In [ ]:
```
!pip install ta
!pip install requests pandas numpy matplotlib ta
!pip install pandas numpy matplotlib scikit-learn requests scipy SQLAlchemy
!pip install statsmodels
!pip install dash
!pip freeze > requirements.txt
!conda install -c conda-forge ta-lib
!pip install sqlalchemy pyodbc
!pip install yfinance
!pip install streamlit
!pip install dash plotly
```

In [ ]:
```
!pip install nbconvert[webpdf]
```

In [ ]:
```
!pip install playwright
```

In [28]:
```
import pandas as pd
import numpy as np
import talib as ta
import yfinance as yf
import matplotlib.pyplot as plt
from datetime import datetime
from sqlalchemy import create_engine
import urllib
import os  # Import the os module for checking file existence

# Database connection configuration
DATABASE_TYPE = 'mssql'
DBAPI = 'pyodbc'
SERVER = 'MARTIN'
DATABASE = 'crypto_data'
DRIVER = 'ODBC Driver 17 for SQL Server'

# Create a connection URI for SQLAlchemy
params = urllib.parse.quote_plus(f"DRIVER={DRIVER};SERVER={SERVER};DATABASE={DATABA
DATABASE_URI = f"{DATABASE_TYPE}+{DBAPI}:///?odbc_connect={params}"

# Create SQLAlchemy engine
engine = create_engine(DATABASE_URI, echo=False)

# Download historical data
def get_crypto_data(symbol, period='7d', interval='1m'):
    data = yf.download(tickers=symbol, period=period, interval=interval)
    return data

# Calculate volatility
def calculate_volatility(df, window):
    df['returns'] = df['Close'].pct_change()
    df['volatility'] = df['returns'].rolling(window=window).std() * np.sqrt(window)
    return df

# Support and resistance levels
def find_support_resistance(df):
```

```
    df['support'] = df['Low'].rolling(window=60).min()
    df['resistance'] = df['High'].rolling(window=60).max()
    return df

# Moving Averages (SMA, EMA)
def calculate_moving_averages(df, short_window=14, long_window=50):
    df['SMA_14'] = ta.SMA(df['Close'], timeperiod=short_window)
    df['EMA_50'] = ta.EMA(df['Close'], timeperiod=long_window)
    return df

# Bollinger Bands
def calculate_bollinger_bands(df, window=20, num_std=2):
    df['BB_upper'], df['BB_middle'], df['BB_lower'] = ta.BBANDS(df['Close'], timepe
    return df

# Relative Strength Index (RSI)
def calculate_rsi(df, period=14):
    df['RSI'] = ta.RSI(df['Close'], timeperiod=period)
    return df

# VWAP calculation
def calculate_vwap(df):
    df['vwap'] = (df['Volume'] * (df['High'] + df['Low'] + df['Close']) / 3).cumsum
    return df

# Fibonacci retracements (simplified)
def calculate_fibonacci_levels(df):
    max_price = df['Close'].max()
    min_price = df['Close'].min()
    diff = max_price - min_price
    df['fib_0.236'] = max_price - 0.236 * diff
    df['fib_0.382'] = max_price - 0.382 * diff
    df['fib_0.5'] = max_price - 0.5 * diff
    df['fib_0.618'] = max_price - 0.618 * diff
    df['fib_1'] = min_price
    return df

# Verify and clean data
def clean_data(df):
    df.dropna(how='all', inplace=True)
    df.ffill(inplace=True)  # Forward fill missing data
    df.bfill(inplace=True)  # Backward fill missing data
    df.replace([np.inf, -np.inf], np.nan, inplace=True)
    df.dropna(inplace=True)
    return df

# Save data to SQL Server
def save_to_sql(df, table_name):
    try:
        if df.empty:
            print("Data is empty after cleaning. Nothing to save.")
            return
        df.to_sql(table_name, con=engine, if_exists='replace', index_label='Date')
        print(f"Data successfully saved to {table_name} in SQL Server.")
    except Exception as e:
        print(f"Error saving to SQL Server: {e}")
```

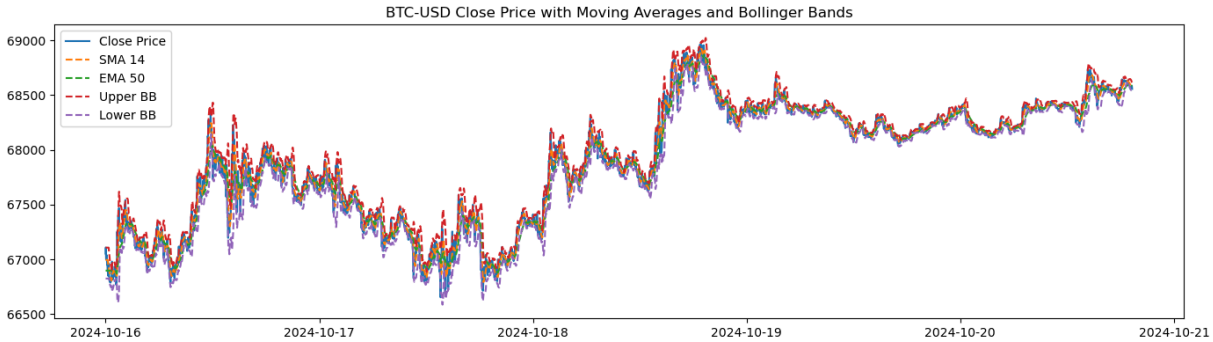
```
    finally:
        engine.dispose()
        print("SQL connection closed.")

# CSV to SQL function
def csv_to_sql(file_name, table_name):
    try:
        df = pd.read_csv(file_name)
        df = clean_data(df)
        save_to_sql(df, table_name)
    except Exception as e:
        print(f"Error moving CSV data to SQL Server: {e}")

# Plot various data points
def plot_data(df, symbol):
    plt.figure(figsize=(14, 8))

    # Plot Close Price, Moving Averages, and Bollinger Bands
    plt.subplot(2, 1, 1)
    plt.plot(df['Close'], label='Close Price')
    plt.plot(df['SMA_14'], label='SMA 14', linestyle='--')
    plt.plot(df['EMA_50'], label='EMA 50', linestyle='--')
    plt.plot(df['BB_upper'], label='Upper BB', linestyle='--')
    plt.plot(df['BB_lower'], label='Lower BB', linestyle='--')
    plt.title(f'{symbol} Close Price with Moving Averages and Bollinger Bands')
    plt.legend()

    # Plot RSI
    plt.subplot(2, 1, 2)
    plt.plot(df['RSI'], label='RSI', color='green')
    plt.axhline(70, color='red', linestyle='--', label='Overbought (70)')
    plt.axhline(30, color='blue', linestyle='--', label='Oversold (30)')
    plt.title(f'{symbol} RSI')
    plt.legend()

    plt.tight_layout()
    plt.show()

    # Plot Returns and Volatility
    plt.figure(figsize=(14, 8))
    plt.subplot(2, 1, 1)
    plt.plot(df.index, df['returns'], label='Returns')
    plt.title(f'{symbol} Returns')
    plt.legend()

    plt.subplot(2, 1, 2)
    plt.plot(df.index, df['volatility'], label='Volatility', color='orange')
    plt.title(f'{symbol} Volatility')
    plt.legend()
    plt.tight_layout()
    plt.show()

# Plot candlestick chart
def plot_candlestick(df, symbol):
    import plotly.graph_objects as go
```

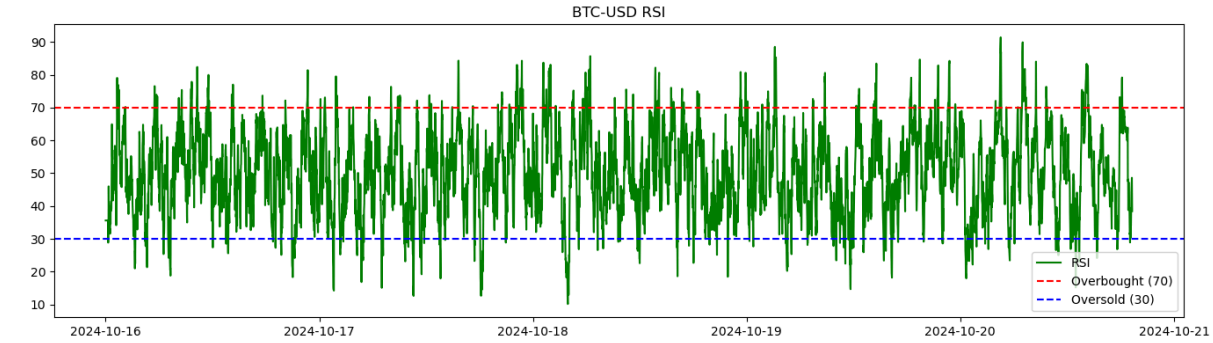
```
    fig = go.Figure(data=[go.Candlestick(x=df.index,
                                         open=df['Open'],
                                         high=df['High'],
                                         low=df['Low'],
                                         close=df['Close'],
                                         name='Candlestick Chart')])

    fig.update_layout(title=f'{symbol} Candlestick Chart',
                      yaxis_title='Price (USD)',
                      xaxis_title='Date')
    fig.show()

# Calculate MACD
def calculate_macd(df):
    df['macd'], df['macdsignal'], df['macdhist'] = ta.MACD(df['Close'], fastperiod=
    return df

# Plot MACD
def plot_macd(df, symbol):
    plt.figure(figsize=(14, 8))
    plt.plot(df['macd'], label='MACD', color='blue')
    plt.plot(df['macdsignal'], label='MACD Signal', color='red')
    plt.fill_between(df.index, df['macdhist'], color='gray', alpha=0.3, label='MACD
    plt.title(f'{symbol} MACD')
    plt.legend()
    plt.show()

# Calculate Average True Range (ATR)
def calculate_atr(df, window):
    df['ATR'] = ta.ATR(df['High'], df['Low'], df['Close'], timeperiod=window)
    return df

# Plot ATR
def plot_atr(df, symbol):
    plt.figure(figsize=(14, 8))
    plt.plot(df['ATR'], label='ATR', color='orange')
    plt.title(f'{symbol} Average True Range (ATR)')
    plt.legend()
    plt.show()

# Plot Volume
def plot_volume(df, symbol):
    plt.figure(figsize=(14, 8))
    plt.bar(df.index, df['Volume'], label='Volume', color='skyblue')
    plt.title(f'{symbol} Trading Volume')
    plt.xlabel('Date')
    plt.ylabel('Volume')
    plt.legend()
    plt.show()

# Create the main function
def main():
    symbol = 'BTC-USD'
    period = '5d'
    interval = '1m'
```

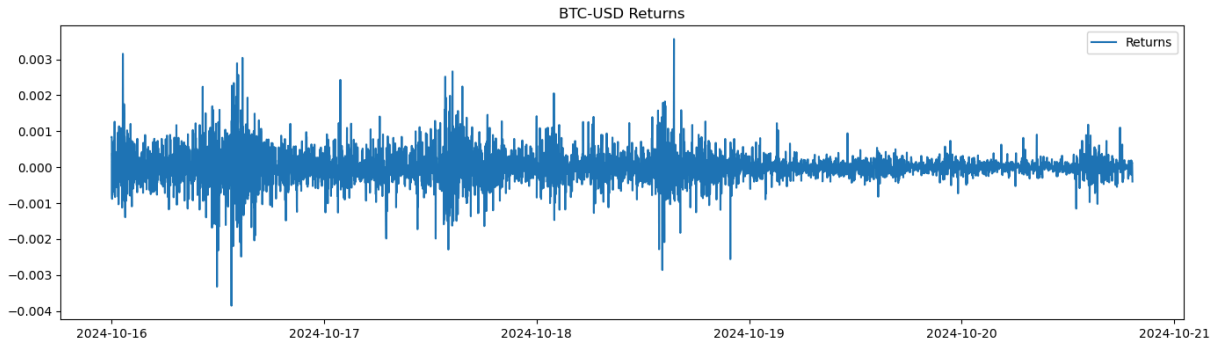
```
    df = get_crypto_data(symbol, period, interval)
    if df.empty:
        print(f"No data found for {symbol}. Please check the period and interval.")
        return

    # Perform technical analysis
    df = calculate_volatility(df, window=60)
    df = find_support_resistance(df)
    df = calculate_moving_averages(df)
    df = calculate_bollinger_bands(df)
    df = calculate_rsi(df)
    df = calculate_vwap(df)
    df = calculate_fibonacci_levels(df)
    df = calculate_macd(df)
    df = calculate_atr(df, window=14)

    df = clean_data(df)
    save_to_sql(df, f"{symbol}_technical_analysis")

    file_name = f"{symbol}_technical_analysis_{datetime.now().strftime('%Y%m%d_%H%M
    df.to_csv(file_name)
    print(f"Data saved to {file_name}")

    # Visualize the data
    plot_data(df, symbol)
    plot_candlestick(df, symbol)
    plot_volume(df, symbol)
    plot_macd(df, symbol)
    plot_atr(df, symbol)

    if os.path.exists(file_name):
        csv_to_sql(file_name, f"{symbol}_technical_analysis")
    else:
        print(f"The file {file_name} does not exist. Please check the file path.")

if __name__ == "__main__":
    main()
```

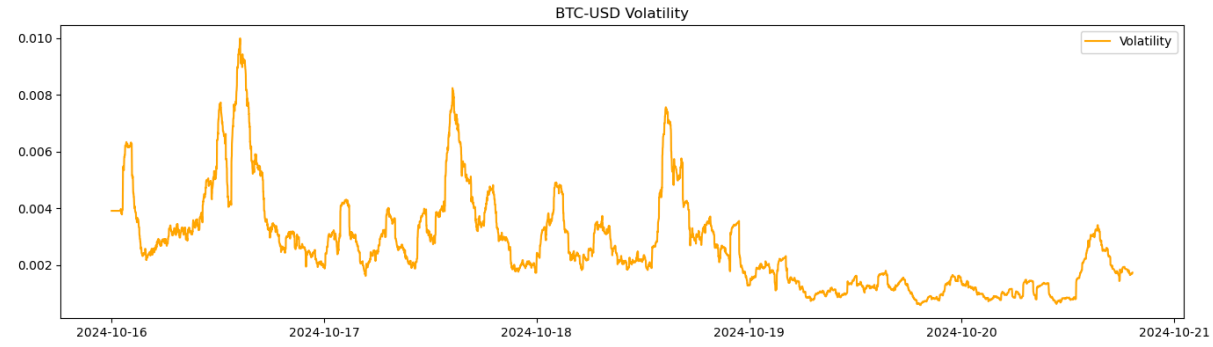
```
[**********100%**********]  1 of 1 completed
```

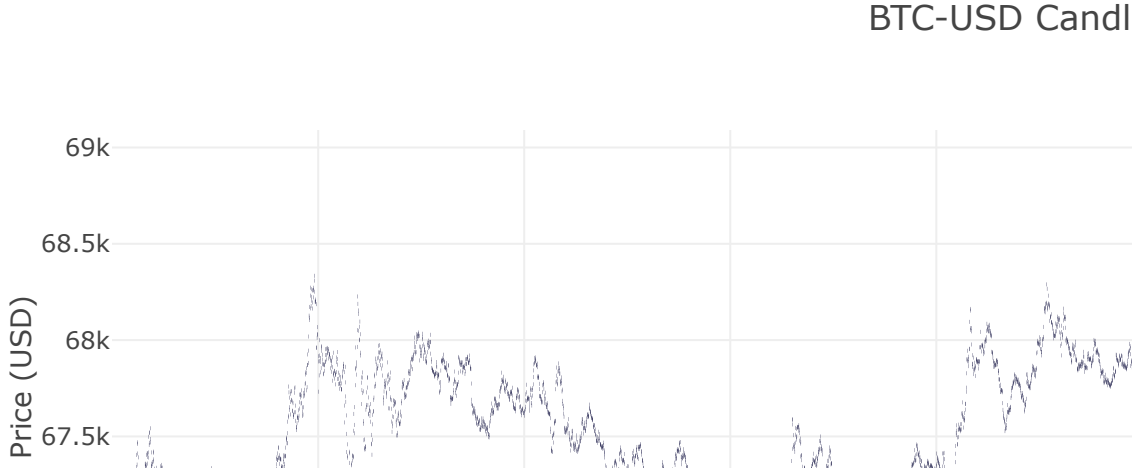
Error saving to SQL Server: (pyodbc.IntegrityError) ('23000', '[23000] [Microsoft][ODBC Driver 17 for SQL Server][SQL Server]Cannot insert an explicit value into a timestamp column. Use INSERT with a column list to exclude the timestamp column, or insert a DEFAULT into the timestamp column. (273) (SQLExecDirectW); [23000] [Microsoft][ODBC Driver 17 for SQL Server][SQL Server]Statement(s) could not be prepared. (8180)')
[SQL: INSERT INTO [BTC-USD_technical_analysis] ([Date], [Open], [High], [Low], [Close], [Adj Close], [Volume], returns, volatility, support, resistance, [SMA_14], [EMA_50], [BB_upper], [BB_middle], [BB_lower], [RSI], vwap, [fib_0.236], [fib_0.382], [fib_0. ... 6355 characters truncated ... ?, ?, ?, ?, ?, ?), (?, ?)]
[parameters: ('2024-10-16 00:00:00.000000 +00:00', 67053.1328125, 67053.1328125, 67053.1328125, 67053.1328125, 67053.1328125, 0, 0.0008399355874615377, 0.003912749250311085, 66789.7109375, 67109.453125, 66995.47544642857, 66898.0621875, 67108.19711410218, 66966.908984375, 66825.62085464782, 35.614266338090054, 67109.453125, 68417.89546875, 68080.892109375, 67808.51953125, 67536.146953125, 66654.3984375, -53.49288715995499, -60.88371191570897, 7.390824755753982, 29.211495535714285, '2024-10-16 00:01:00.000000 +00:00', 67109.453125, 67109.453125, 67109.453125, 67109.453125, 67109.453125, 929792, 0.0008399355874615377, 0.003912749250311085, 66789.7109375, 67109.453125, 66995.47544642857, 66898.0621875, 67108.19711410218, 66966.908984375, 66825.62085464782, 35.614266338090054, 67109.453125, 68417.89546875, 68080.892109375, 67808.51953125, 67536.146953125, 66654.3984375 ... 1979 parameters truncated ... 67108.859375, 67108.859375, 0, 0.0031544135104333293, 0.00505336455189185, 66767.6484375, 67108.859375, 66865.52455357143, 66880.4603614673, 67006.54198145322, 66870.63046875, 66734.71895604677, 73.06286285146648, 66912.28421534634, 68417.89546875, 68080.892109375, 67808.51953125, 67536.146953125, 66654.3984375, 10.124783137041959, -7.525005435853857, 17.649788572895815, 39.229309385598604, '2024-10-16 01:17:00.000000 +00:00', 67255.3046875, 67255.3046875, 67255.3046875, 67255.3046875, 67255.3046875, 39837696, 0.0021822053580389245, 0.00543903346641764, 66767.6484375, 67255.3046875, 66889.688058035571, 66895.16013895877, 67105.51651812762, 66889.594140625, 66673.67176312239, 79.07239851474893, 67027.84821521355, 68417.89546875, 68080.892109375, 67808.519531255, 67536.146953125, 66654.3984375, 39.02048269701481, 1.7840921907198775, 37.236390506294946, 46.88759532234156)]
(Background on this error at: https://sqlalche.me/e/20/gkpj)
SQL connection closed.
Data saved to BTC-USD_technical_analysis_20241020_132410.csv

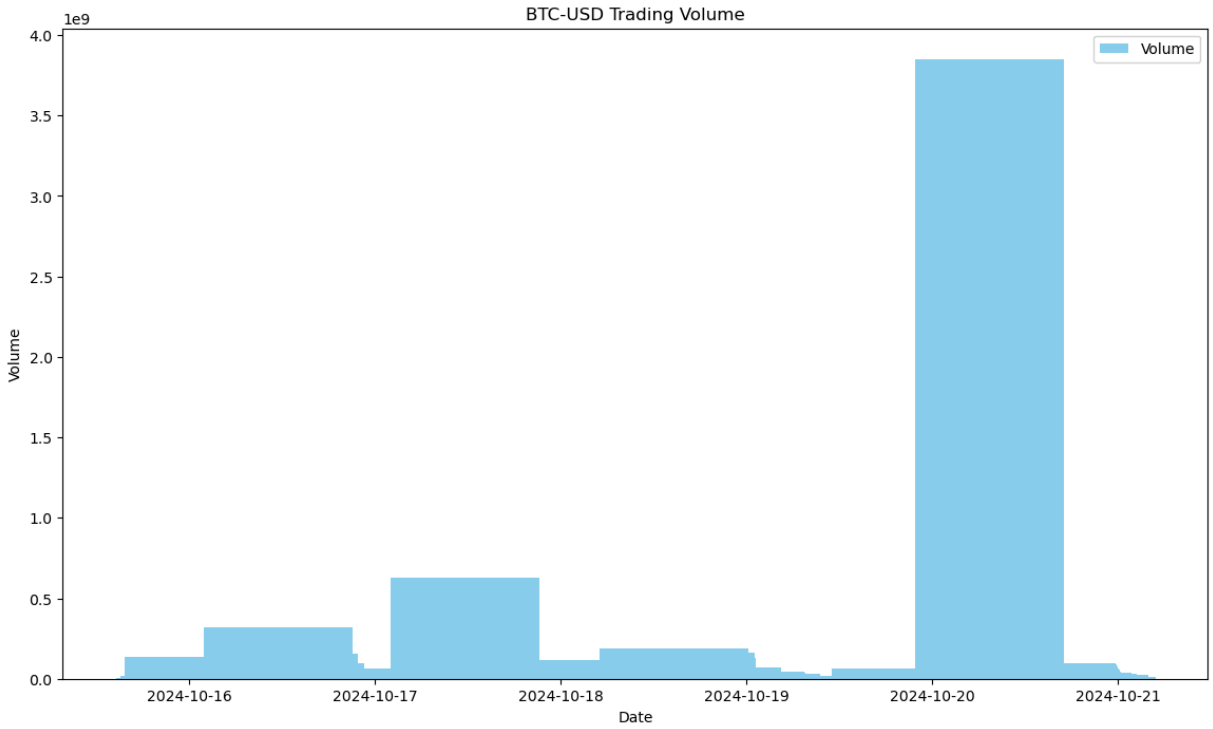

BTC-USD Close Price with Moving Averages and Bollinger Bands
Close Price
SMA 14
EMA 50
Upper BB
Lower BB
69000
68500
68000
67500
67000
66500
2024-10-16
2024-10-17
2024-10-18
2024-10-19
2024-10-20
2024-10-21

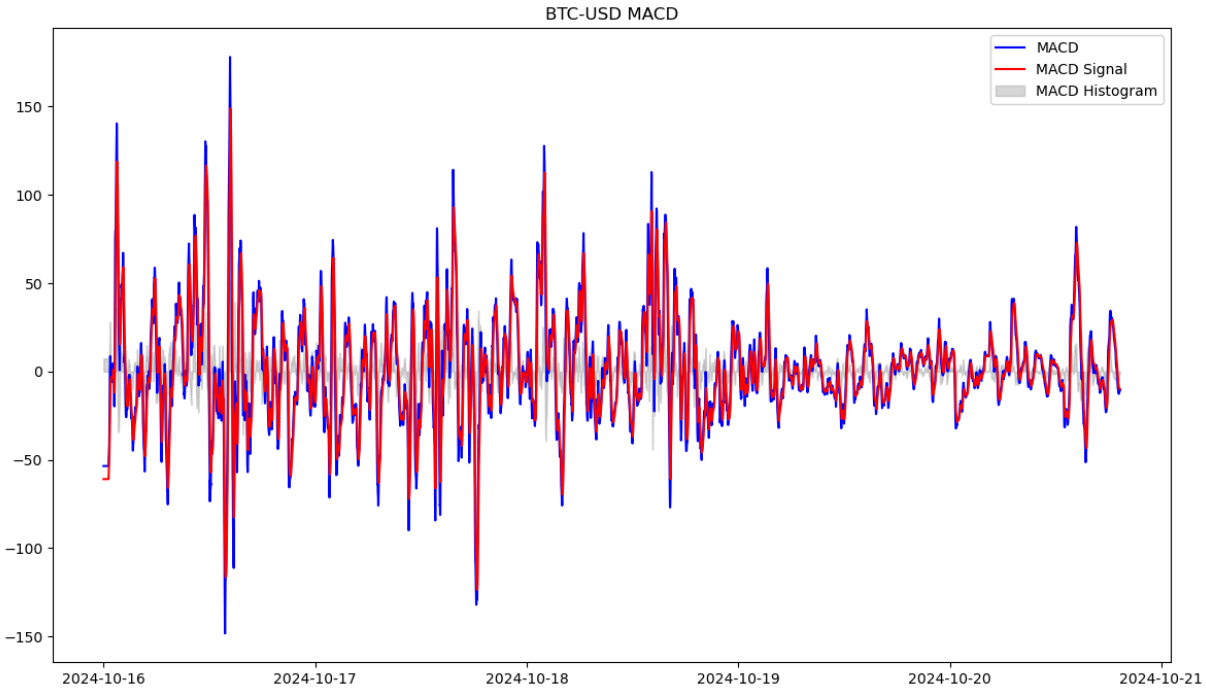

BTC-USD RSI
90
80
70
60
50
40
30
20
10
RSI
Overbought (70)
Oversold (30)
2024-10-16
2024-10-17
2024-10-18
2024-10-19
2024-10-20
2024-10-21

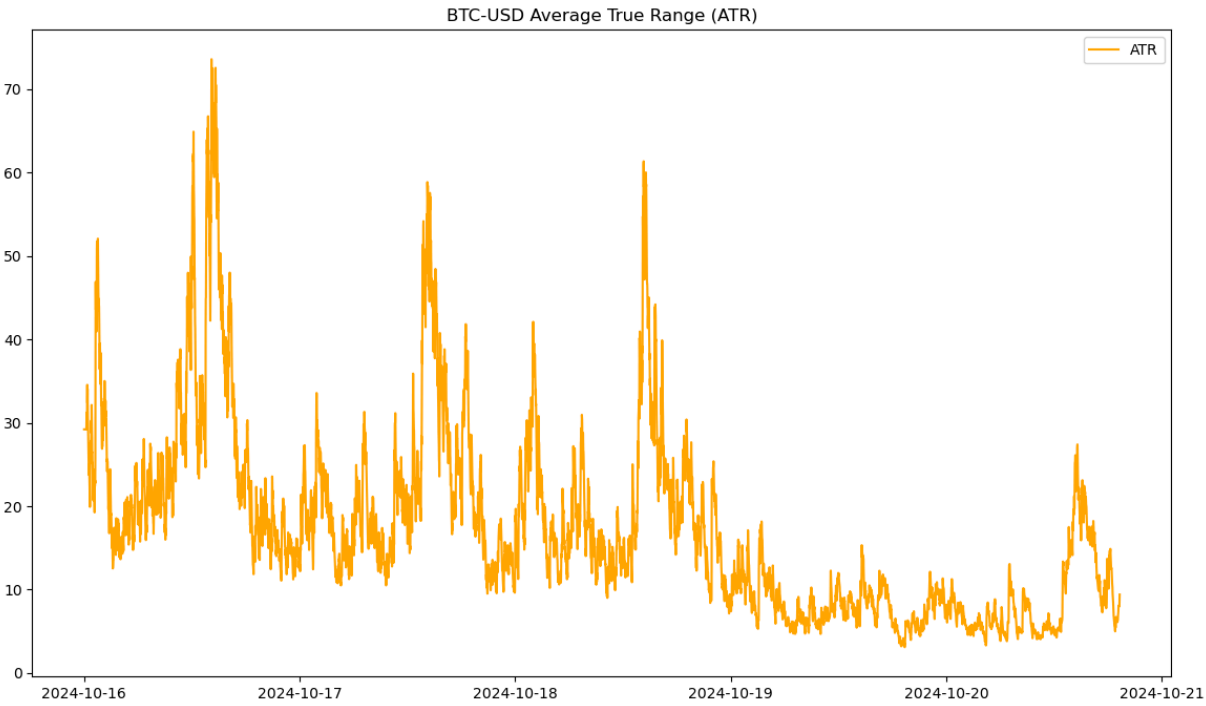

BTC-USD Returns
Returns
0.003
0.002
0.001
0.000
−0.001
−0.002
−0.003
−0.004
2024-10-16
2024-10-17
2024-10-18
2024-10-19
2024-10-20
2024-10-21


BTC-USD Volatility
Volatility
0.010
0.008
0.006
0.004
0.002
2024-10-16
2024-10-17
2024-10-18
2024-10-19
2024-10-20
2024-10-21


BTC-USD Candl
69k
68.5k
68k
67.5k
Price (USD)


BTC-USD Trading Volume
1e9
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Volume
Volume
2024-10-16
2024-10-17
2024-10-18
2024-10-19
2024-10-20
2024-10-21
Date


BTC-USD MACD
MACD
MACD Signal
MACD Histogram
150
100
50
0
−50
−100
−150
2024-10-16
2024-10-17
2024-10-18
2024-10-19
2024-10-20
2024-10-21


BTC-USD Average True Range (ATR)
ATR
70
60
50
40
30
20
10
0
2024-10-16
2024-10-17
2024-10-18
2024-10-19
2024-10-20
2024-10-21

```
Error saving to SQL Server: (pyodbc.ProgrammingError) ('42000', "[42000] [Microsoft]
[ODBC Driver 17 for SQL Server][SQL Server]There is insufficient system memory in re
source pool 'default' to run this query. (701) (SQLExecDirectW)")
[SQL: SELECT [INFORMATION_SCHEMA].[COLUMNS].[COLUMN_NAME], [INFORMATION_SCHEMA].[COL
UMNS].[DATA_TYPE], [INFORMATION_SCHEMA].[COLUMNS].[IS_NULLABLE], [INFORMATION_SCHEM
A].[COLUMNS].[CHARACTER_MAXIMUM_LENGTH], [INFORMATION_SCHEMA].[COLUMNS].[NUMERIC_PRE
CISION], [INFORMATION_SCHEMA].[COLUMNS].[NUMERIC_SCALE], [INFORMATION_SCHEMA].[COLUM
NS].[COLUMN_DEFAULT], [INFORMATION_SCHEMA].[COLUMNS].[COLLATION_NAME], sys.computed_
columns.definition, sys.computed_columns.is_persisted, sys.identity_columns.is_ident
ity, CAST(sys.identity_columns.seed_value AS NUMERIC(38, 0)) AS seed_value, CAST(sy
s.identity_columns.increment_value AS NUMERIC(38, 0)) AS increment_value, CAST(sys.e
xtended_properties.value AS NVARCHAR(max)) AS comment
FROM [INFORMATION_SCHEMA].[COLUMNS] LEFT OUTER JOIN sys.computed_columns ON sys.comp
uted_columns.object_id = object_id([INFORMATION_SCHEMA].[COLUMNS].[TABLE_SCHEMA] + C
AST(? AS NVARCHAR(max)) + [INFORMATION_SCHEMA].[COLUMNS].[TABLE_NAME]) AND sys.compu
ted_columns.name = ([INFORMATION_SCHEMA].[COLUMNS].[COLUMN_NAME] COLLATE DATABASE_DE
FAULT) LEFT OUTER JOIN sys.identity_columns ON sys.identity_columns.object_id = obje
ct_id([INFORMATION_SCHEMA].[COLUMNS].[TABLE_SCHEMA] + CAST(? AS NVARCHAR(max)) + [IN
FORMATION_SCHEMA].[COLUMNS].[TABLE_NAME]) AND sys.identity_columns.name = ([INFORMAT
ION_SCHEMA].[COLUMNS].[COLUMN_NAME] COLLATE DATABASE_DEFAULT) LEFT OUTER JOIN sys.ex
tended_properties ON sys.extended_properties.class = ? AND sys.extended_properties.m
ajor_id = object_id([INFORMATION_SCHEMA].[COLUMNS].[TABLE_SCHEMA] + CAST(? AS NVARCH
AR(max)) + [INFORMATION_SCHEMA].[COLUMNS].[TABLE_NAME]) AND sys.extended_properties.
minor_id = [INFORMATION_SCHEMA].[COLUMNS].[ORDINAL_POSITION] AND sys.extended_proper
ties.name = CAST(? AS NVARCHAR(max))
WHERE [INFORMATION_SCHEMA].[COLUMNS].[TABLE_NAME] = CAST(? AS NVARCHAR(max)) AND [IN
FORMATION_SCHEMA].[COLUMNS].[TABLE_SCHEMA] = CAST(? AS NVARCHAR(max)) ORDER BY [INFO
RMATION_SCHEMA].[COLUMNS].[ORDINAL_POSITION]]
[parameters: ('.', '.', 1, '.', 'MS_Description', 'BTC-USD_technical_analysis', 'db
o')]
(Background on this error at: https://sqlalche.me/e/20/f405)
SQL connection closed.
```

In [34]:

```python
import pandas as pd

# Load your cryptocurrency data
df = pd.read_csv('BTC-USD_technical_analysis_20241020_132410.csv')

# Example of calculating a 20-day Bollinger Band
df['BB_upper'] = df['Close'].rolling(window=20).mean() + (df['Close'].rolling(windo
df['BB_lower'] = df['Close'].rolling(window=20).mean() - (df['Close'].rolling(windo

# Example RSI calculation (14-day)
delta = df['Close'].diff(1)
gain = delta.where(delta > 0, 0)
loss = -delta.where(delta < 0, 0)
avg_gain = gain.rolling(window=14).mean()
avg_loss = loss.rolling(window=14).mean()
rs = avg_gain / avg_loss
df['RSI'] = 100 - (100 / (1 + rs))

# Example MACD calculation
df['EMA12'] = df['Close'].ewm(span=12, adjust=False).mean()
df['EMA26'] = df['Close'].ewm(span=26, adjust=False).mean()
df['MACD'] = df['EMA12'] - df['EMA26']
df['MACD_signal'] = df['MACD'].ewm(span=9, adjust=False).mean()
```

```
df['MACD_hist'] = df['MACD'] - df['MACD_signal']

# Save the enhanced dataset with technical indicators
df.to_csv('enhanced_crypto_data.csv', index=False)
```

In [32]:
```
import pandas as pd
import os

# Define the file path
file_path = 'BTC-USD.csv'

# Check if the file exists
if not os.path.exists(file_path):
    print(f"File not found: {file_path}")
else:
    # Load your cryptocurrency data
    df = pd.read_csv(file_path)

    # Example of calculating a 20-day Bollinger Band
    df['BB_upper'] = df['Close'].rolling(window=20).mean() + (df['Close'].rolling(w
    df['BB_lower'] = df['Close'].rolling(window=20).mean() - (df['Close'].rolling(w

    # Example RSI calculation (14-day)
    delta = df['Close'].diff(1)
    gain = delta.where(delta > 0, 0)
    loss = -delta.where(delta < 0, 0)
    avg_gain = gain.rolling(window=14).mean()
    avg_loss = loss.rolling(window=14).mean()
    rs = avg_gain / avg_loss
    df['RSI'] = 100 - (100 / (1 + rs))

    # Example MACD calculation
    df['EMA12'] = df['Close'].ewm(span=12, adjust=False).mean()
    df['EMA26'] = df['Close'].ewm(span=26, adjust=False).mean()
    df['MACD'] = df['EMA12'] - df['EMA26']
    df['MACD_signal'] = df['MACD'].ewm(span=9, adjust=False).mean()
    df['MACD_hist'] = df['MACD'] - df['MACD_signal']

    # Save the enhanced dataset with technical indicators
    df.to_csv('enhanced_crypto_data.csv', index=False)
    print("Enhanced data saved to enhanced_crypto_data.csv")
```

```
File not found: BTC-USD.csv
```

In [2]:
```
import pandas as pd
import numpy as np
import talib as ta
import yfinance as yf
import matplotlib.pyplot as plt
from datetime import datetime
from sqlalchemy import create_engine
import urllib
import os  # Import the os module for checking file existence

# Database connection configuration
DATABASE_TYPE = 'mssql'
```

```
DBAPI = 'pyodbc'
SERVER = 'MARTIN'
DATABASE = 'crypto_data'
DRIVER = 'ODBC Driver 17 for SQL Server'

# Create a connection URI for SQLAlchemy
params = urllib.parse.quote_plus(f"DRIVER={DRIVER};SERVER={SERVER};DATABASE={DATABA
DATABASE_URI = f"{DATABASE_TYPE}+{DBAPI}:///?odbc_connect={params}"

# Create SQLAlchemy engine
engine = create_engine(DATABASE_URI, echo=False)

# Download historical data
def get_crypto_data(symbol, period='7d', interval='1m'):
    data = yf.download(tickers=symbol, period=period, interval=interval)
    return data

# Calculate volatility
def calculate_volatility(df, window):
    df['returns'] = df['Close'].pct_change()
    df['volatility'] = df['returns'].rolling(window=window).std() * np.sqrt(window)
    return df

# Support and resistance levels
def find_support_resistance(df):
    df['support'] = df['Low'].rolling(window=60).min()
    df['resistance'] = df['High'].rolling(window=60).max()
    return df

# Moving Averages (SMA, EMA)
def calculate_moving_averages(df, short_window=14, long_window=50):
    df['SMA_14'] = ta.SMA(df['Close'], timeperiod=short_window)
    df['EMA_50'] = ta.EMA(df['Close'], timeperiod=long_window)
    return df

# Bollinger Bands
def calculate_bollinger_bands(df, window=20, num_std=2):
    df['BB_upper'], df['BB_middle'], df['BB_lower'] = ta.BBANDS(df['Close'], timepe
    return df

# Relative Strength Index (RSI)
def calculate_rsi(df, period=14):
    df['RSI'] = ta.RSI(df['Close'], timeperiod=period)
    return df

# VWAP calculation
def calculate_vwap(df):
    df['vwap'] = (df['Volume'] * (df['High'] + df['Low'] + df['Close']) / 3).cumsum
    return df

# Fibonacci retracements (simplified)
def calculate_fibonacci_levels(df):
    max_price = df['Close'].max()
    min_price = df['Close'].min()
    diff = max_price - min_price
    df['fib_0.236'] = max_price - 0.236 * diff
```

```
    df['fib_0.382'] = max_price - 0.382 * diff
    df['fib_0.5'] = max_price - 0.5 * diff
    df['fib_0.618'] = max_price - 0.618 * diff
    df['fib_1'] = min_price
    return df

# Verify and clean data
def clean_data(df):
    df.dropna(how='all', inplace=True)
    df.ffill(inplace=True)  # Forward fill missing data
    df.bfill(inplace=True)  # Backward fill missing data
    df.replace([np.inf, -np.inf], np.nan, inplace=True)
    df.dropna(inplace=True)
    return df

# Save data to SQL Server
def save_to_sql(df, table_name):
    try:
        if df.empty:
            print("Data is empty after cleaning. Nothing to save.")
            return
        df.to_sql(table_name, con=engine, if_exists='replace', index_label='Date')
        print(f"Data successfully saved to {table_name} in SQL Server.")
    except Exception as e:
        print(f"Error saving to SQL Server: {e}")
    finally:
        engine.dispose()
        print("SQL connection closed.")

# CSV to SQL function
def csv_to_sql(file_name, table_name):
    try:
        df = pd.read_csv(file_name)
        df = clean_data(df)
        save_to_sql(df, table_name)
    except Exception as e:
        print(f"Error moving CSV data to SQL Server: {e}")

# Plot various data points
def plot_data(df, symbol):
    plt.figure(figsize=(14, 8))

    # Plot Close Price, Moving Averages, and Bollinger Bands
    plt.subplot(2, 1, 1)
    plt.plot(df['Close'], label='Close Price')
    plt.plot(df['SMA_14'], label='SMA 14', linestyle='--')
    plt.plot(df['EMA_50'], label='EMA 50', linestyle='--')
    plt.plot(df['BB_upper'], label='Upper BB', linestyle='--')
    plt.plot(df['BB_lower'], label='Lower BB', linestyle='--')
    plt.title(f'{symbol} Close Price with Moving Averages and Bollinger Bands')
    plt.legend()

    # Plot RSI
    plt.subplot(2, 1, 2)
    plt.plot(df['RSI'], label='RSI', color='green')
    plt.axhline(70, color='red', linestyle='--', label='Overbought (70)')
```

```
    plt.axhline(30, color='blue', linestyle='--', label='Oversold (30)')
    plt.title(f'{symbol} RSI')
    plt.legend()

    plt.tight_layout()
    plt.show()

    # Plot Returns and Volatility
    plt.figure(figsize=(14, 8))
    plt.subplot(2, 1, 1)
    plt.plot(df.index, df['returns'], label='Returns')
    plt.title(f'{symbol} Returns')
    plt.legend()

    plt.subplot(2, 1, 2)
    plt.plot(df.index, df['volatility'], label='Volatility', color='orange')
    plt.title(f'{symbol} Volatility')
    plt.legend()
    plt.tight_layout()
    plt.show()

# Plot candlestick chart
def plot_candlestick(df, symbol):
    import plotly.graph_objects as go

    fig = go.Figure(data=[go.Candlestick(x=df.index,
                                         open=df['Open'],
                                         high=df['High'],
                                         low=df['Low'],
                                         close=df['Close'],
                                         name='Candlestick Chart')])

    fig.update_layout(title=f'{symbol} Candlestick Chart',
                      yaxis_title='Price (USD)',
                      xaxis_title='Date')
    fig.show()

# Calculate MACD
def calculate_macd(df):
    df['macd'], df['macdsignal'], df['macdhist'] = ta.MACD(df['Close'], fastperiod=
    return df

# Plot MACD
def plot_macd(df, symbol):
    plt.figure(figsize=(14, 8))
    plt.plot(df['macd'], label='MACD', color='blue')
    plt.plot(df['macdsignal'], label='MACD Signal', color='red')
    plt.fill_between(df.index, df['macdhist'], color='gray', alpha=0.3, label='MACD
    plt.title(f'{symbol} MACD')
    plt.legend()
    plt.show()

# Calculate Average True Range (ATR)
def calculate_atr(df, window):
    df['ATR'] = ta.ATR(df['High'], df['Low'], df['Close'], timeperiod=window)
    return df
```

```python
# Plot ATR
def plot_atr(df, symbol):
    plt.figure(figsize=(14, 8))
    plt.plot(df['ATR'], label='ATR', color='orange')
    plt.title(f'{symbol} Average True Range (ATR)')
    plt.legend()
    plt.show()

# Plot Volume
def plot_volume(df, symbol):
    plt.figure(figsize=(14, 8))
    plt.bar(df.index, df['Volume'], label='Volume', color='skyblue')
    plt.title(f'{symbol} Trading Volume')
    plt.xlabel('Date')
    plt.ylabel('Volume')
    plt.legend()
    plt.show()

# Create the main function
def main():
    symbols = [
        'BTC-USD', 'ETH-USD', 'XRP-USD', 'LTC-USD', 'BNB-USD', 'MATIC-USD', 'SOL-US
        'TRX-USD', 'BLZ-USD', 'LEVER-USD', 'EURUSD=X', 'NZDUSD=X', 'GBPUSD=X', 'JPY
        'AUDUSD=X', 'AUDJPY=X', 'GBPJPY=X', 'XAUUSD=X', 'XAGUSD=X'
    ]

    period = '5d'
    interval = '1m'

    for symbol in symbols:
        print(f"Processing data for {symbol}...")
        df = get_crypto_data(symbol, period, interval)
        if df.empty:
            print(f"No data found for {symbol}. Please check the period and interva
            continue

        # Perform technical analysis
        df = calculate_volatility(df, window=60)
        df = find_support_resistance(df)
        df = calculate_moving_averages(df)
        df = calculate_bollinger_bands(df)
        df = calculate_rsi(df)
        df = calculate_vwap(df)
        df = calculate_fibonacci_levels(df)
        df = calculate_macd(df)
        df = calculate_atr(df, window=14)

        df = clean_data(df)
        save_to_sql(df, f"{symbol}_technical_analysis")

        file_name = f"{symbol}_technical_analysis_{datetime.now().strftime('%Y%m%d_
        df.to_csv(file_name)
        print(f"Data saved to {file_name}")

        # Visualize the data
```

```
        plot_data(df, symbol)
        plot_candlestick(df, symbol)
        plot_volume(df, symbol)
        plot_macd(df, symbol)
        plot_atr(df, symbol)

        if os.path.exists(file_name):
            csv_to_sql(file_name, f"{symbol}_technical_analysis")
        else:
            print(f"The file {file_name} does not exist. Please check the file path

if __name__ == "__main__":
    main()
```

```
Processing data for BTC-USD...
[**********************100%***********************]  1 of 1 completed
Error saving to SQL Server: (pyodbc.IntegrityError) ('23000', '[23000] [Microsoft][O
DBC Driver 17 for SQL Server][SQL Server]Cannot insert an explicit value into a time
stamp column. Use INSERT with a column list to exclude the timestamp column, or inse
rt a DEFAULT into the timestamp column. (273) (SQLExecDirectW); [23000] [Microsoft]
[ODBC Driver 17 for SQL Server][SQL Server]Statement(s) could not be prepared. (818
0)')
[SQL: INSERT INTO [BTC-USD_technical_analysis] ([Date], [Open], [High], [Low], [Clos
e], [Adj Close], [Volume], returns, volatility, support, resistance, [SMA_14], [EMA_
50], [BB_upper], [BB_middle], [BB_lower], [RSI], vwap, [fib_0.236], [fib_0.382], [fi
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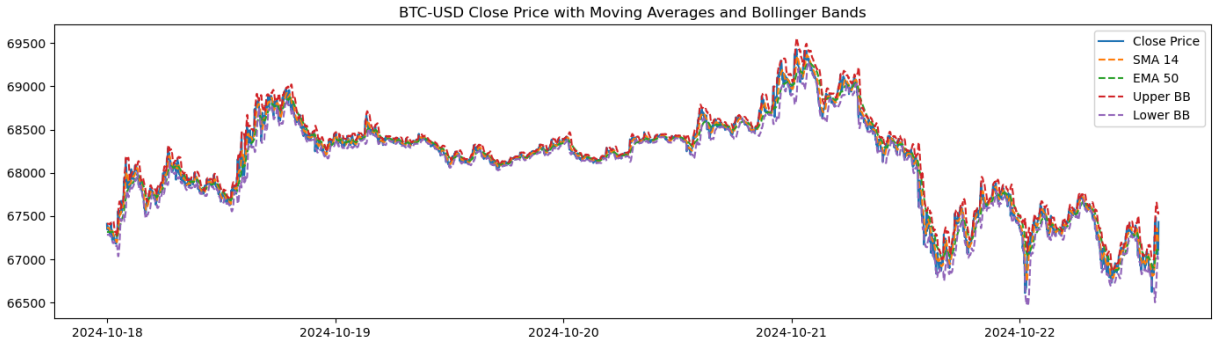
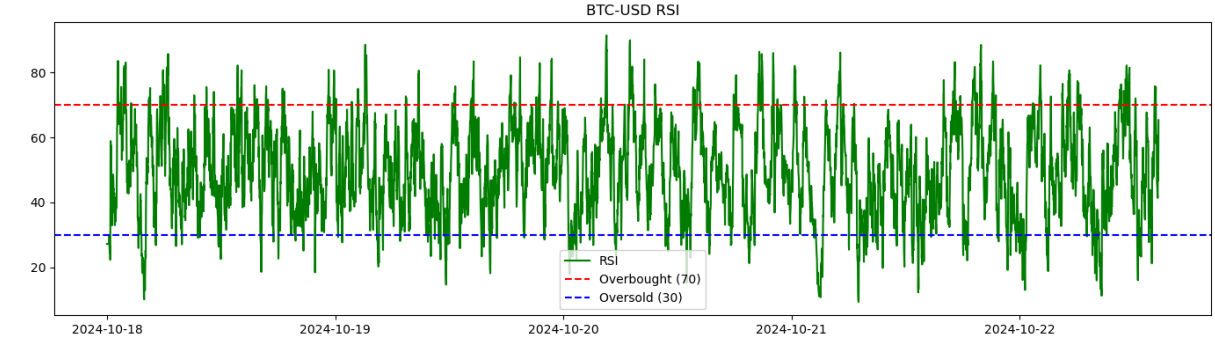
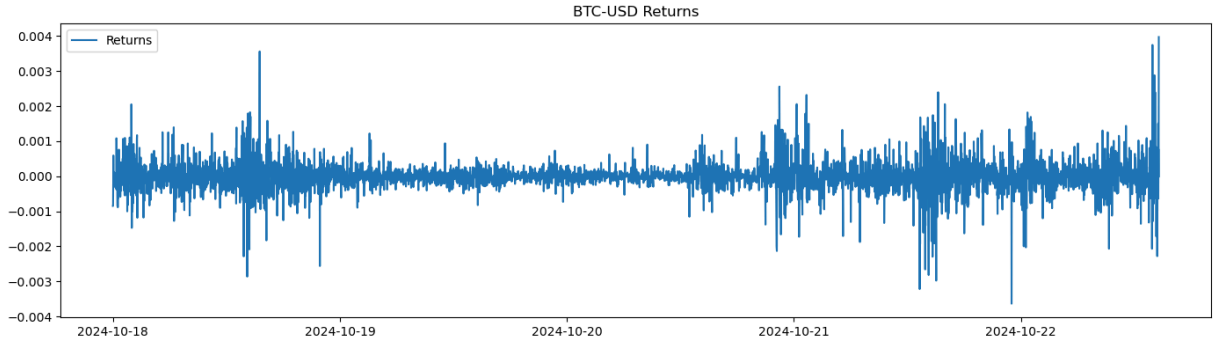
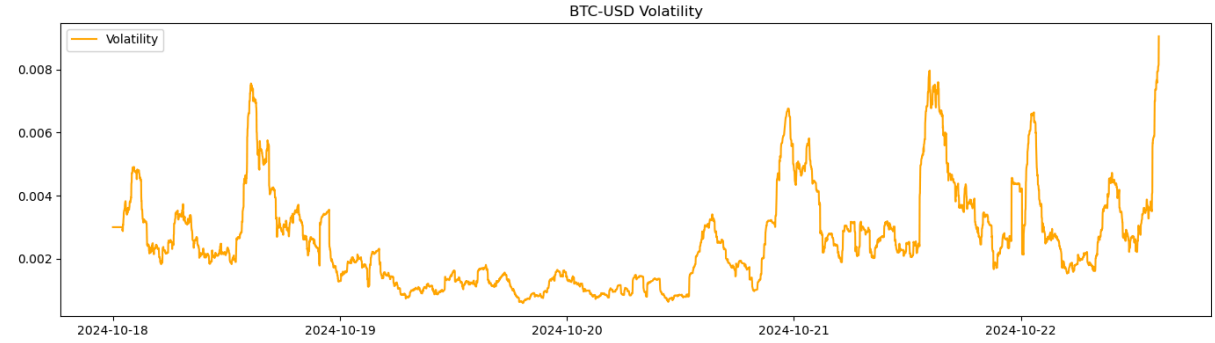
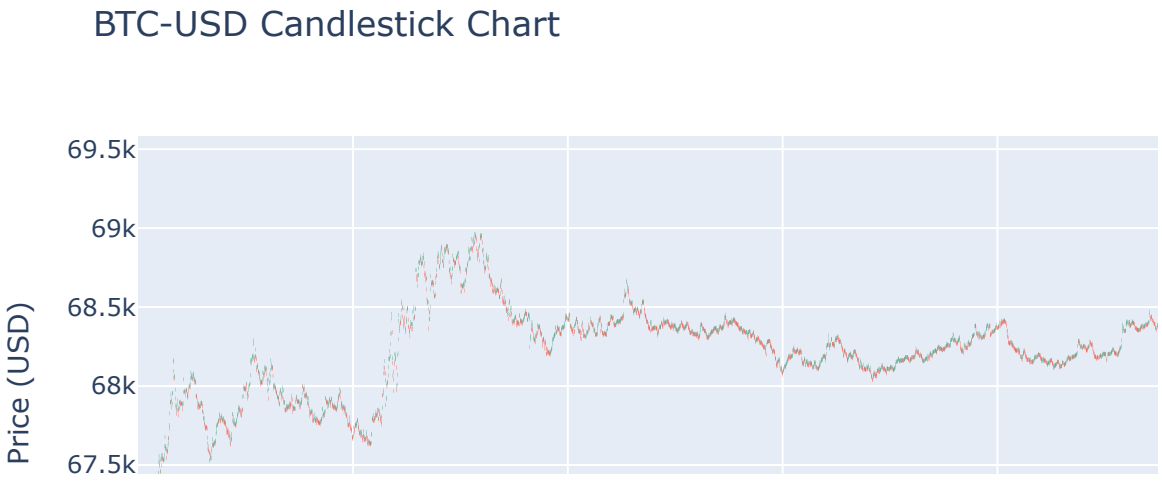
SQL connection closed.
Data saved to BTC-USD_technical_analysis_20241022_083907.csv
```

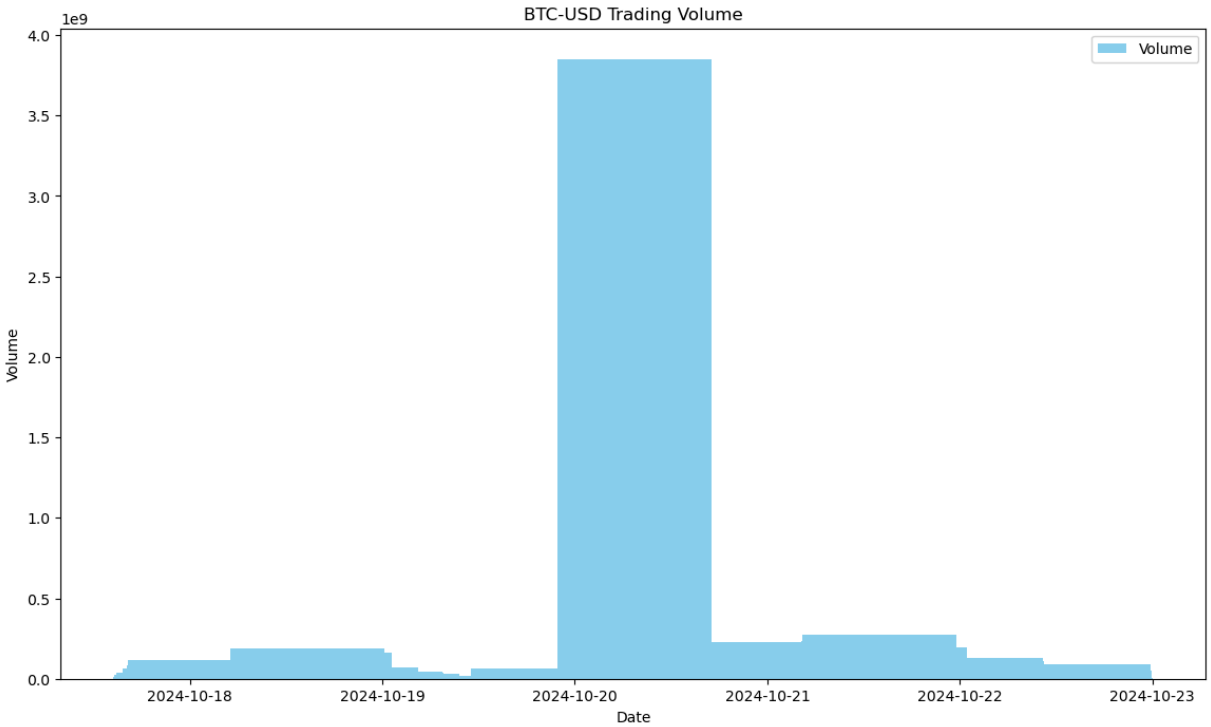

BTC-USD Close Price with Moving Averages and Bollinger Bands
Close Price
SMA 14
EMA 50
Upper BB
Lower BB
69500
69000
68500
68000
67500
67000
66500
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22

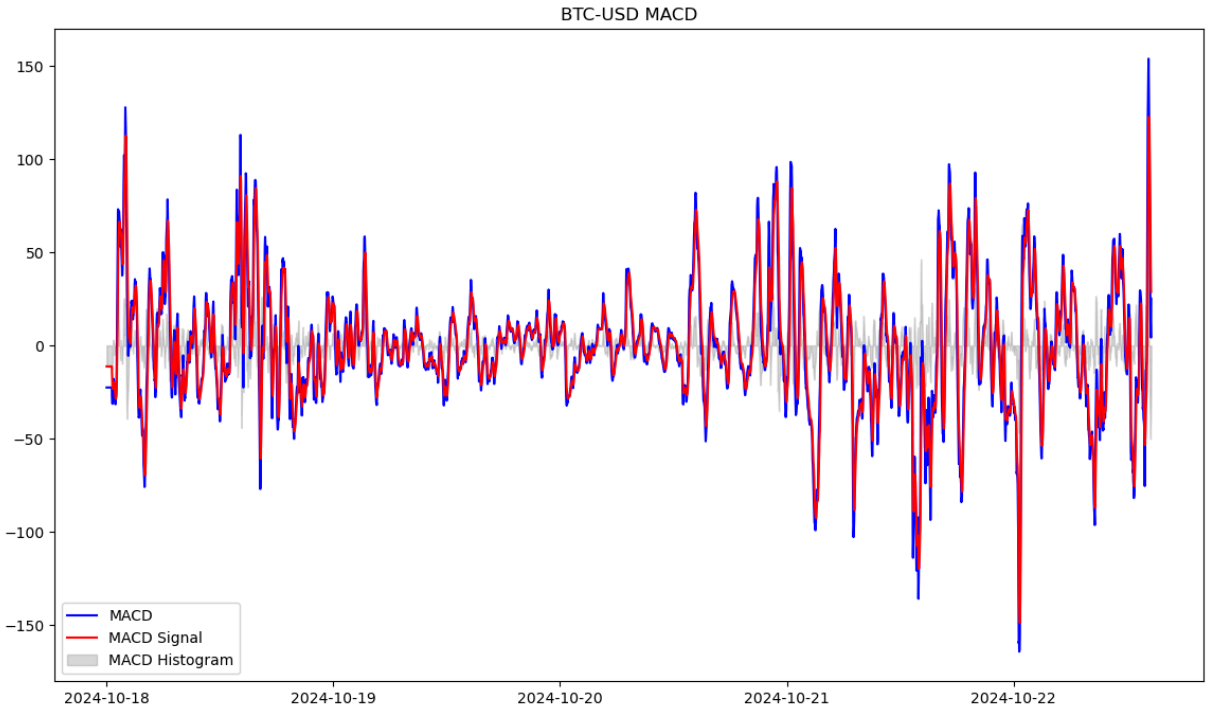

BTC-USD RSI
RSI
Overbought (70)
Oversold (30)
80
60
40
20
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22

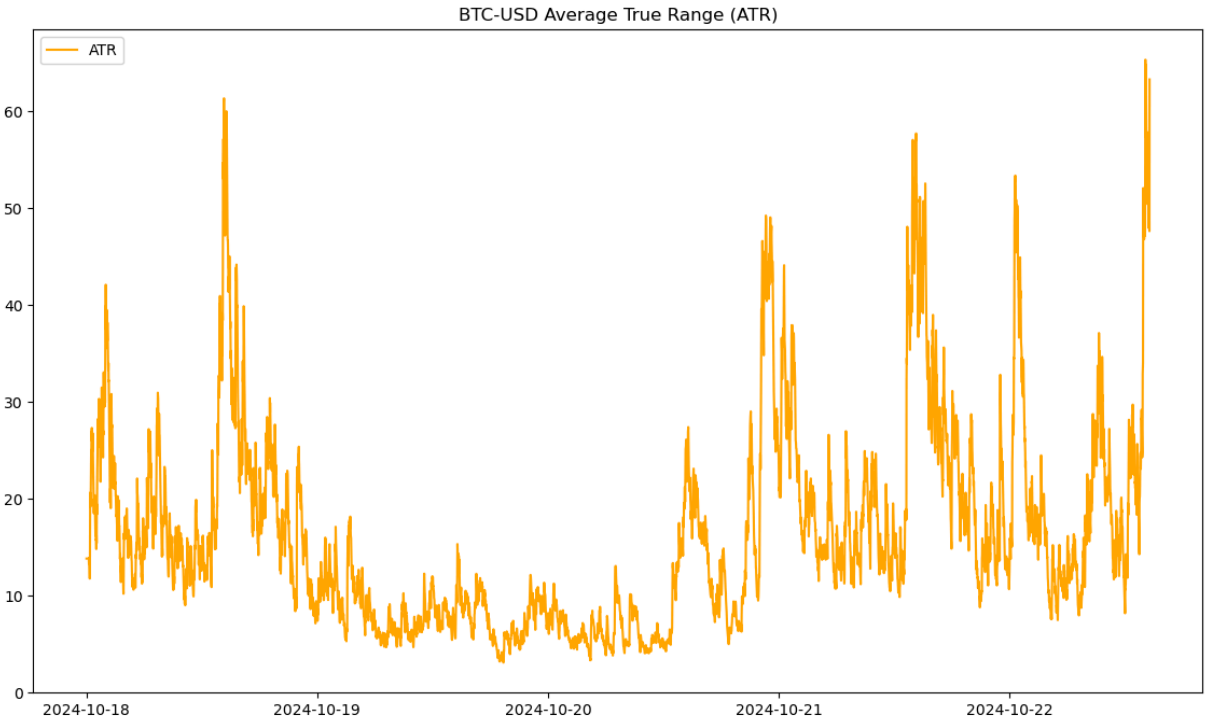

BTC-USD Returns
Returns
0.004
0.003
0.002
0.001
0.000
−0.001
−0.002
−0.003
−0.004
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22


BTC-USD Volatility
Volatility
0.008
0.006
0.004
0.002
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22


BTC-USD Candlestick Chart
Price (USD)
69.5k
69k
68.5k
68k
67.5k


BTC-USD Trading Volume
1e9
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Volume
Volume
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22
2024-10-23
Date






```
Data successfully saved to BTC-USD_technical_analysis in SQL Server.
SQL connection closed.
Processing data for ETH-USD...
[**********100%**********]  1 of 1 completed
```

```
Error saving to SQL Server: (pyodbc.IntegrityError) ('23000', '[23000] [Microsoft][O
DBC Driver 17 for SQL Server][SQL Server]Cannot insert an explicit value into a time
stamp column. Use INSERT with a column list to exclude the timestamp column, or inse
rt a DEFAULT into the timestamp column. (273) (SQLExecDirectW); [23000] [Microsoft]
[ODBC Driver 17 for SQL Server][SQL Server]Statement(s) could not be prepared. (818
0)')
[SQL: INSERT INTO [ETH-USD_technical_analysis] ([Date], [Open], [High], [Low], [Clos
e], [Adj Close], [Volume], returns, volatility, support, resistance, [SMA_14], [EMA_
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(Background on this error at: https://sqlalche.me/e/20/gkpj)
SQL connection closed.
Data saved to ETH-USD_technical_analysis_20241022_083954.csv
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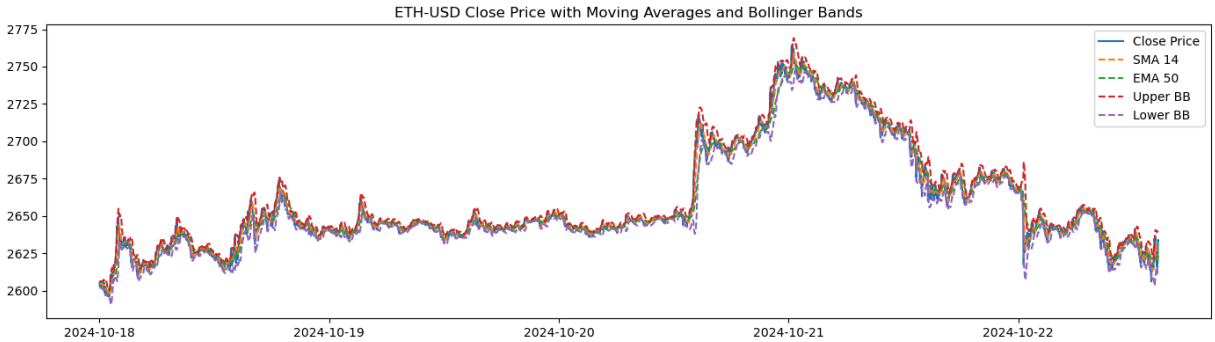
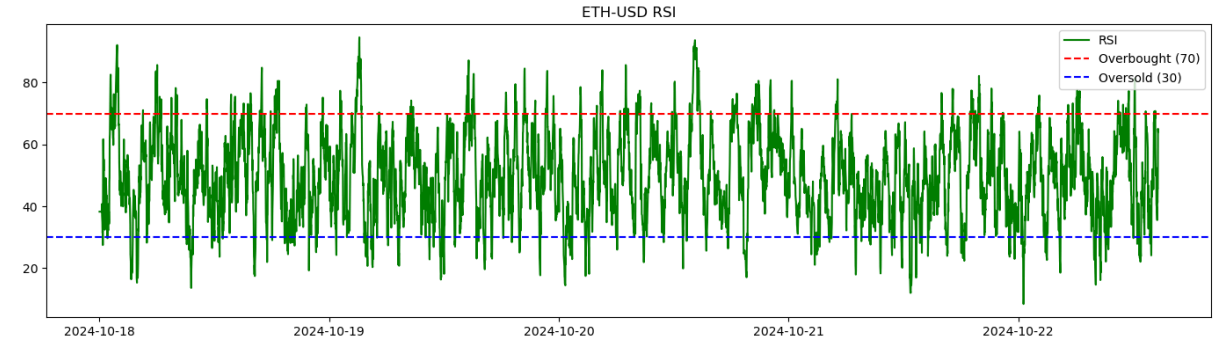
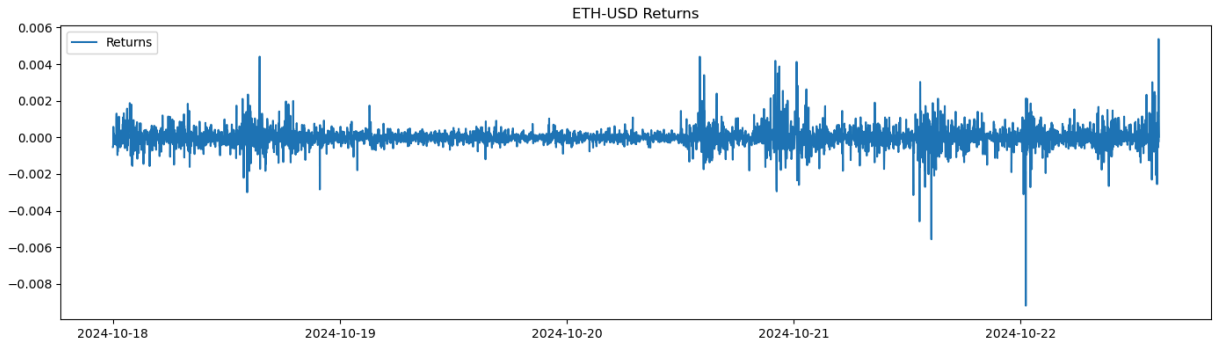
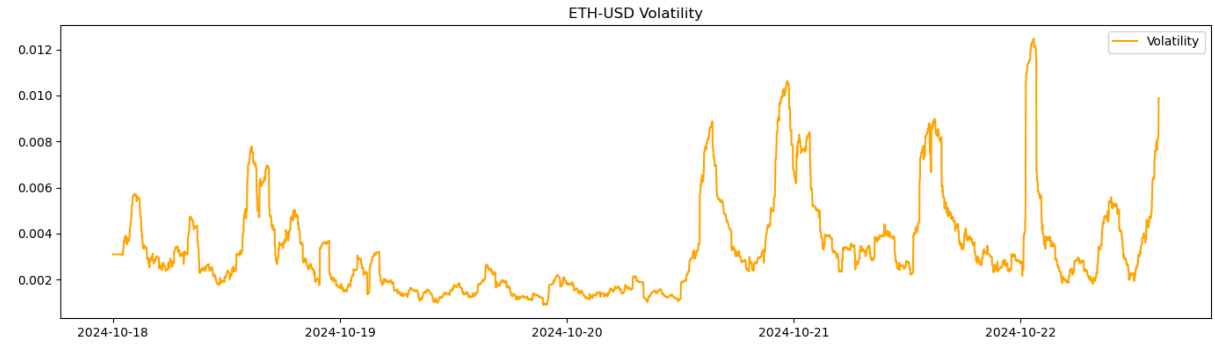
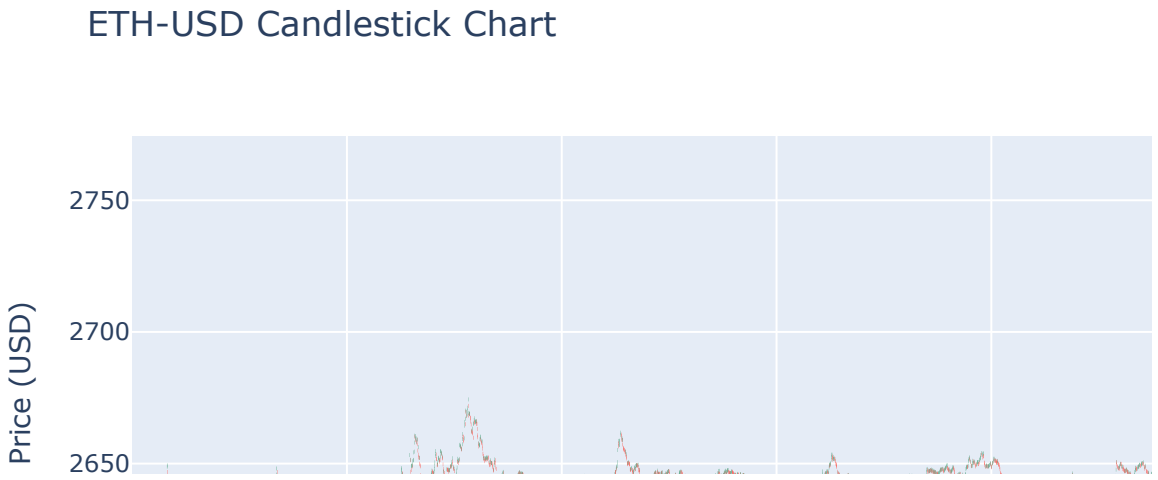
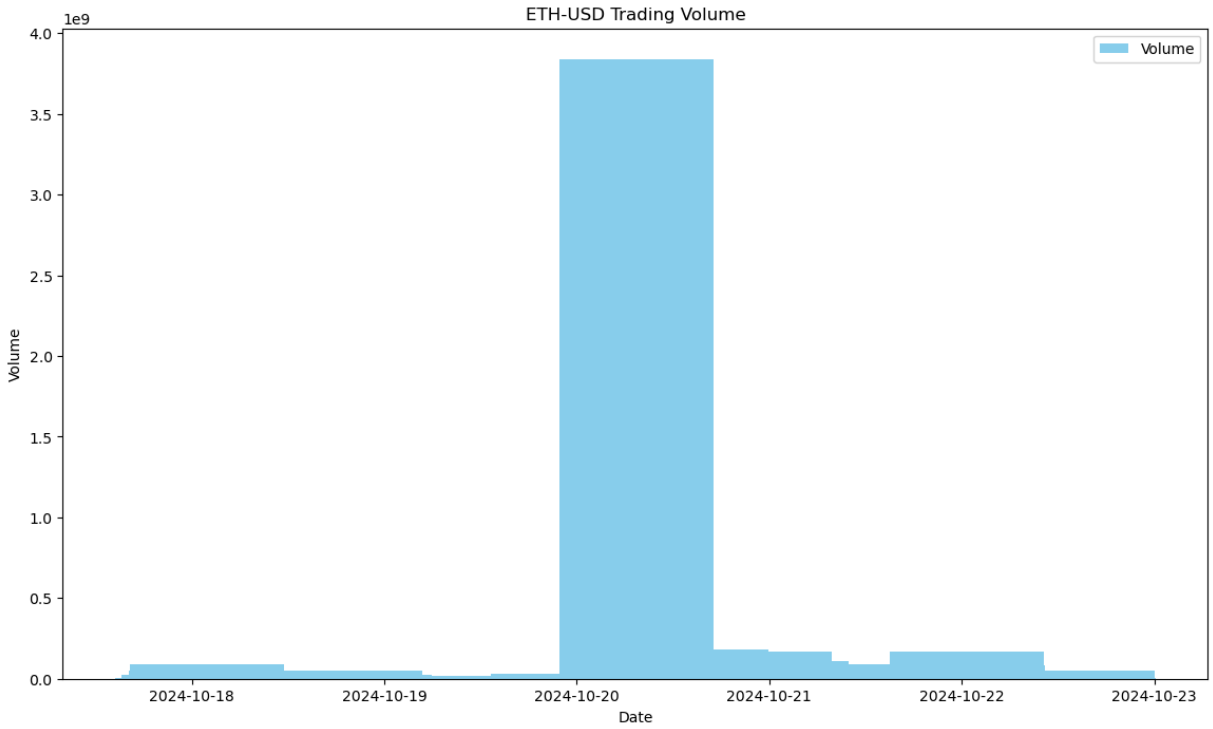

ETH-USD Close Price with Moving Averages and Bollinger Bands
Close Price
SMA 14
EMA 50
Upper BB
Lower BB
2775
2750
2725
2700
2675
2650
2625
2600
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22

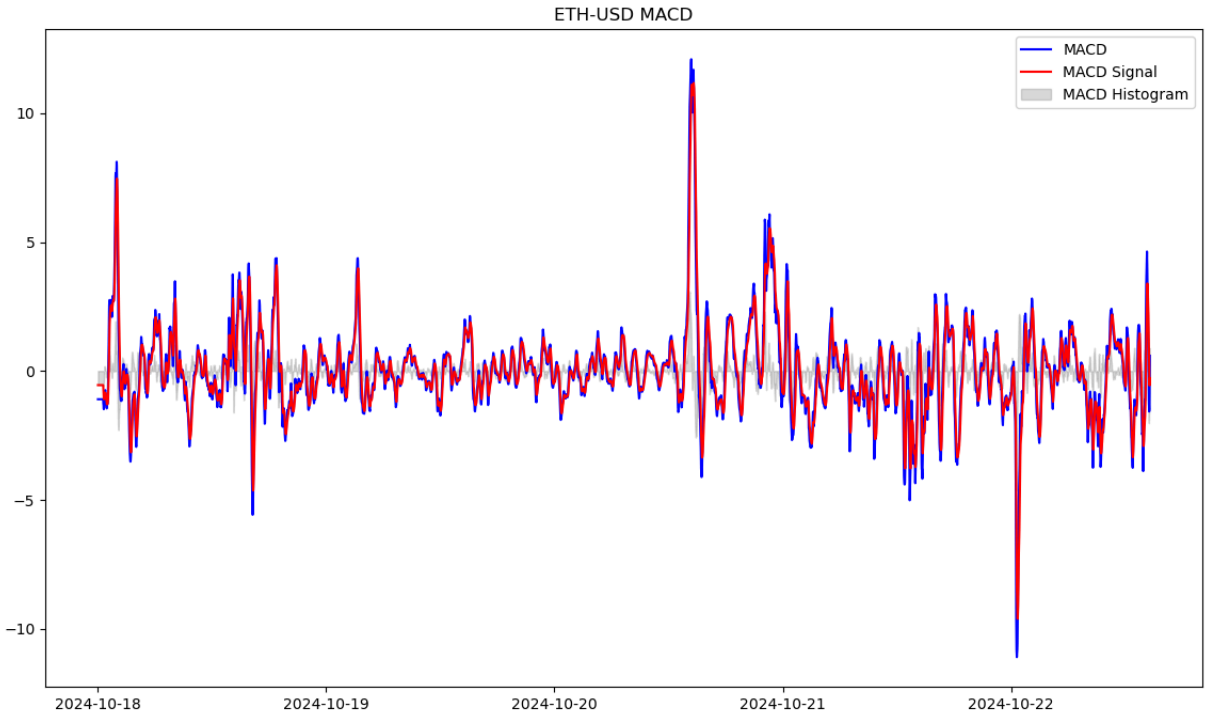

ETH-USD RSI
RSI
Overbought (70)
Oversold (30)
80
60
40
20
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22

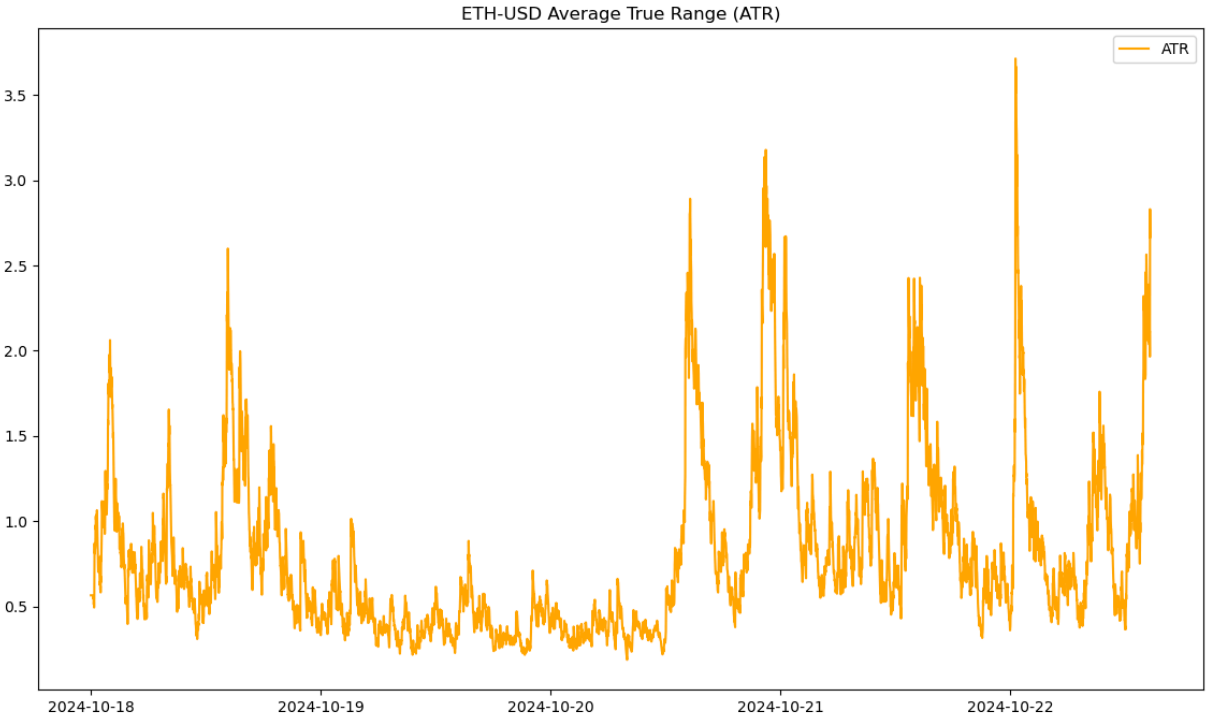

ETH-USD Returns
Returns
0.006
0.004
0.002
0.000
−0.002
−0.004
−0.006
−0.008
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22


ETH-USD Volatility
Volatility
0.012
0.010
0.008
0.006
0.004
0.002
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22


ETH-USD Candlestick Chart
Price (USD)
2750
2700
2650


ETH-USD Trading Volume
1e9
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Volume
Volume
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22
2024-10-23
Date



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Data successfully saved to ETH-USD_technical_analysis in SQL Server.
SQL connection closed.
Processing data for XRP-USD...
[**********100%**********]  1 of 1 completed
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Error saving to SQL Server: (pyodbc.IntegrityError) ('23000', '[23000] [Microsoft][O
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[ODBC Driver 17 for SQL Server][SQL Server]Statement(s) could not be prepared. (818
0)')
[SQL: INSERT INTO [XRP-USD_technical_analysis] ([Date], [Open], [High], [Low], [Clos
e], [Adj Close], [Volume], returns, volatility, support, resistance, [SMA_14], [EMA_
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68, 0.0001156958596619553, 0.0001999420806904315, 0.00017440752266768505)]
(Background on this error at: https://sqlalche.me/e/20/gkpj)
SQL connection closed.
Data saved to XRP-USD_technical_analysis_20241022_084042.csv
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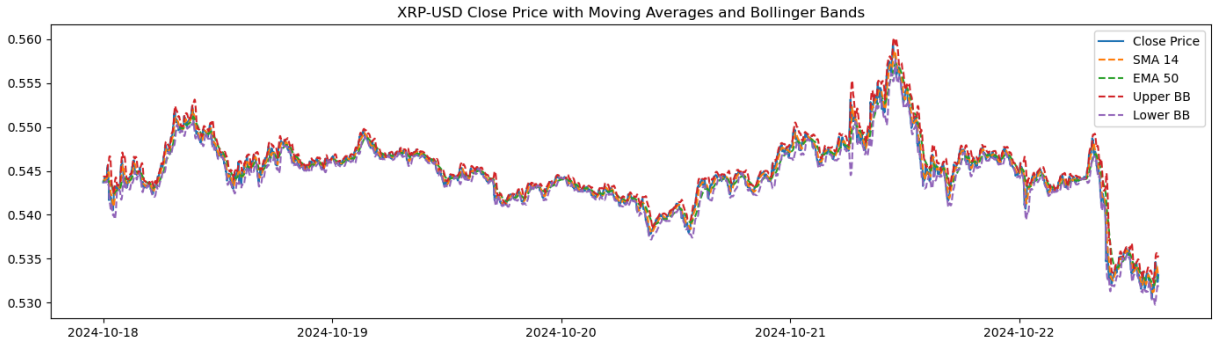
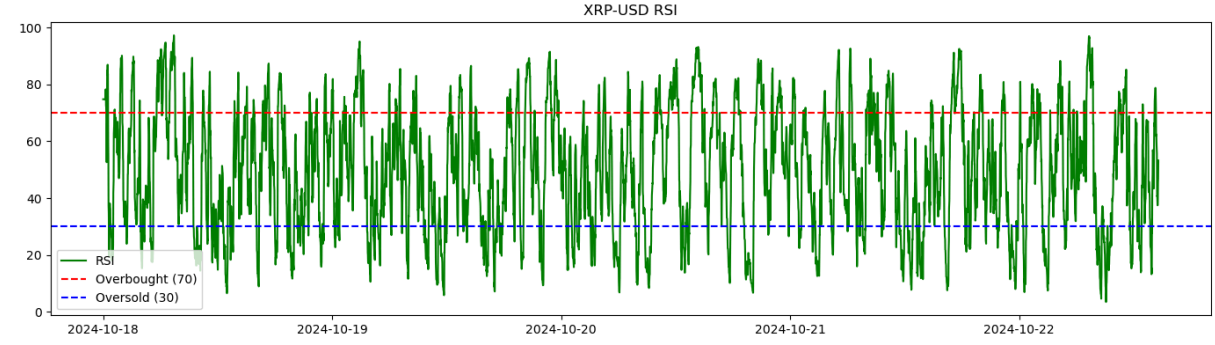
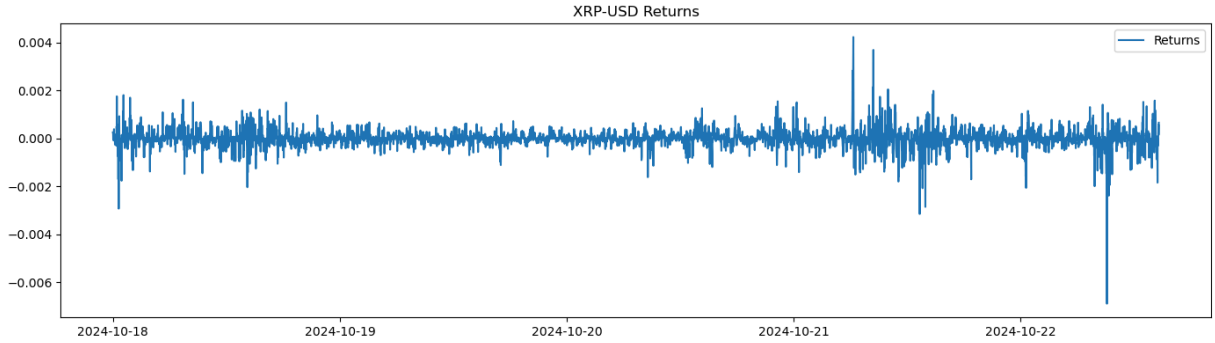
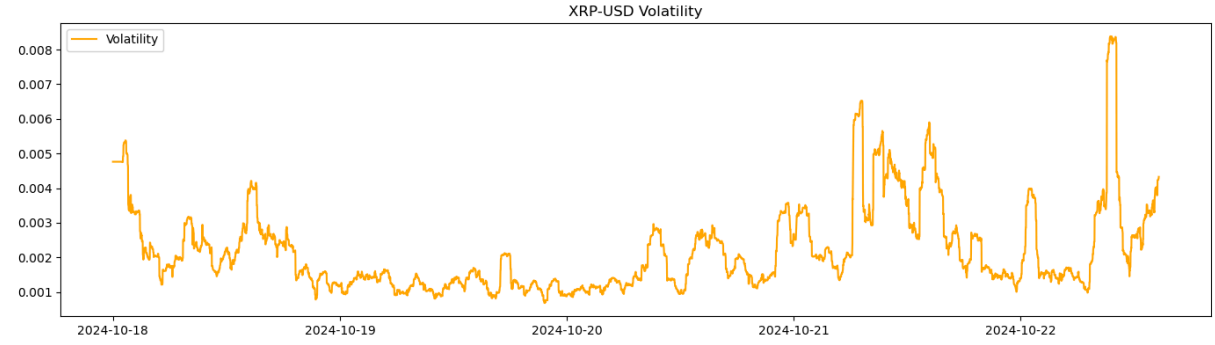
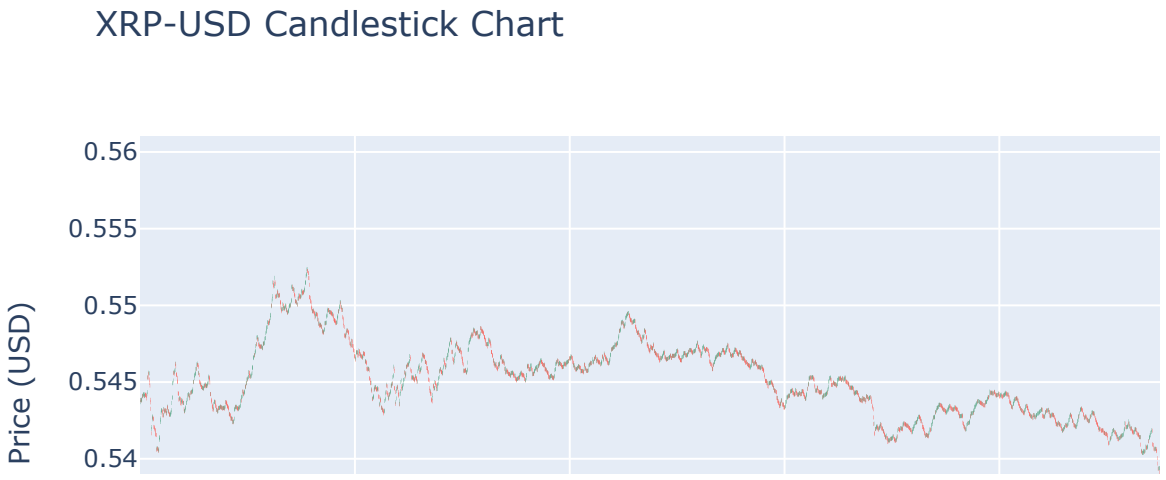
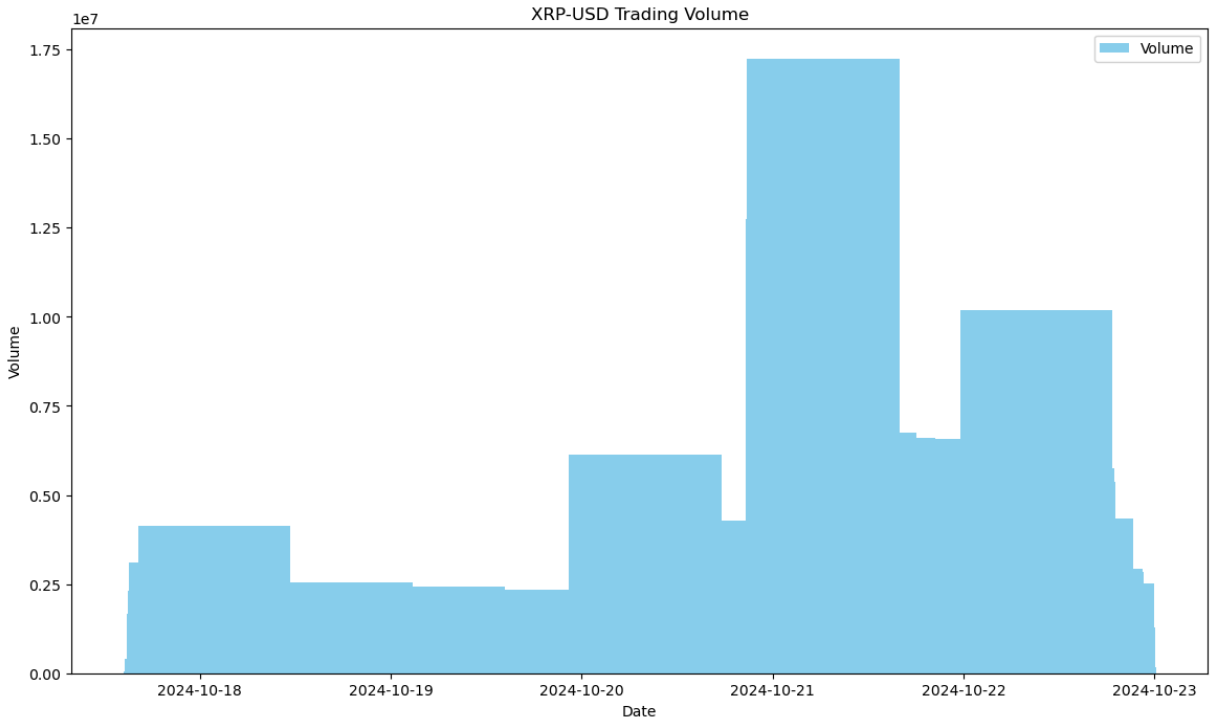

XRP-USD Close Price with Moving Averages and Bollinger Bands
Close Price
SMA 14
EMA 50
Upper BB
Lower BB
0.560
0.555
0.550
0.545
0.540
0.535
0.530
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22

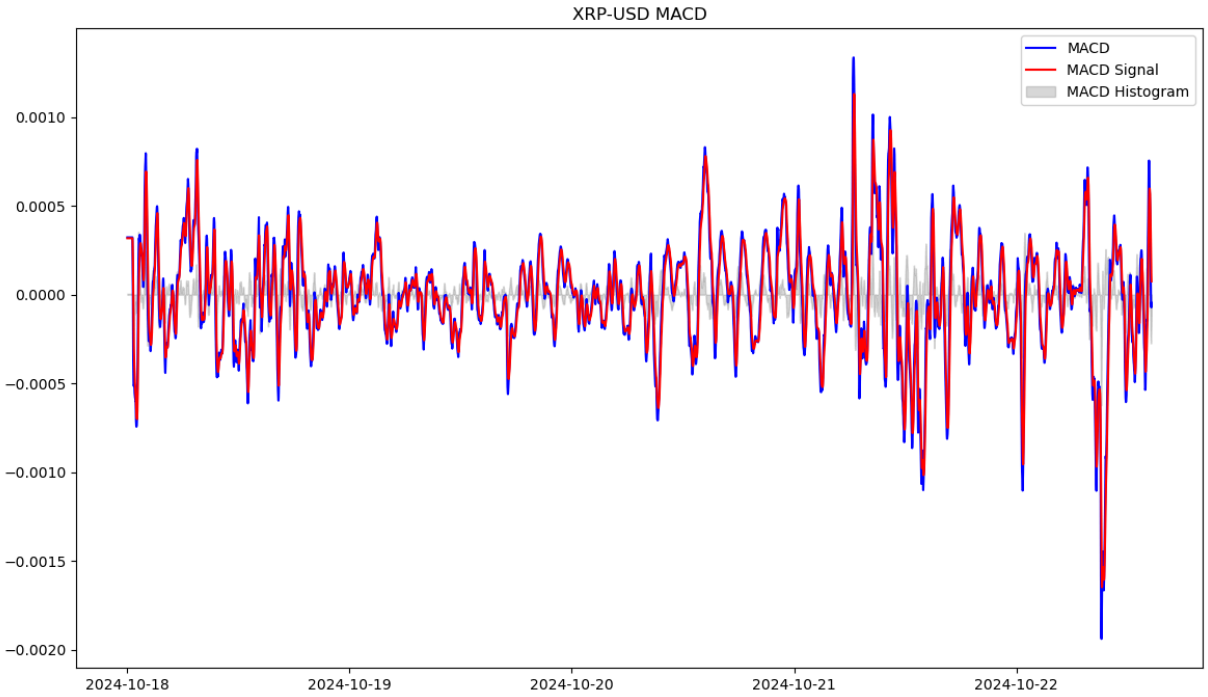

XRP-USD RSI
RSI
Overbought (70)
Oversold (30)
100
80
60
40
20
0
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22

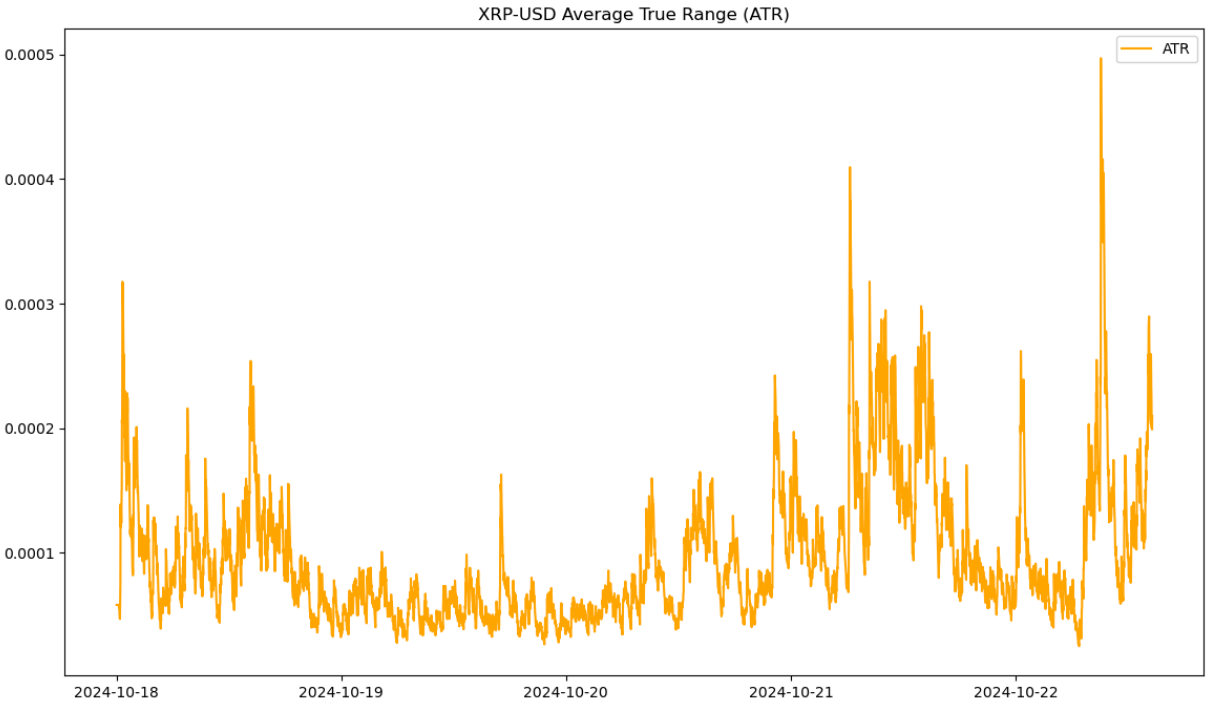

XRP-USD Returns
Returns
0.004
0.002
0.000
−0.002
−0.004
−0.006
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22


XRP-USD Volatility
Volatility
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22


XRP-USD Candlestick Chart
Price (USD)
0.56
0.555
0.55
0.545
0.54


XRP-USD Trading Volume
1e7
Volume
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22
2024-10-23
Date



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Data successfully saved to XRP-USD_technical_analysis in SQL Server.
SQL connection closed.
Processing data for LTC-USD...
[**********100%**********]  1 of 1 completed
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Error saving to SQL Server: (pyodbc.IntegrityError) ('23000', '[23000] [Microsoft][ODBC Driver 17 for SQL Server][SQL Server]Cannot insert an explicit value into a timestamp column. Use INSERT with a column list to exclude the timestamp column, or insert a DEFAULT into the timestamp column. (273) (SQLExecDirectW); [23000] [Microsoft][ODBC Driver 17 for SQL Server][SQL Server]Statement(s) could not be prepared. (8180)')
[SQL: INSERT INTO [LTC-USD_technical_analysis] ([Date], [Open], [High], [Low], [Close], [Adj Close], [Volume], returns, volatility, support, resistance, [SMA_14], [EMA_50], [BB_upper], [BB_middle], [BB_lower], [RSI], vwap, [fib_0.236], [fib_0.382], [fib_0. ... 6355 characters truncated ... ?, ?, ?, ?, ?, ?), (?, ?)]
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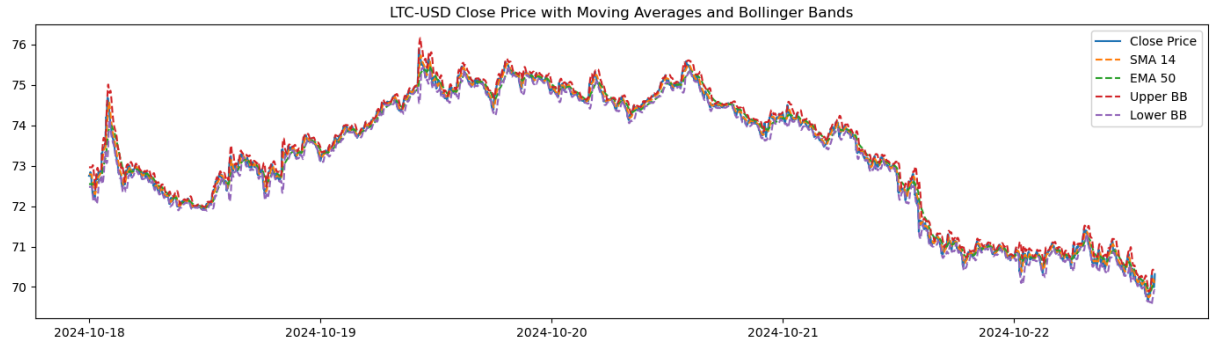
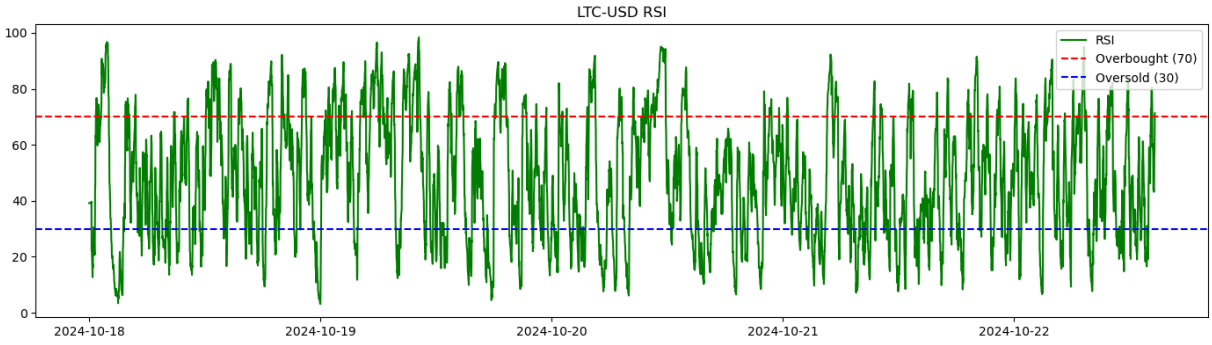
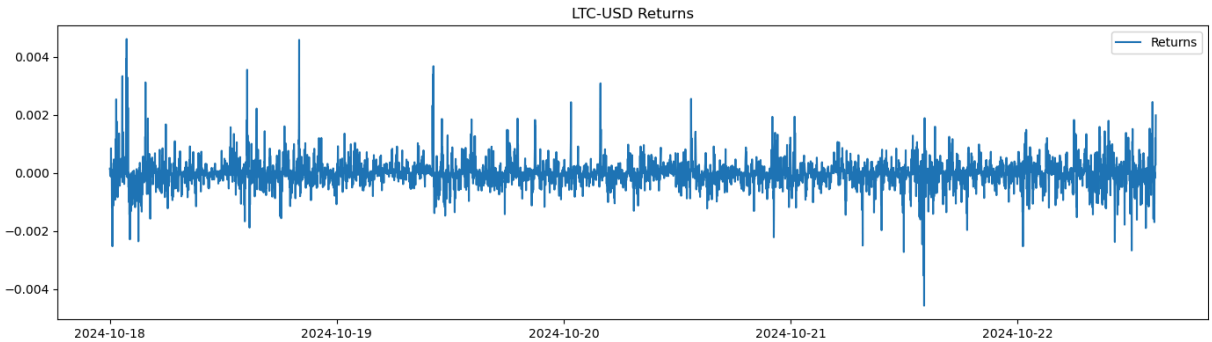
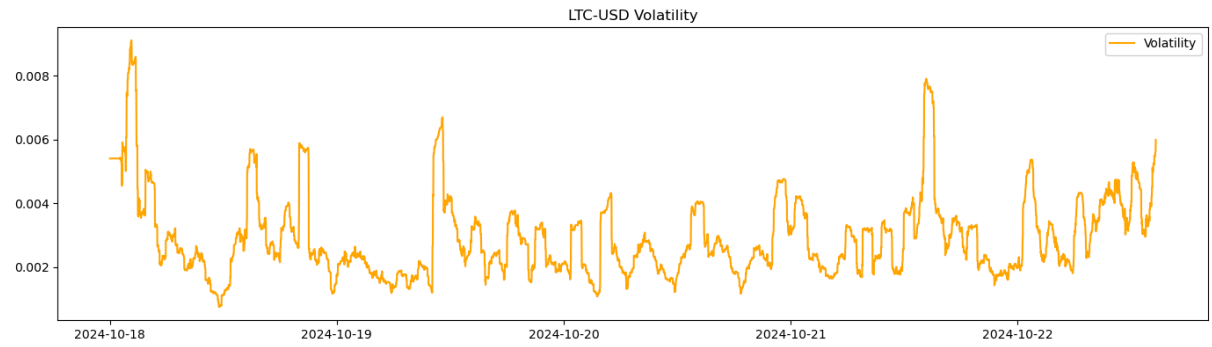
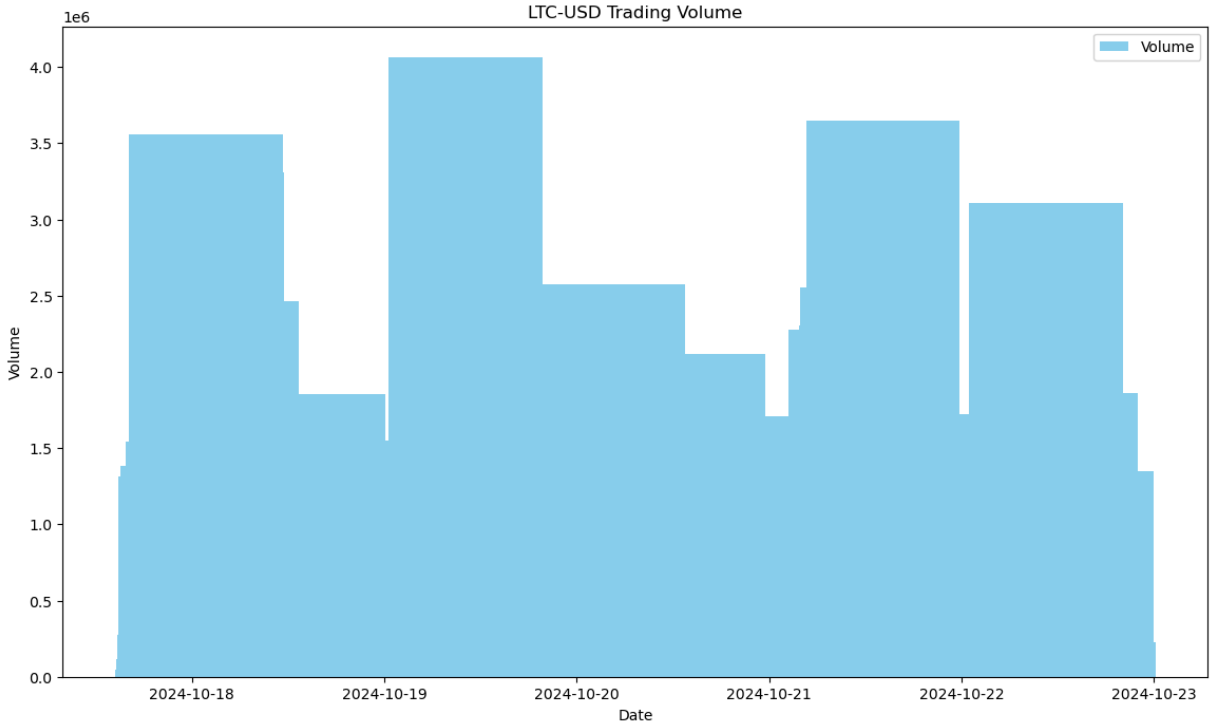
SQL connection closed.
Data saved to LTC-USD_technical_analysis_20241022_084127.csv

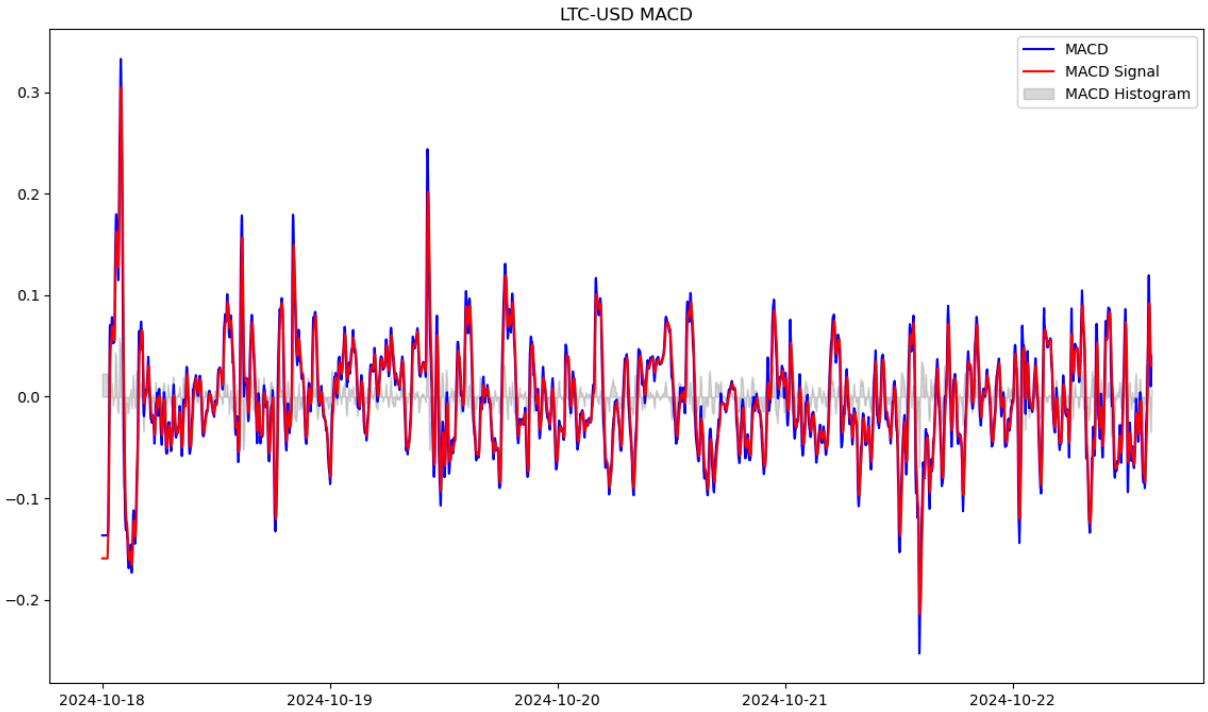

LTC-USD Close Price with Moving Averages and Bollinger Bands
Close Price
SMA 14
EMA 50
Upper BB
Lower BB
76
75
74
73
72
71
70
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22

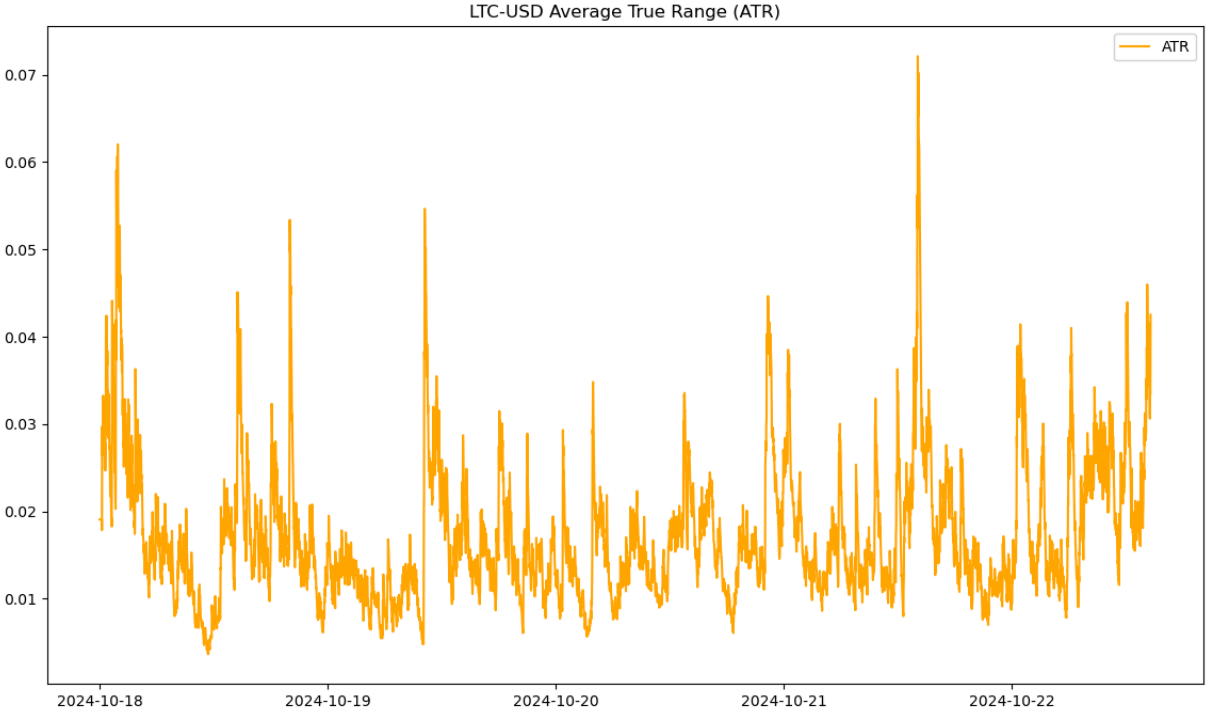

LTC-USD RSI
RSI
Overbought (70)
Oversold (30)
100
80
60
40
20
0
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22


LTC-USD Returns
Returns
0.004
0.002
0.000
−0.002
−0.004
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22


LTC-USD Volatility
Volatility
0.008
0.006
0.004
0.002
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22


LTC-USD Trading Volume
1e6
Volume
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Volume
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22
2024-10-23
Date



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Data successfully saved to LTC-USD_technical_analysis in SQL Server.
SQL connection closed.
Processing data for BNB-USD...
[**********************100%**********************]  1 of 1 completed
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Error saving to SQL Server: (pyodbc.IntegrityError) ('23000', '[23000] [Microsoft][ODBC Driver 17 for SQL Server][SQL Server]Cannot insert an explicit value into a timestamp column. Use INSERT with a column list to exclude the timestamp column, or insert a DEFAULT into the timestamp column. (273) (SQLExecDirectW); [23000] [Microsoft][ODBC Driver 17 for SQL Server][SQL Server]Statement(s) could not be prepared. (8180)')
[SQL: INSERT INTO [BNB-USD_technical_analysis] ([Date], [Open], [High], [Low], [Close], [Adj Close], [Volume], returns, volatility, support, resistance, [SMA_14], [EMA_50], [BB_upper], [BB_middle], [BB_lower], [RSI], vwap, [fib_0.236], [fib_0.382], [fib_0. ... 6355 characters truncated ... ?, ?, ?, ?, ?, ?), (?, ?)]
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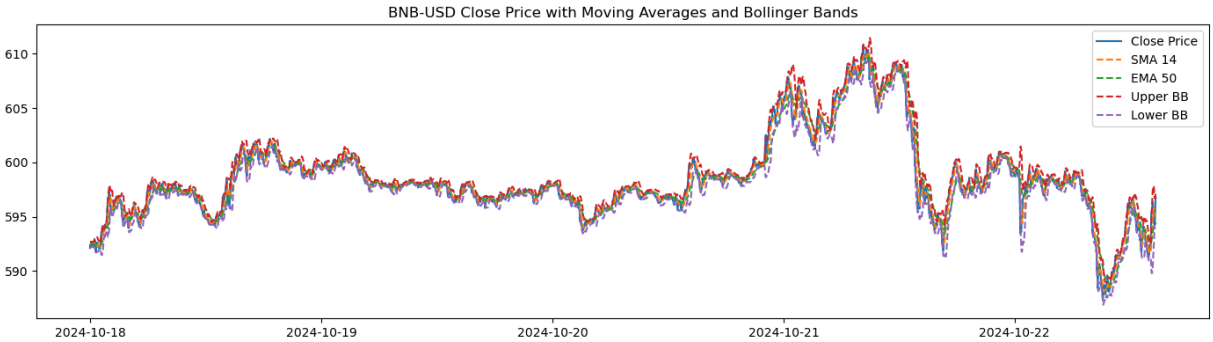
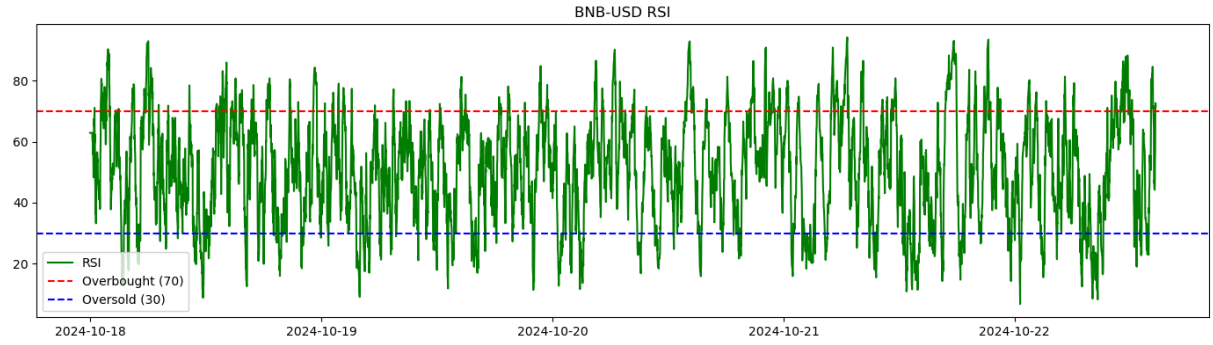
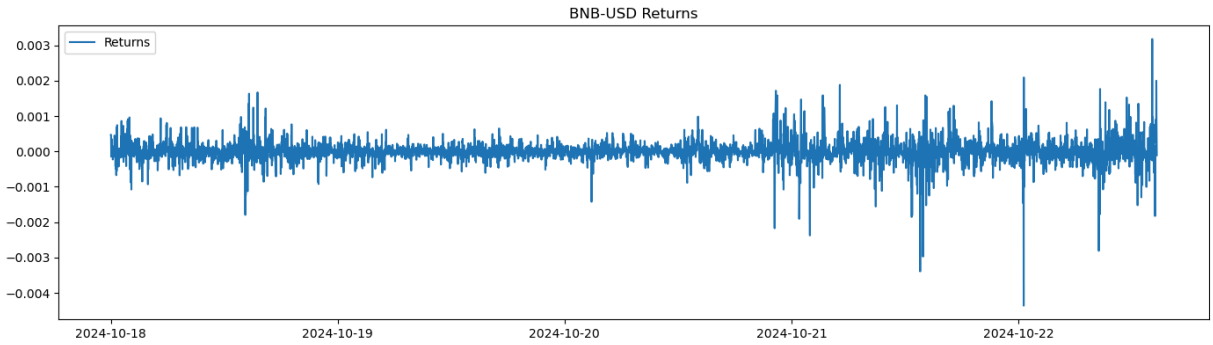
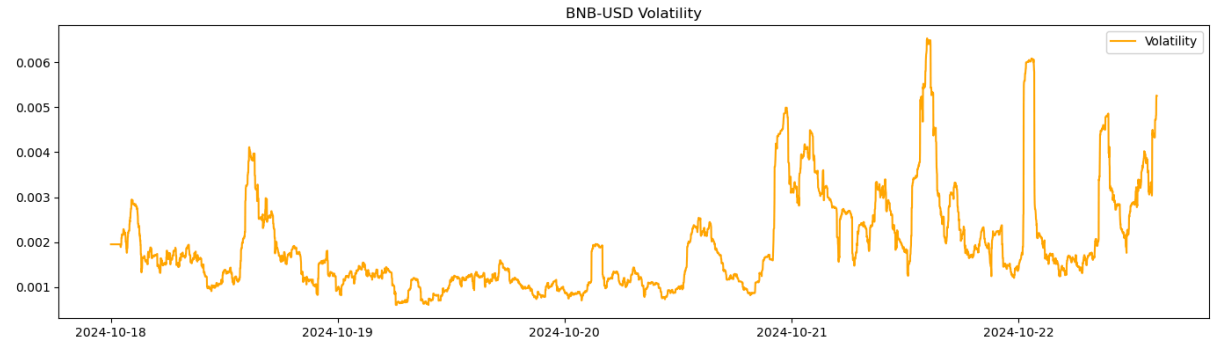
SQL connection closed.
Data saved to BNB-USD_technical_analysis_20241022_084206.csv


BNB-USD Close Price with Moving Averages and Bollinger Bands
Close Price
SMA 14
EMA 50
Upper BB
Lower BB
610
605
600
595
590
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22


BNB-USD RSI
RSI
Overbought (70)
Oversold (30)
80
60
40
20
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22


BNB-USD Returns
Returns
0.003
0.002
0.001
0.000
−0.001
−0.002
−0.003
−0.004
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22


BNB-USD Volatility
Volatility
0.006
0.005
0.004
0.003
0.002
0.001
2024-10-18
2024-10-19
2024-10-20
2024-10-21
2024-10-22