

SOCIAL AND TECHNICAL ANALYSIS

# CRYPTOCURRENCY INVESTMENTS

D. Chris Young

# Cryptocurrency Investments

## TOPIC OUTLINE

- Problem Identification
- Data Source
- Data Cleaning
- Exploratory Data Analysis
- Preprocessing
- Modeling





# Problem Identification

## CRYPTOCURRENCY COINS

Cryptocurrency coins are digital assets designed to work as a medium of exchange where ownership records are transactions stored in a blockchain ledger.

## SHORT-TERM INVESTMENTS

Identify buy, hold and sell opportunities for short-term holding periods by leveraging technical analysis and social media metrics to predict the price trend for the next 7 days.

# Data Source

## LunarCRUSH

Cryptocurrency focused platform that delivers community insights to investors, funds, and exchanges.

Assets API provides overall metrics and time series metrics for multiple cryptocurrency coins.

## Technical Analysis Metrics/Indicators

TA-Lib is a widely used Python library used by trading software developers to perform technical analysis of financial market data.



# Data Cleaning

## HIGHLIGHTS



### MISSING VALUES

Most metrics were missing values at the beginning of the time series between 27-41 days between Aug - Oct 2019.

### NEW METRICS

Social media sources such as Medium and YouTube were only populated from Feb 2020 forward.

### DISCONTINUED METRICS

Several metrics were no longer populated or populated with a static value so these were removed. Reddit metrics were removed in July 2021.

### REPLACE MISSING VALUES

Only 1 metric had missing values so these were interpolated based on the values before and after.

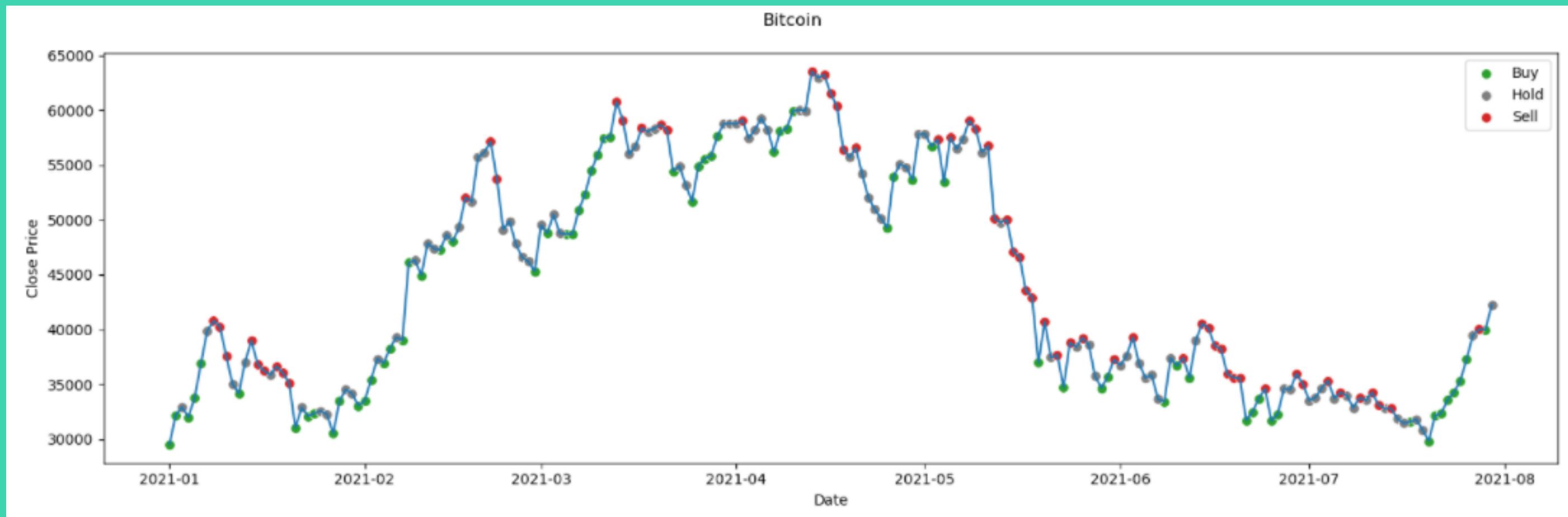
# **Exploratory Data Analysis**

TECHNICAL AND SOCIAL ANALYSIS

# Trend Detection

## BUY/HOLD/SELL INVESTMENT DECISION

- Buy at the bottom and as the price is on an upward trend
- Sell at the top and as the price is on a downward trend
- Hold when there is trend direction uncertainty



# TECHNICAL ANALYSIS

---

***Term used to evaluate investments and identify trading opportunities based on trends and patterns.***

# Technical Analysis Categories

## OVERLAP STUDIES

Moving Averages:  
Simple  
Exponential  
Weighted  
  
Bollinger Bands

## MOMENTUM INDICATORS

Relative Strength Index  
  
Moving Average Convergence Divergence (MACD)  
  
Directional Movement Price Oscillators

## STATISTICS

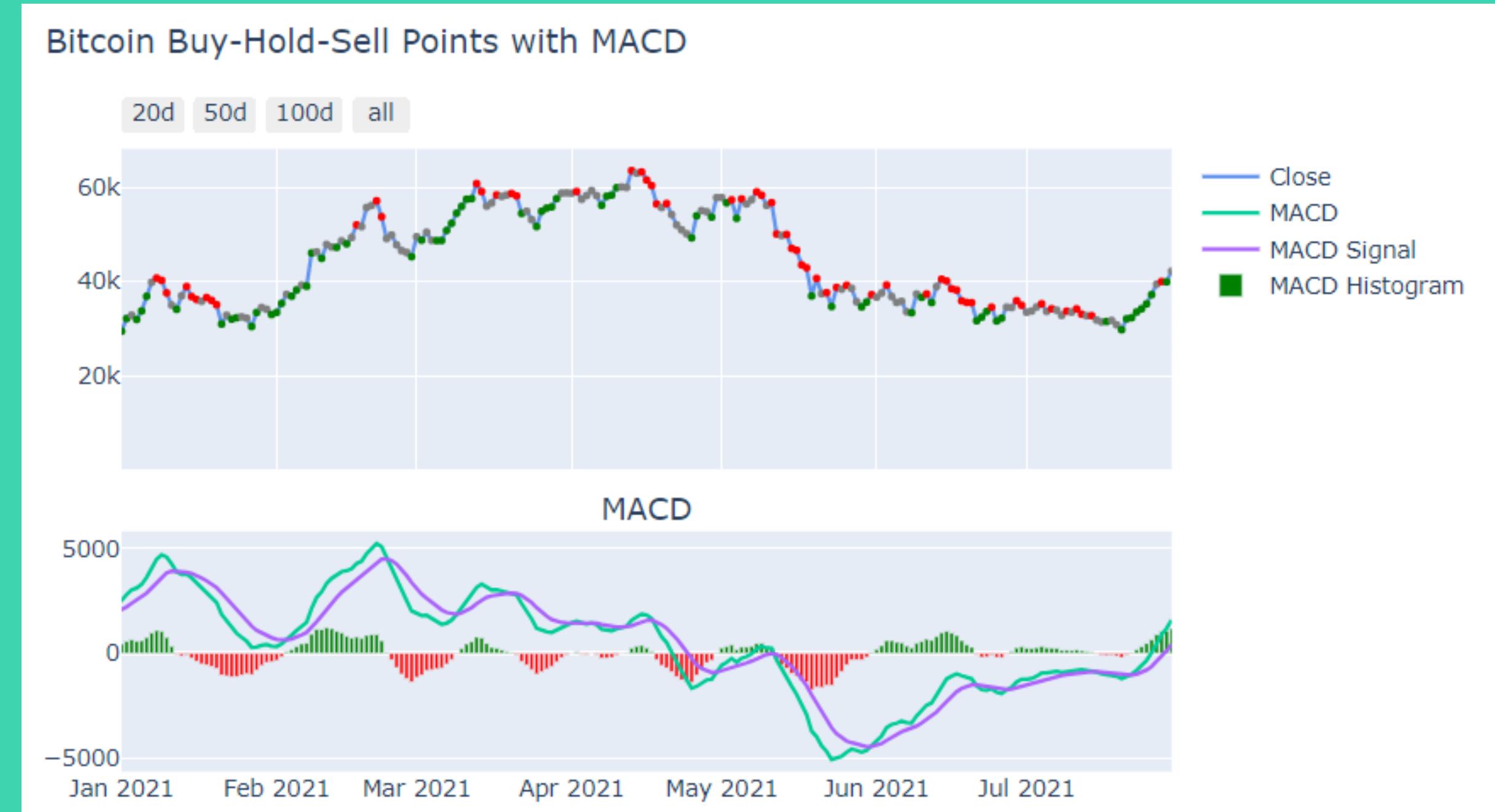
Correlation  
  
Linear Regression  
  
Standard Deviation

# MACD

**Moving average convergence divergence is a trend following momentum indicator based on moving averages.**

**The MACD line crosses above the MACD Signal is a bullish sign with potential buy opportunities.**

**The market will eventually go bearish and drive the MACD back below the signal from a selloff.**

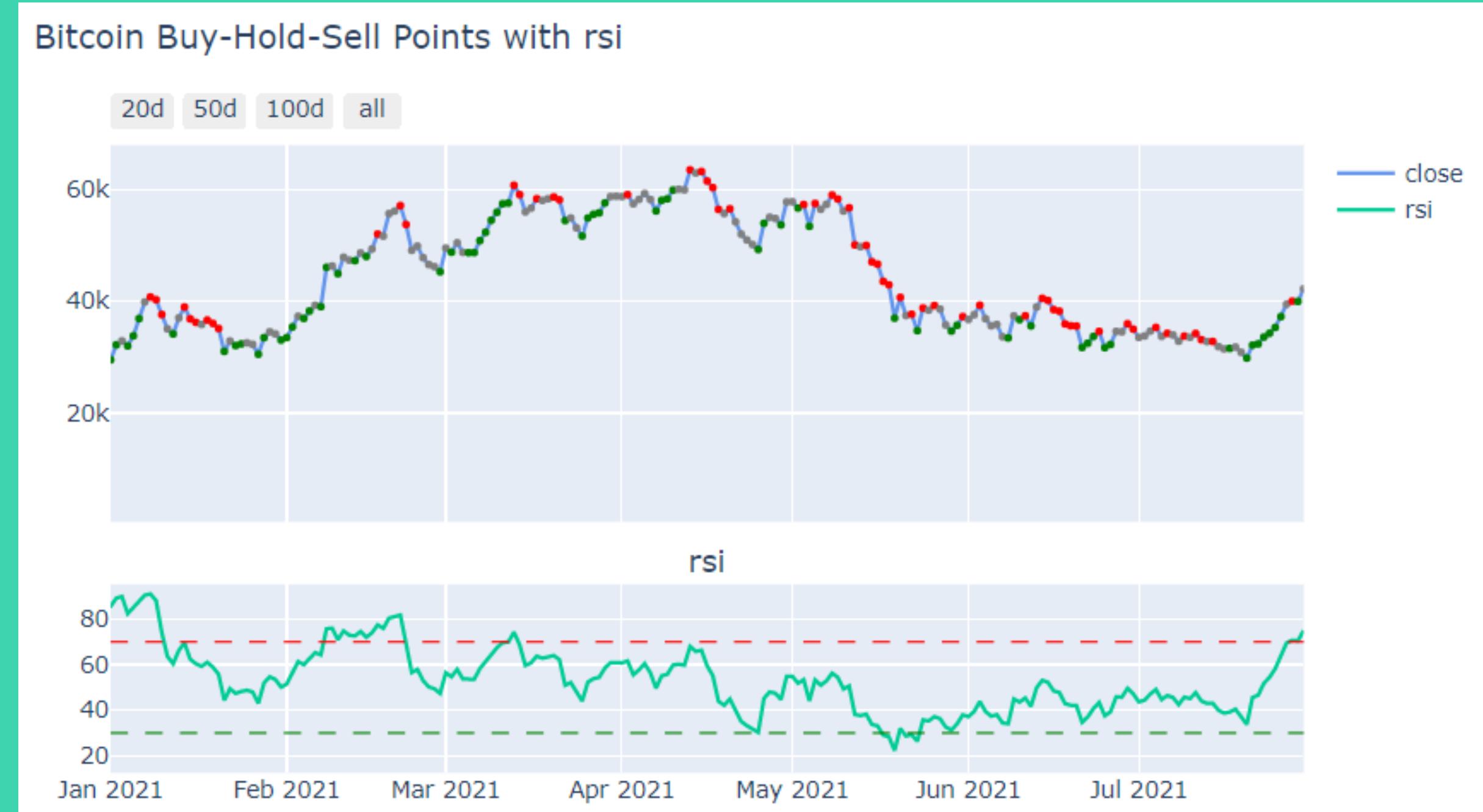


# RSI

**The Relative Strength Index is another momentum indicator that measures the magnitude of recent price changes.**

**RSI values range between 0 and 100.**

**Above 70 is a sign the coin is overbought and below 30 is a sign of oversold.**



# SOCIAL ANALYSIS

---

***Term used to evaluate investments and identify trading opportunities based market sentiment and activity on social media platforms.***

# Social Analysis Categories

## SOCIAL MEDIA

Tweet Volume  
Twitter Sentiment  
Global Social Volume  
YouTube  
Medium  
News Outlets

## MARKET METRICS

Market Capitalization  
Market Coin Dominance  
Volatility

## SOCIAL METRICS

Proprietary scores:  
Social Score  
Price Score  
Social Impact Score  
Galaxy Score

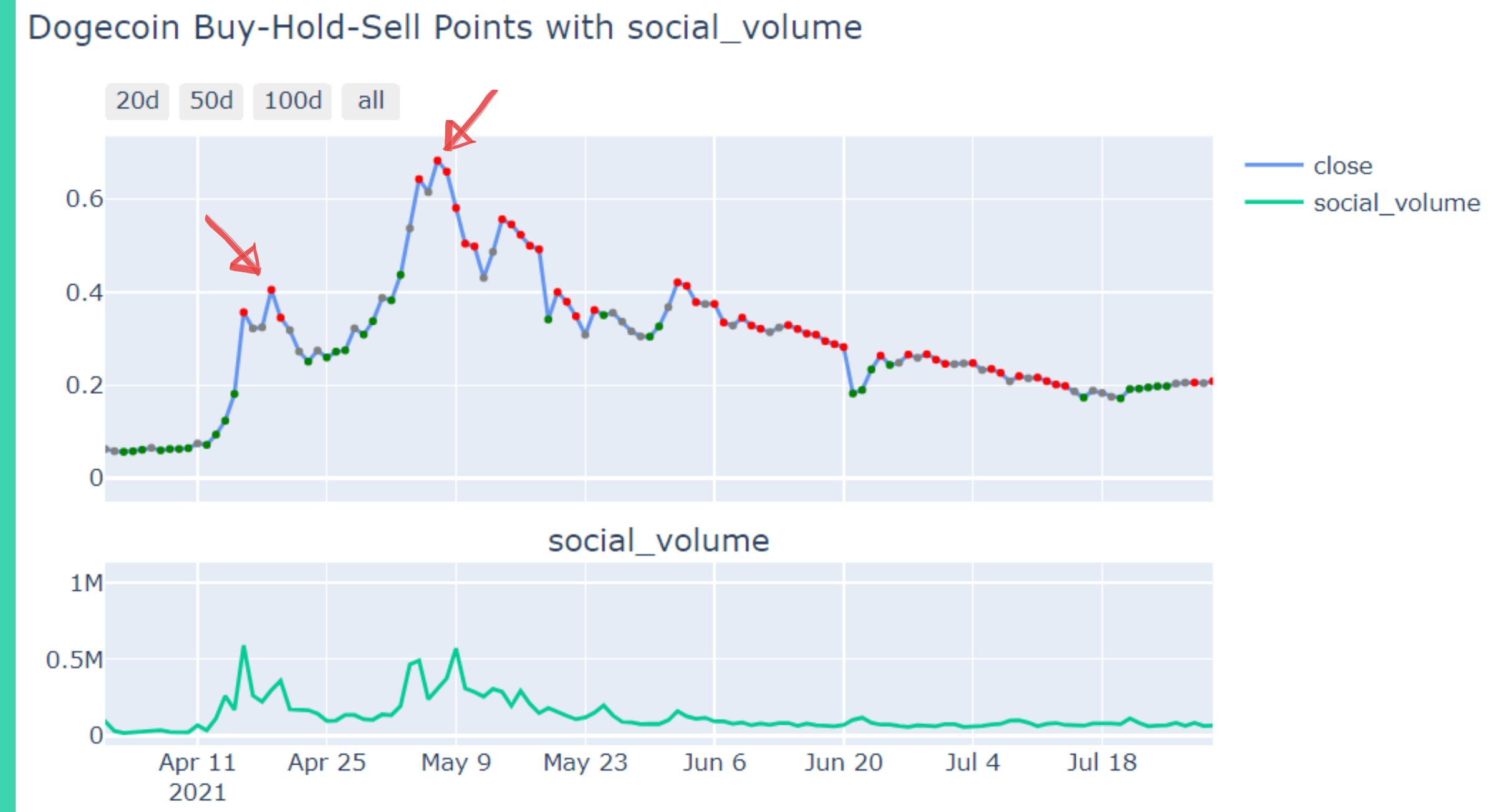
# Correlation Analysis

Dogecoin price movement is heavily influenced by social media activity as well as when the coin dominants market capitalization.

	close -	0.9	0.27	0.31	0.51	0.23	0.039	-0.034	0.077	0.049	0.47	0.61	0.83	0.017	0.29	0.79	1	0.055	0.032
close_percent_change_1d -	0.059	0.0016	0.008	0.065	0.019	-0.028	-0.017	-0.024	-0.03	0.045	0.013	0.068	-0.0093	-0.07	0.05	0.055	1	0.36	
close_percent_change_7d -	0.035	-0.0037	-0.0028	0.012	0.04	-0.013	-0.0048	-0.018	-0.0046	0.038	0.019	0.024	-0.0041	0.0092	0.018	0.032	0.36	1	
volume -																			
url_shares -																			
unique_url_shares -																			
social_score -																			
news -																			
price_score -																			
social_impact_score -																			
correlation_rank -																			
galaxy_score -																			
volatility -																			
social_contributors -																			
social_volume -																			
social_volume_global -																			
market_cap_global -																			
market_dominance -																			
close -																			
close_percent_change_1d -																			
close_percent_change_7d -																			

# Social Volume

**Global social media activity increased in line with the exponential Dogecoin price increases in April and May 2021.**



# Preprocessing Normalization Methods

## MIN-MAX NORMALIZATION

Scale each value between 0 and 1 based on the minimum and maximum values.

Global across the entire time series only.

## STANDARDIZATION

Standardize features by removing the mean and scaling to unit variance.

Window and global time series.

## % CHANGE NORMALIZATION

Normalize features by the % change in value from a starting value.

Window and global time series.

# LONG SHORT-TERM MEMORY (LSTM) MODELING

LSTM is a recurrent neural network (RNN) architecture that are well suited for time series predictions.

# Evaluation Metrics

## MEAN DIRECTIONAL ACCURACY

MDA utilizes the change in value (positive or negative) and averages if the predictions had the same directional change. Higher is better.

## MEAN ABSOLUTE SCALED ERROR

MASE uses MAE but scales the result by dividing by the MAE of actual data and a shifted forward naive forecast. This metric is scale invariant. Lower is better.

## TREND ACCURACY

Custom evaluation metric based on directional trend analysis. Predict the correct directional change while also being able to identify large % increase or decreases.

# ONE-DIMENSIONAL BASELINE MODEL TREND ACCURACY

48%

BITCOIN

62%

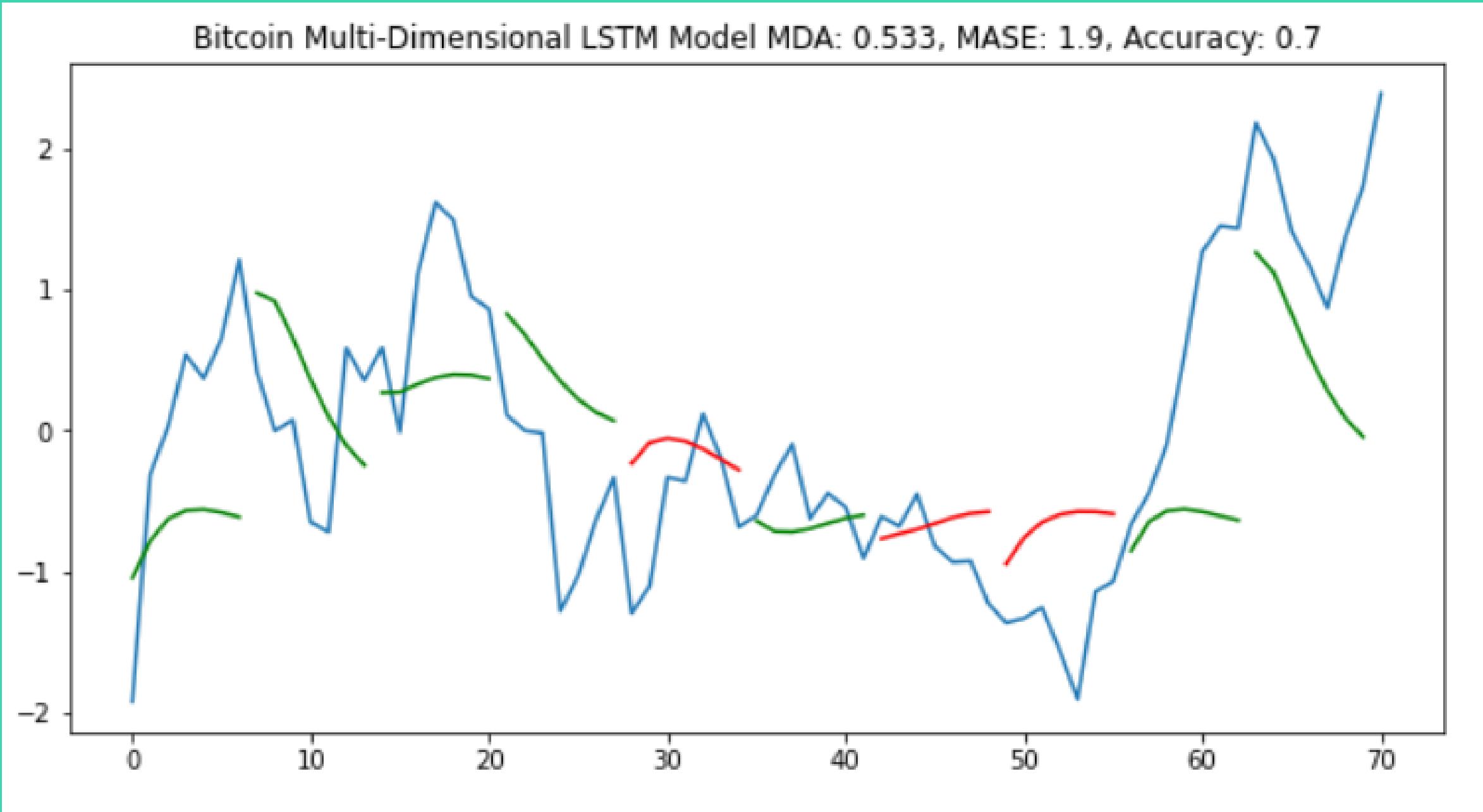
DOGECOIN

70%

# Bitcoin

FINAL  
MULTIVARIATE  
MODEL

CLOSE  
LINREG  
PERCENT CHANGE 24H RANK  
SOCIAL VOLUME 24H RANK  
TWEET SENTIMENT BULLISH

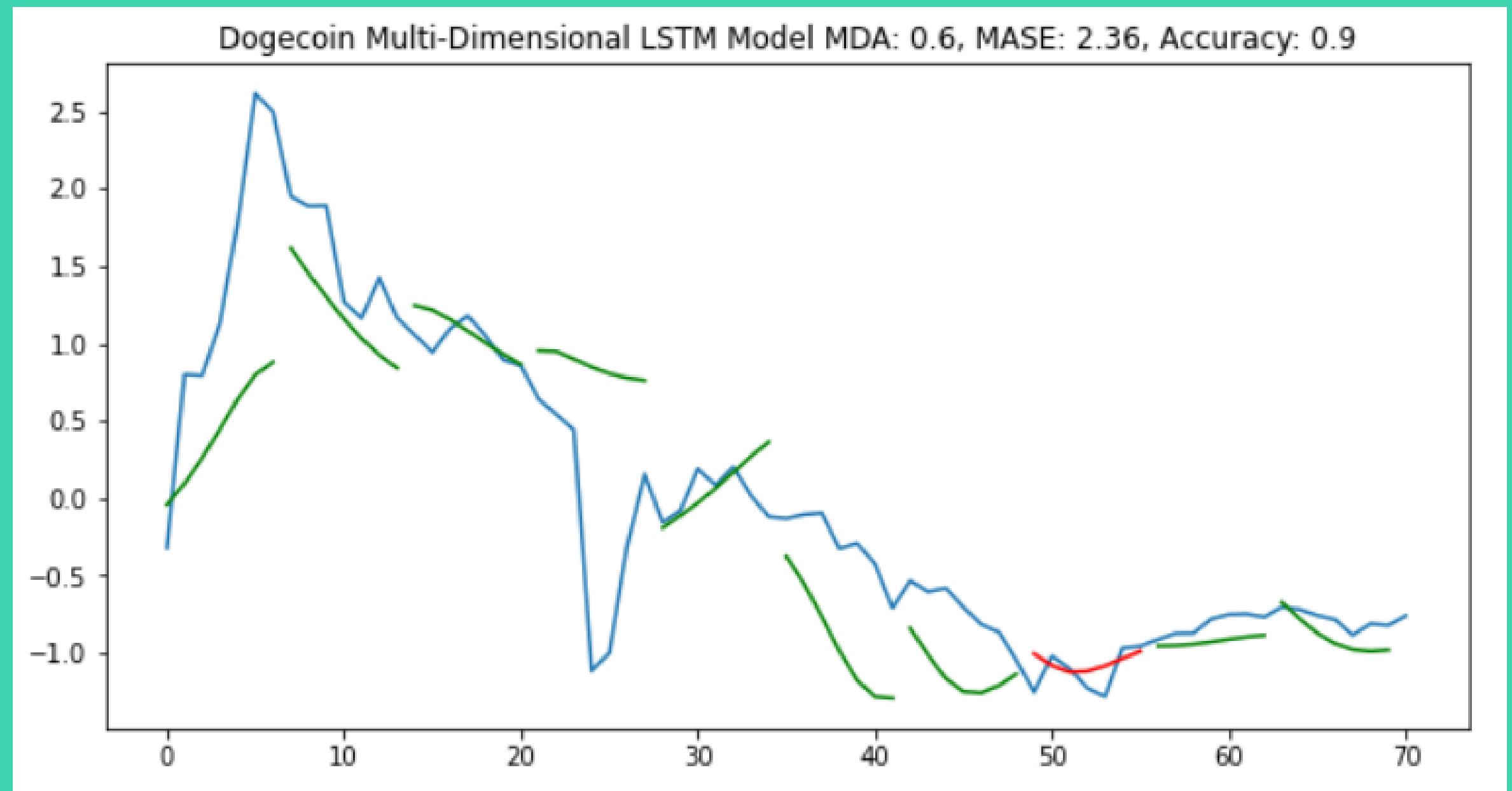


90%

# Dogecoin

FINAL  
MULTIVARIATE  
MODEL

CLOSE  
LINREG  
MARKET CAP GLOBAL PCT CHANGE  
SOCIAL VOLUME GLOBAL MEAN  
TWEET SENTIMENT IMPACT NET MEAN



# Thank you

EMAIL

me@dchrisyoung.com

