APPLIED DATA ANALYTICS IN BUISNESS (DA-720)

Capstone Project : Bitcoin Investment Firm

Done by : Dereddy Likhith Reddy

Under Guidance of : Gurpreet Singh

Table Of Context

1. Introduction

At Bitcoin Investment Company, we are dedicated to helping you confidently navigate the world of cryptocurrency. Our focus is on Bitcoin, the pioneering digital asset that has transformed the financial landscape. We equip our clients with the knowledge and tools they need to make informed investment decisions, ensuring the highest levels of security and transparency. Bitcoin Investment Company is committed to empowering investors by offering strategic insights into the ever-evolving world of Bitcoin investments.

This year, Bitcoin ETFs have been approved by the United States Securities and Exchange Commission (SEC), marking a significant milestone. This approval positions Bitcoin as a major investment asset, albeit with a higher risk profile. Bitcoin is poised to open up new opportunities in the financial space, and we are committed to guiding our investors toward embracing crypto adoption and the world of Web3.

An Exchange-Traded Fund (ETF) is an investment fund traded on stock exchanges, similar to individual stocks. ETFs hold assets such as stocks, commodities, or bonds and typically track an underlying index, such as the S&P 500. By investing in an ETF, investors can diversify their portfolios by purchasing a single fund that represents a basket of different assets.

A Bitcoin ETF, specifically, is a type of ETF that aims to track the price of Bitcoin. Instead of buying and holding Bitcoin directly, investors can purchase shares in a Bitcoin ETF. This provides exposure to the cryptocurrency without the need to deal with the complexities of buying, storing, and securing Bitcoin themselves.
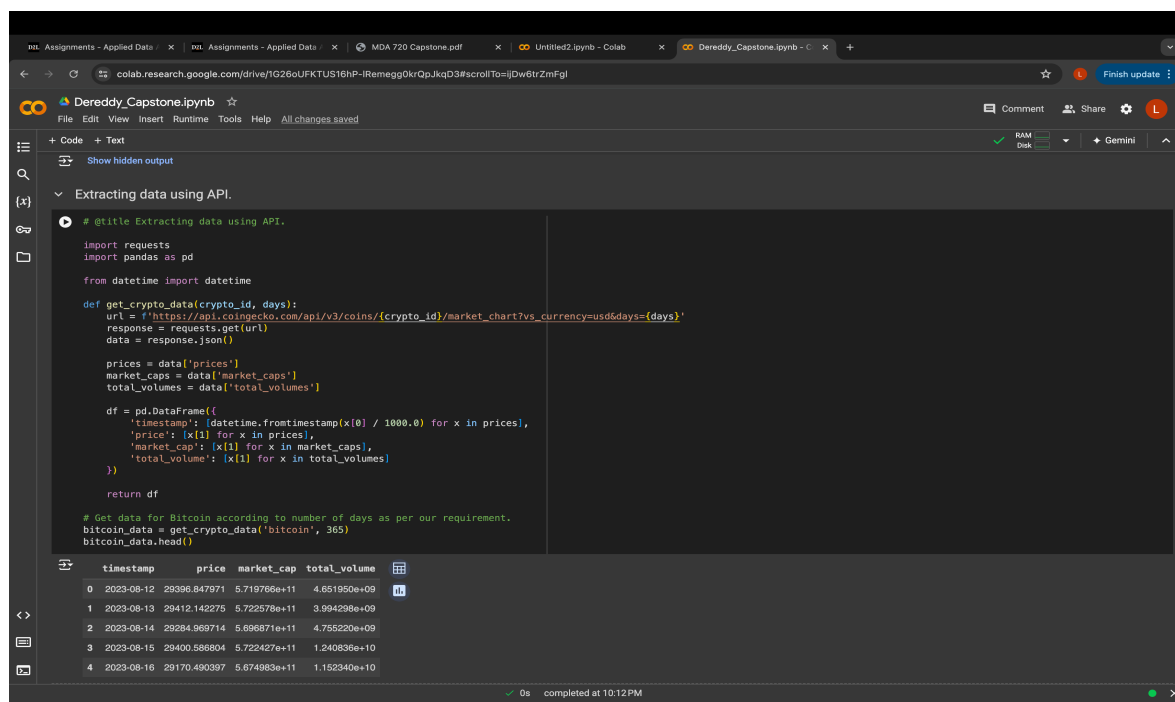
2. Objective of the Project

- **Objective**: We at Bitcoin Investment Company are dedicated to helping clients navigate Bitcoin investments with confidence, offering valuable knowledge, tools, and ensuring security and transparency.

- The recent approval of Bitcoin ETFs by the SEC, marking a key milestone for Bitcoin as a significant investment asset.

- Overview of Exchange-Traded Funds (ETFs), and the concept of Bitcoin ETFs and how they allow investors to gain Bitcoin exposure without the complexities of handling the cryptocurrency directly.

- Emphasizing that Bitcoin has one the highest potential to open new financial opportunities and the company's role in guiding investors towards embracing Bitcoin and Web3 technologies.

3. Data Extraction

The project commenced with the essential task of collecting historical Bitcoin price data from reliable sources. This initial step is crucial as it forms the bedrock for all subsequent analysis. The process involved several key activities:

Data Collection: Historical Bitcoin price data was sourced from reputable and trusted platforms, ensuring that the information was accurate and relevant and APIs to gather data from online sources efficiently.

Code Used:

In the above figure we extract required data using created function called get_crypto_data(crypto_id, days). Here crypto_id is bitcoin and days is 365 and this is stored in our data frame.

Result:

	timestamp	price	market_cap	total_volume
0	2023-08-12	29396.847971	5.719766e+11	4.651950e+09
1	2023-08-13	29412.142275	5.722578e+11	3.994298e+09
2	2023-08-14	29284.969714	5.696871e+11	4.755220e+09
3	2023-08-15	29400.586804	5.722427e+11	1.240836e+10
4	2023-08-16	29170.490397	5.674983e+11	1.152340e+10

Data Preprocessing: After collecting the raw data, it was necessary to preprocess it to ensure its quality. This stage involved cleaning the data to remove any inaccuracies or inconsistencies, formatting it into a structured format, and handling missing values.

Code used:

```python
# Handle missing values
prices.dropna(inplace=True)

# Convert data types directly from Series to float
prices = prices.astype(float)
```

Tools and Technologies: Python and other data processing tools were utilized during this phase. Python, with its extensive libraries for data manipulation and analysis, played a significant role in managing and preparing the data for further analysis.

4. Data Exploration and Visualization

Data exploration is an essential part of any data analysis project, and the document likely provides a thorough exploration of the Bitcoin price data. This involves statistical summaries and visual representations. The visualizations help to make the data more understandable and provide insights that guide the subsequent analysis. The document likely discusses the insights gained from this exploration and how they informed the modeling process.

Price summary Code used:

```python
import matplotlib.pyplot as plt
import seaborn as sns

# Get data for Bitcoin
bitcoin_data = get_crypto_data('bitcoin', 365)

# Extract prices from the DataFrame
prices = bitcoin_data['price']

# Basic statistics
print(prices.describe())
```
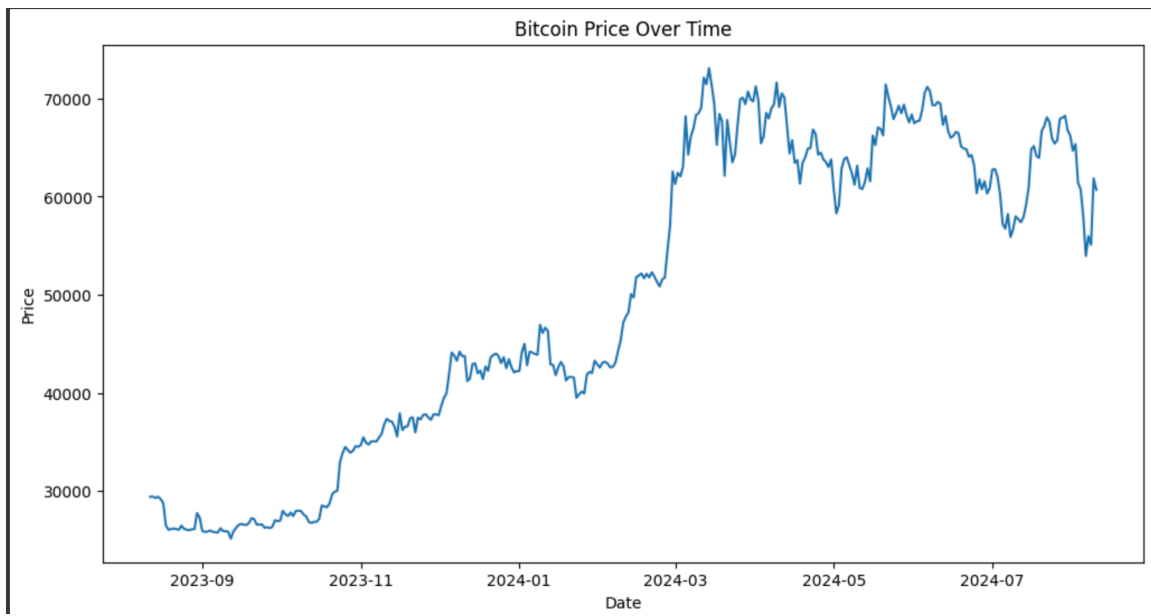
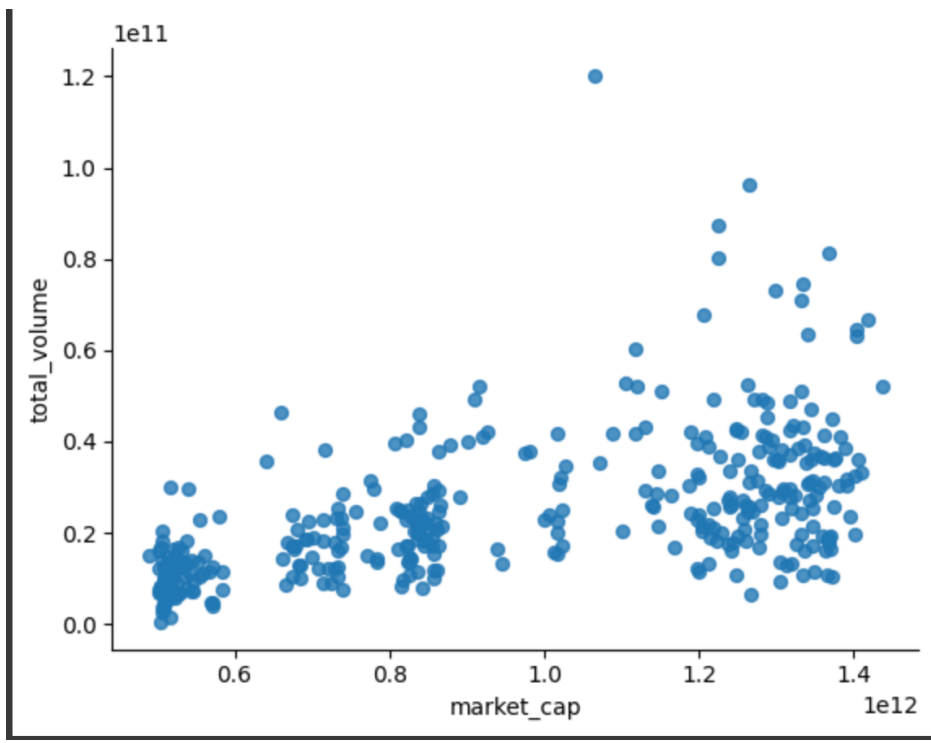## Result:

```
count        365.000000
mean       49408.648482
std        15745.045826
min        25133.303107
25%        35965.360361
50%        47143.242991
75%        64844.674418
max        73097.767027
Name: price, dtype: float64
```
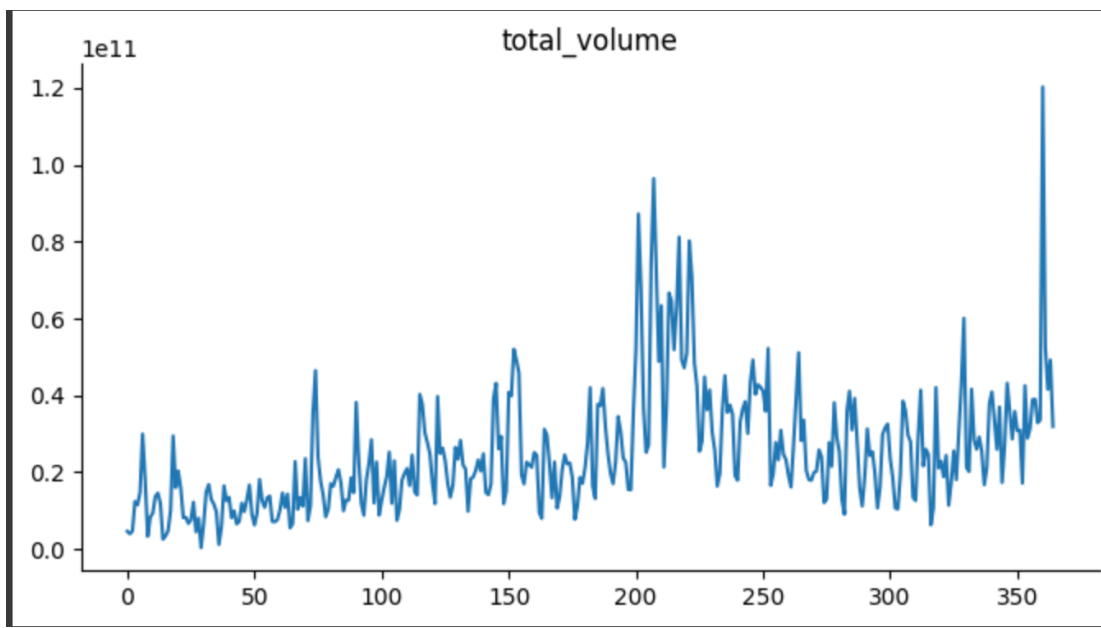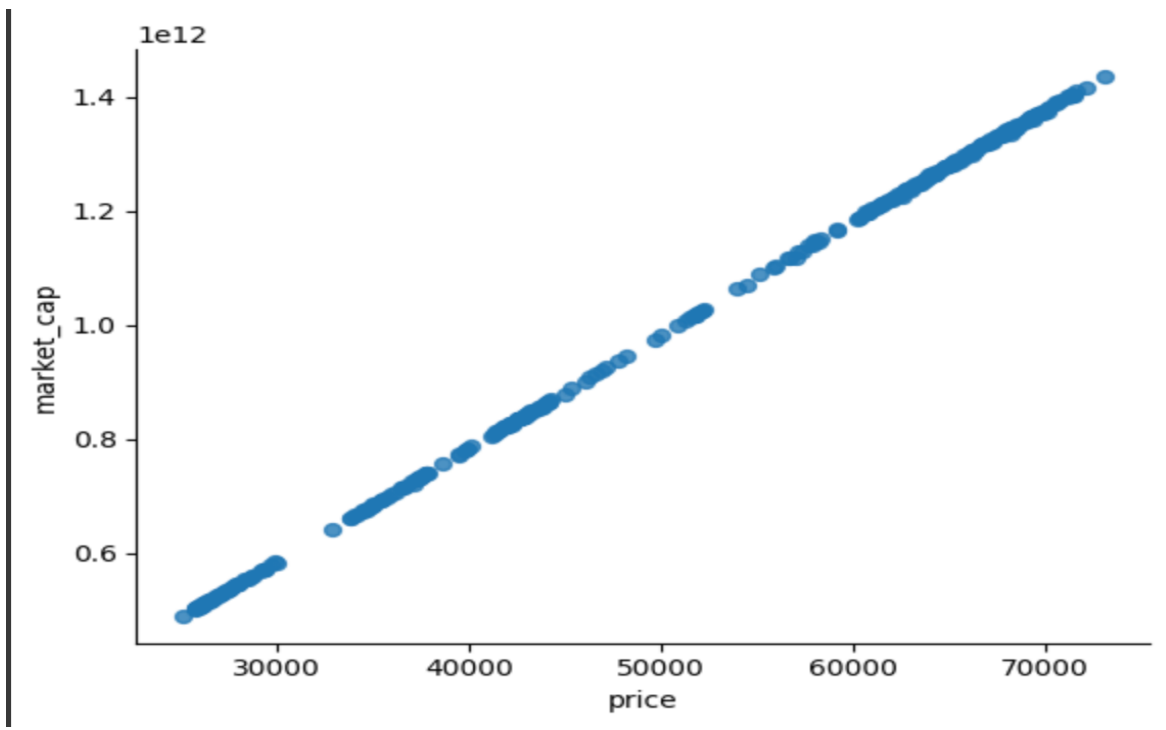
BTC Price vs Time

Scatter Plot of Market Capital vs Total Volume

Total Volume traded

Price vs Market capital

Correlation Matrix
Code:

```python
import matplotlib.pyplot as plt
import seaborn as sns
import pandas as pd

# Get data for Bitcoin
bitcoin_data = get_crypto_data('bitcoin', 365)

correlation_matrix = bitcoin_data.corr()
sns.heatmap(correlation_matrix, annot=True)
plt.title('Correlation Matrix')
plt.show()
```
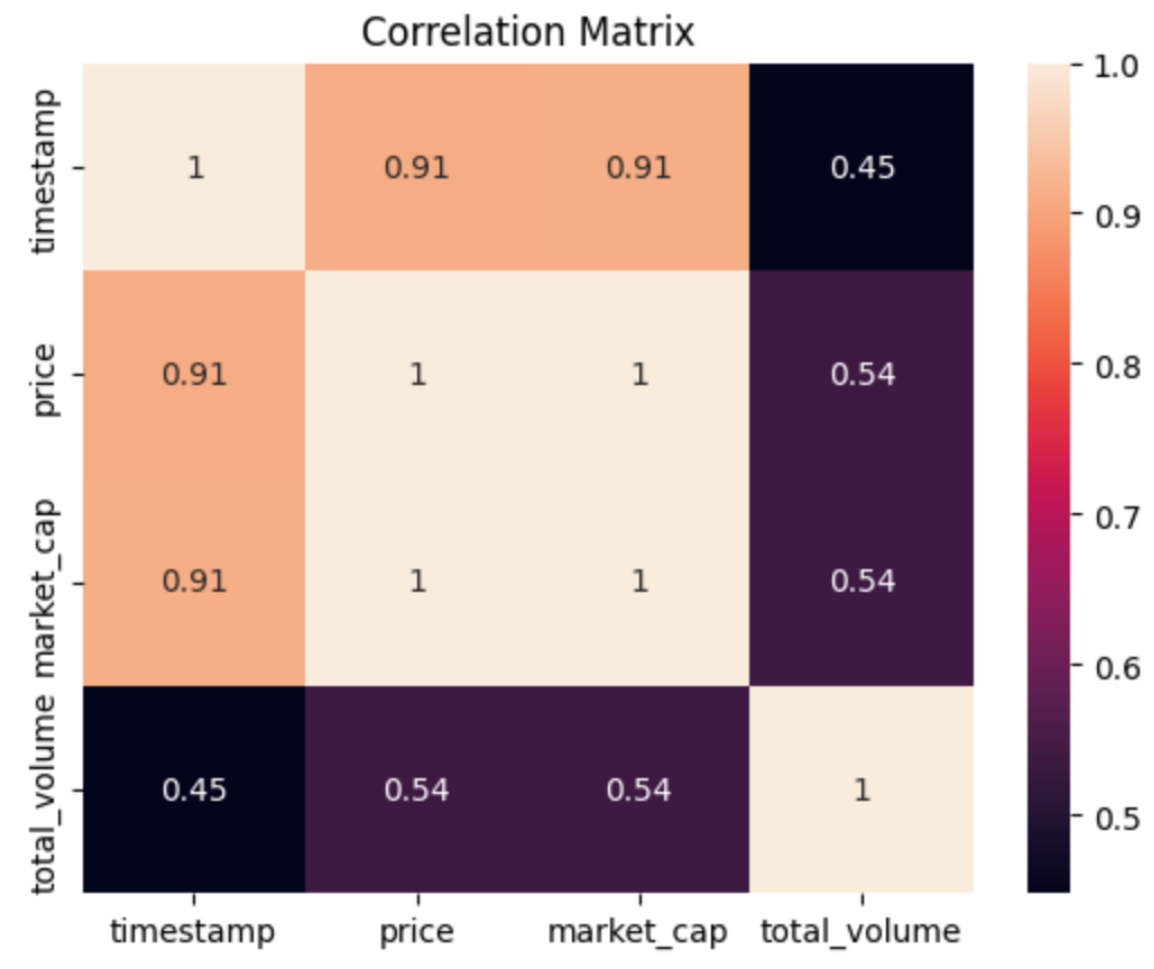
Result:

Correlation Matrix

Finally, I have created a complied version of different data visualization as follows :
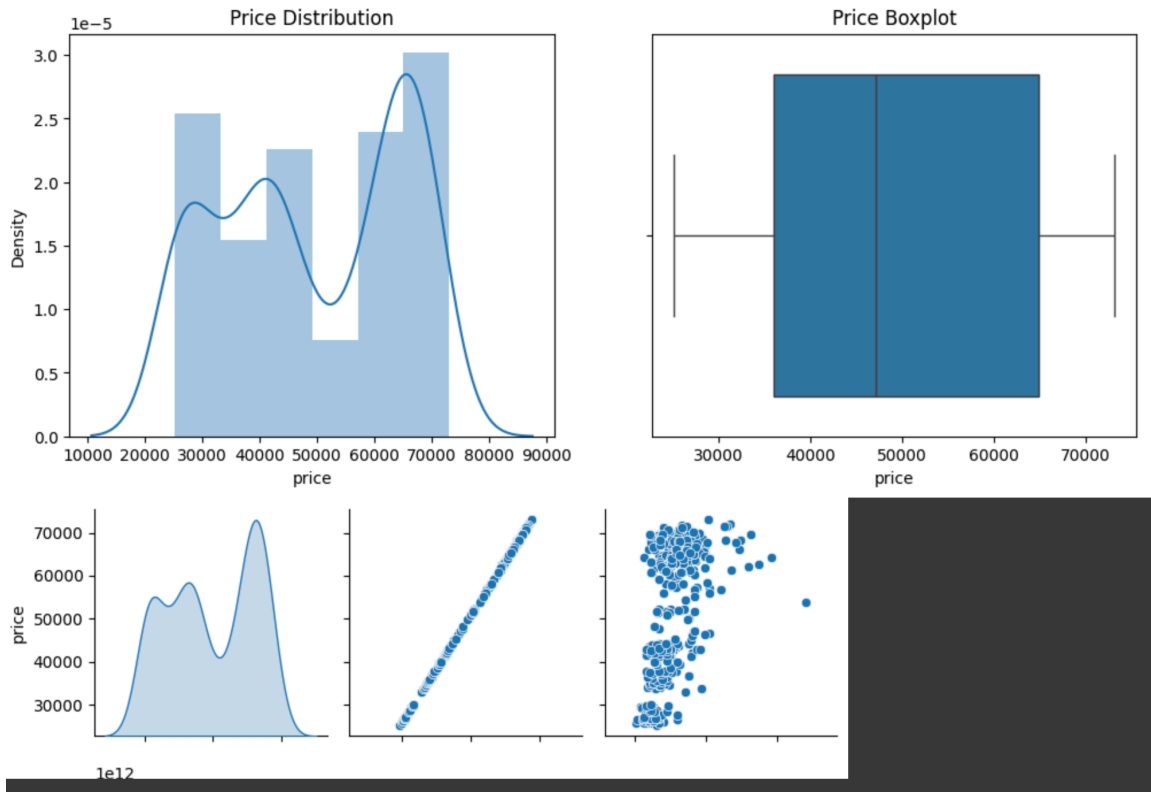
From the above we can observe that price and market cap are highly correlated and other different parameters which will help in future analysis.

We can conclude to use Time series based forecasting for better results.

5. Data Mining and Analysis (Google Trends)
Code used:

```python
# @title Extracting and Plotting GOOGLE TRENDS data for Bitcoin.
!pip install pytrends
from pytrends.request import TrendReq
pytrends = TrendReq(hl='en-US', tz=360)  # Initialize pytrends object

# Building payload with keywords and timeframe
kw_list = ["Bitcoin"]
pytrends.build_payload(kw_list, cat=0, timeframe='today 5-y', geo='', gprop='')

# Getting interest over time
trend_data = pytrends.interest_over_time()
print(trend_data.head())

# Plotting the trend data
plt.figure(figsize=(12,6))
plt.plot(trend_data.index, trend_data['Bitcoin'])
plt.xlabel('Date')
plt.ylabel('Interest Over Time')
plt.title('Google Search Trends for "Bitcoin" (Last 5 Years)')
plt.grid(True)
plt.show()
```
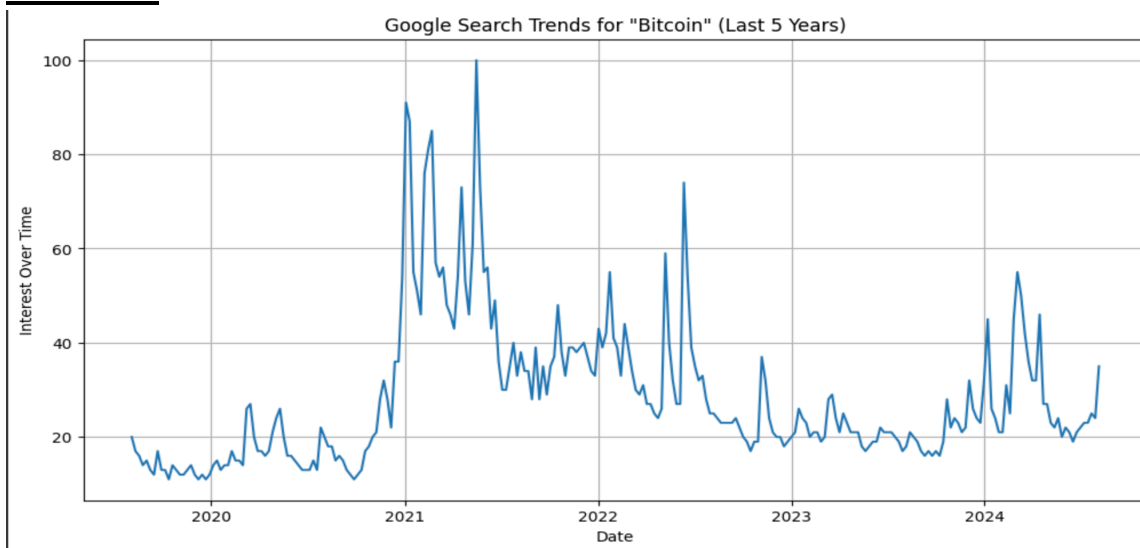
Result:

The above shows the result of Bitcoin Search over past 5 years and which is every much moves close to price action of bitcoin.

Sentiment Analysis using Vader.

Code used:

```python
# @title Sentiment Analysis using VADER.

import nltk
from nltk.sentiment.vader import SentimentIntensityAnalyzer

nltk.download('vader_lexicon')
sia = SentimentIntensityAnalyzer()

# Define or retrieve the headlines data here.
headlines = ["Positive headline about Bitcoin.", "Negative news about cryptocurrency regulations."]

# Analyzing sentiment for headlines
headlines_sentiment = [sia.polarity_scores(headline)['compound'] for headline in headlines]
sentiment_df = pd.DataFrame({'Headline': headlines, 'Sentiment': headlines_sentiment})

sentiment_df.head()
```

Result:

	Headline	Sentiment
0	Positive headline about Bitcoin.	0.5574
1	Negative news about cryptocurrency regulations.	-0.5719

Using ARIMA model for forecasting
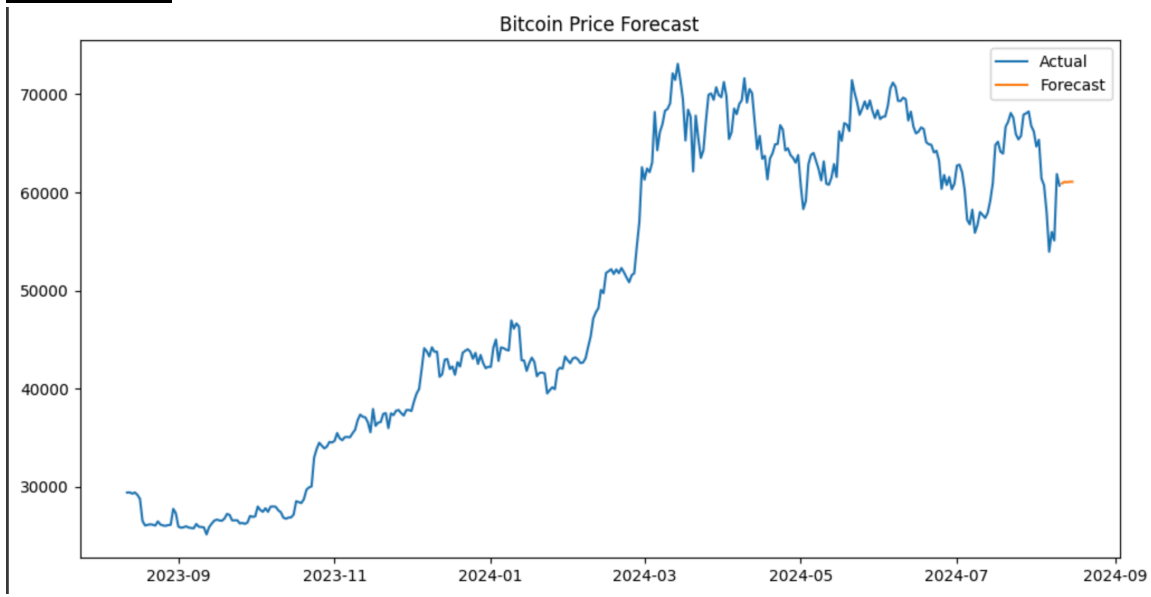# Code used:

```python
# @title ARIMA model

from statsmodels.tsa.arima.model import ARIMA

# Fit ARIMA model
model = ARIMA(bitcoin_data['price'], order=(5, 1, 0))
model_fit = model.fit()

# Forecast the next 5 days
forecast = model_fit.forecast(steps=5)

# Plot the forecast
plt.figure(figsize=(12, 6))
plt.plot(bitcoin_data['timestamp'], bitcoin_data['price'], label='Actual')
plt.plot([bitcoin_data['timestamp'].iloc[-1] + pd.Timedelta(days=i) for i in range(1, 6)], forecast, label='Forecast')
plt.legend()
plt.title('Bitcoin Price Forecast')
plt.show()
```

Result:

Bitcoin Price Forecast

We create a Investment Strategy Based on this
Code used:

```python
# @title Investment Strategy Based on Forecast
if forecast.iloc[-1] > bitcoin_data['price'].iloc[-1]:
    recommendation = "Recommended: Buy Bitcoin"
else:
    recommendation = "Recommended: Sell Bitcoin"

print(recommendation)
```

Result:

```
Recommended: Buy Bitcoin
```

The provided code snippet is a basic investment strategy based on a comparison between a forecasted Bitcoin price and the current Bitcoin price.

6. Conclusions

The document likely provides specific recommendations based on the model's predictions, such as when to buy or sell Bitcoin. These recommendations are probably grounded in the data and analysis, offering practical advice for investors. The document may also suggest areas for future research or improvements to the model, acknowledging any limitations encountered during the project.

The Investment strategy offers a straightforward approach to making investment decisions based on Bitcoin price forecasts. By comparing the forecasted price with the current price, it generates a recommendation to buy or sell Bitcoin. This method can help investors make informed decisions, but it is essential to consider additional factors and perform further analysis to enhance investment strategies.

The document is structured to provide a clear and logical flow from data collection to analysis and conclusions. Each section builds upon the previous one, guiding the reader through the process of developing a predictive model for Bitcoin prices. The use of data visualization and detailed analysis helps to make the findings accessible and actionable.

7. Bibliography

Sources:
1. https://www.coingecko.com/en/api
2. Google trends