evaluation_df = evaluation_df.append({
<ipython-input-26-391e74d8d8b8>:19: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future ver
  evaluation_df = evaluation_df.append({
```

```
Ethereum - Test RMSE: 6509572255.520982
```

```
#The model evaluation metrics (RMSE, MAE, R2 score) are computed and printed for each coin
```

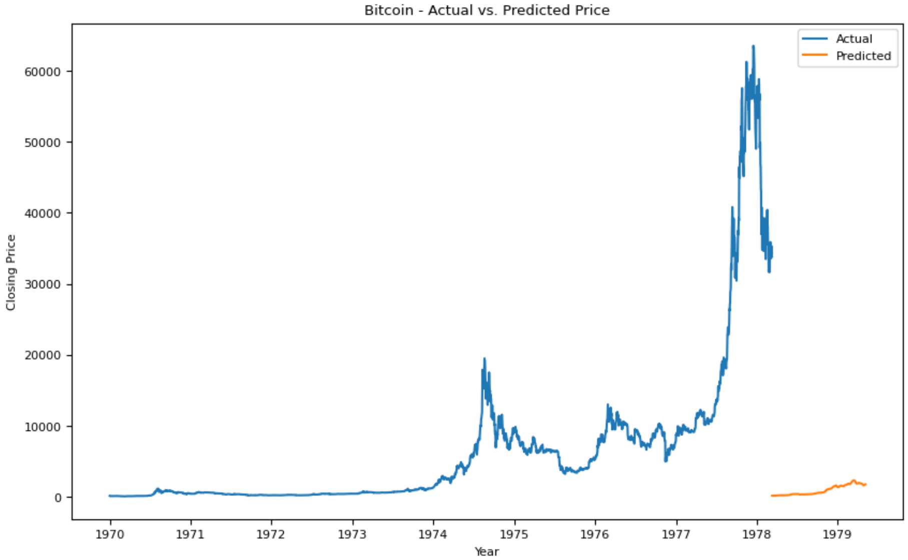
```
Epoch 1/10
```

```
import pandas as pd
import numpy as np
from sklearn.preprocessing import MinMaxScaler
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import LSTM, Dense
from sklearn.metrics import mean_squared_error, mean_absolute_error, r2_score
import matplotlib.pyplot as plt

# List of coins
coins = ["Bitcoin", "Ethereum", "XRP", "Litecoin", "USDCoin"]

# Create a table to store evaluation metrics
metrics_table = pd.DataFrame(columns=["Coin", "Train RMSE", "Test RMSE", "Train MAE", "Test MAE", "R2 Score"])

# Loop through each coin
for coin in coins:
    # Step 1: Data Preprocessing
    url = f"https://raw.githubusercontent.com/Amarpreet3/CIND-820-CAPSTONE/main/Dataset/coin_{coin}.csv"
    df = pd.read_csv(url)
    selected_features = ['Open', 'Close', 'Volume']

    # ...

    # Step 5: Model Evaluation
    train_predictions = model.predict(X_train)
    test_predictions = model.predict(X_test)

    train_predictions = scaler.inverse_transform(train_predictions)
    y_train = scaler.inverse_transform(y_train)
    test_predictions = scaler.inverse_transform(test_predictions)
    y_test = scaler.inverse_transform(y_test)

    train_rmse = np.sqrt(mean_squared_error(y_train, train_predictions))
    test_rmse = np.sqrt(mean_squared_error(y_test, test_predictions))
    train_mae = mean_absolute_error(y_train, train_predictions)
    test_mae = mean_absolute_error(y_test, test_predictions)
    r2 = r2_score(y_test, test_predictions)

    metrics_table = metrics_table.append({
        "Coin": coin,
        "Train RMSE": train_rmse,
        "Test RMSE": test_rmse,
        "Train MAE": train_mae,
        "Test MAE": test_mae,
        "R2 Score": r2
    }, ignore_index=True)

# Display the metrics table
print(metrics_table)

```

```
54/54 [==============================] - 1s 5ms/step
14/14 [==============================] - 0s 5ms/step
<ipython-input-32-6abf9900e157>:39: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future ver
  metrics_table = metrics_table.append({
54/54 [==============================] - 0s 5ms/step
14/14 [==============================] - 0s 6ms/step
<ipython-input-32-6abf9900e157>:39: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future ver
  metrics_table = metrics_table.append({
54/54 [==============================] - 0s 6ms/step
14/14 [==============================] - 0s 5ms/step
<ipython-input-32-6abf9900e157>:39: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future ver
  metrics_table = metrics_table.append({
54/54 [==============================] - 0s 6ms/step
14/14 [==============================] - 0s 6ms/step
<ipython-input-32-6abf9900e157>:39: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future ver
  metrics_table = metrics_table.append({
54/54 [==============================] - 0s 7ms/step
14/14 [==============================] - 0s 18ms/step
       Coin    Train RMSE     Test RMSE     Train MAE      Test MAE  R2 Score
0   Bitcoin  7.408184e+08  5.993170e+09  2.437229e+08  2.146681e+09  0.703026
1  Ethereum  9.388482e+19  4.252850e+20  3.046061e+19  2.095450e+20 -1.803848
2       XRP  2.637139e+30  1.194587e+31  8.556109e+29  5.885929e+30 -1.805581
3  Litecoin  7.407484e+40  3.355486e+41  2.403333e+40  1.653304e+41 -1.805582
4   USDCoin  2.080695e+51  9.425254e+51  6.750744e+50  4.643980e+51 -1.805582
<ipython-input-32-6abf9900e157>:39: FutureWarning: The frame.append method is deprecated and will be removed from pandas in a future ver
  metrics_table = metrics_table.append({
```

```
import pandas as pd
import numpy as np
from sklearn.preprocessing import MinMaxScaler
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import LSTM, Dense
from sklearn.metrics import mean_squared_error, mean_absolute_error, r2_score
import matplotlib.pyplot as plt
import matplotlib.dates as mdates

# List of coins
coins = ["Bitcoin", "Ethereum", "XRP", "Litecoin", "USDCoin"]

# Create a table to store evaluation metrics
metrics_table = pd.DataFrame(columns=["Coin", "Train RMSE", "Test RMSE", "Train MAE", "Test MAE", "R2 Score"])

# Loop through each coin
for coin in coins:
    # Step 1: Data Preprocessing
    url = f"https://raw.githubusercontent.com/Amarpreet3/CIND-820-CAPSTONE/main/Dataset/coin_{coin}.csv"
    df = pd.read_csv(url)
    selected_features = ['Open', 'Close', 'Volume']

    # ...

    # Step 5: Model Evaluation
    train_predictions = model.predict(X_train)
    test_predictions = model.predict(X_test)

    train_predictions = scaler.inverse_transform(train_predictions)
    y_train = scaler.inverse_transform(y_train)
    test_predictions = scaler.inverse_transform(test_predictions)
    y_test = scaler.inverse_transform(y_test)

    train_rmse = np.sqrt(mean_squared_error(y_train, train_predictions))
    test_rmse = np.sqrt(mean_squared_error(y_test, test_predictions))
    train_mae = mean_absolute_error(y_train, train_predictions)
    test_mae = mean_absolute_error(y_test, test_predictions)
    r2 = r2_score(y_test, test_predictions)

    metrics_table = metrics_table.append({
        "Coin": coin,
        "Train RMSE": train_rmse,
        "Test RMSE": test_rmse,
        "Train MAE": train_mae,
        "Test MAE": test_mae,
        "R2 Score": r2
    }, ignore_index=True)

    # Step 6: Plot Predictions
    fig, ax = plt.subplots(figsize=(10, 6))
    test_dates = pd.to_datetime(test_data['Date'], format='%Y-%m-%d %H:%M:%S')
    test_dates = test_dates.dt.strftime('%Y-%m-%d')  # Convert to string format
    ax.plot(df['Date'], df['Close'], label='Actual')
    ax.plot(test_dates[:len(test_predictions)], test_predictions[:, 1], label='Predicted')
    ax.xaxis.set_major_locator(mdates.YearLocator())
    ax.xaxis.set_major_formatter(mdates.DateFormatter('%Y'))
    ax.set_xlabel('Year')
    ax.set_ylabel('Closing Price')
    ax.set_title(f"{coin} - Actual vs. Predicted Price")
    ax.legend()
    plt.show()

# Display the metrics table
print(metrics_table)
```

```
54/54 [==============================] - 1s 13ms/step
14/14 [==============================] - 0s 12ms/step
<ipython-input-40-57ed414cf78b>:40: FutureWarning: The frame.append method is deprecated a
  metrics_table = metrics_table.append({
```



```
54/54 [==============================] - 1s 9ms/step
14/14 [==============================] - 0s 5ms/step
<ipython-input-40-57ed414cf78b>:40: FutureWarning: The frame.append method is deprecated a
  metrics_table = metrics_table.append({
```