

Crypto Investment Analysis

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Crypto market becomes prosperous in recent years, not only the price but also their application.

Elon musk recommended dogecoin to be a currency in circulation



Most people still see crypto as an investment way to storage their asserts.

Introduction

- This project provides an overview of crypto market and illustrates some insights by data analysis
- Analyze data from crypto market, find some basic rules to help investment decision-making
- Validate some quantitative investment methods and technique indicators in crypto market

Dataset Overview

- We utilized a dataset containing updated data of 14 different kinds crypto

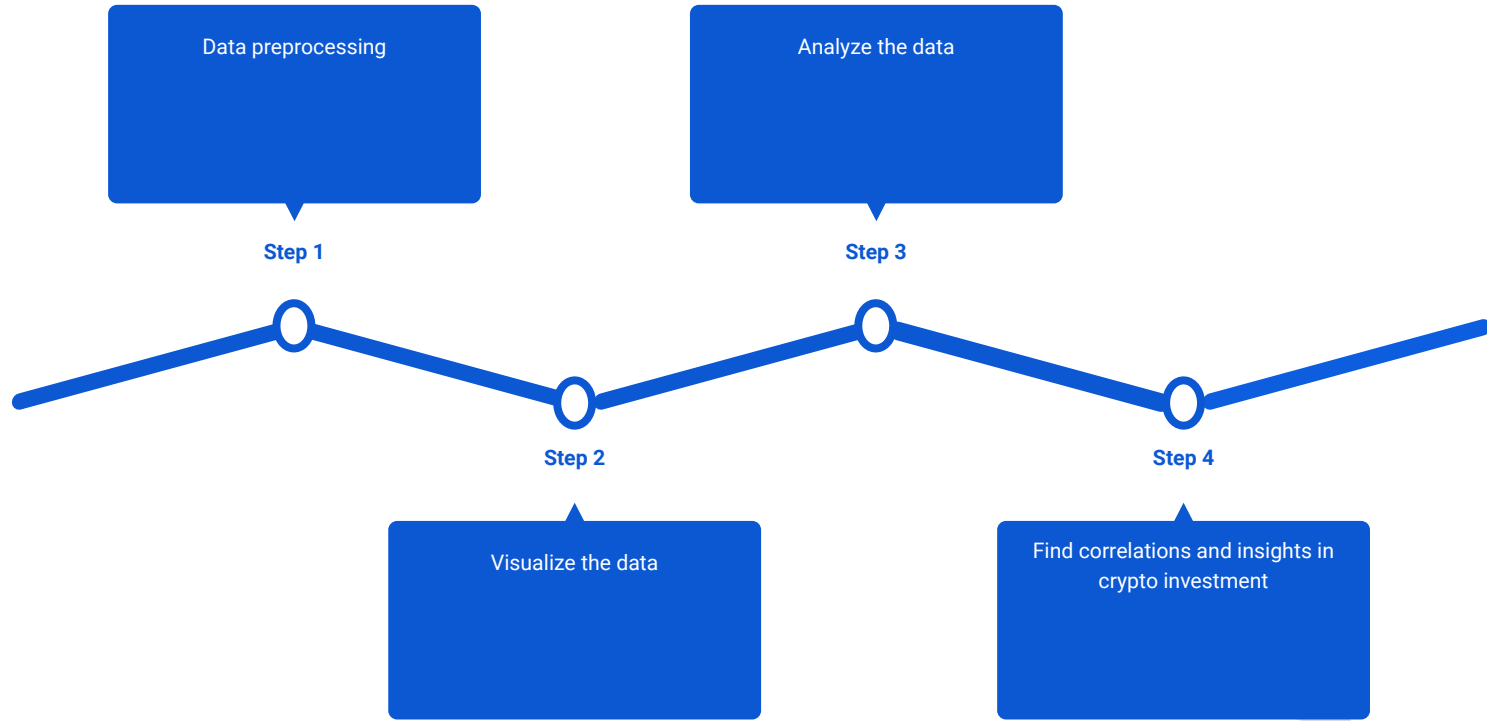
	Asset_ID	Weight	Asset_Name
0	2	2.397895	Bitcoin Cash
1	0	4.304065	Binance Coin
2	1	6.779922	Bitcoin
3	5	1.386294	EOS.IO
4	7	2.079442	Ethereum Classic
5	6	5.894403	Ethereum
6	9	2.397895	Litecoin
7	11	1.609438	Monero
8	13	1.791759	TRON
9	12	2.079442	Stellar
10	3	4.406719	Cardano
11	8	1.098612	IOTA
12	10	1.098612	Maker
13	4	3.555348	Dogecoin

	timestamp	Asset_ID	Count	Open	High	Low	Close	Volume	VWAP	Target
2	1514764860	1	229.0	13835.194	14013.8	13666.11	13850.176	31.550062	13827.062093	-0.014643
10	1514764920	1	235.0	13835.036	14052.3	13680.00	13828.102	31.046432	13840.362591	-0.015037
18	1514764980	1	528.0	13823.900	14000.4	13601.00	13801.314	55.061820	13806.068014	-0.010309
26	1514765040	1	435.0	13802.512	13999.0	13576.28	13768.040	38.780529	13783.598101	-0.008999
34	1514765100	1	742.0	13766.000	13955.9	13554.44	13724.914	108.501637	13735.586842	-0.008079

Data Contained 7 Different Features

1	Timestamp	<ul style="list-style-type: none">Minute-by-minute data from 2018-2021
2	Asset ID	<ul style="list-style-type: none">Unique identifier of the traded coin
3	Count	<ul style="list-style-type: none">Number of trades executed within the respective minute
4	Open, High, Low, Close	<ul style="list-style-type: none">Usual price details for a given unit of time
5	Volume	<ul style="list-style-type: none">Amount of units of a particular coin traded
6	VWAP	<ul style="list-style-type: none">The average price of the asset over the time interval, weighted by volumeVWAP is an aggregated form of trade data
7	Target	<ul style="list-style-type: none">Residual log-returns for the asset over a 15 minute horizon

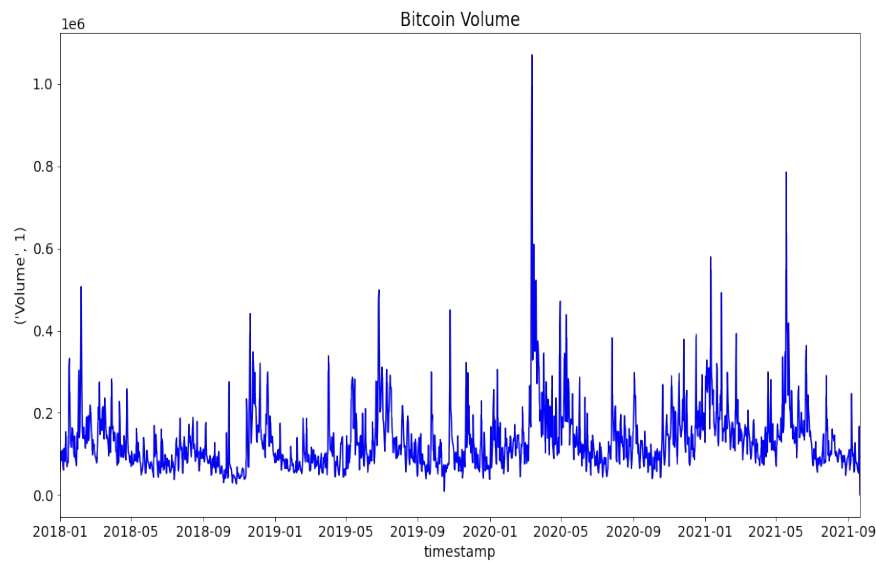
Project Flow



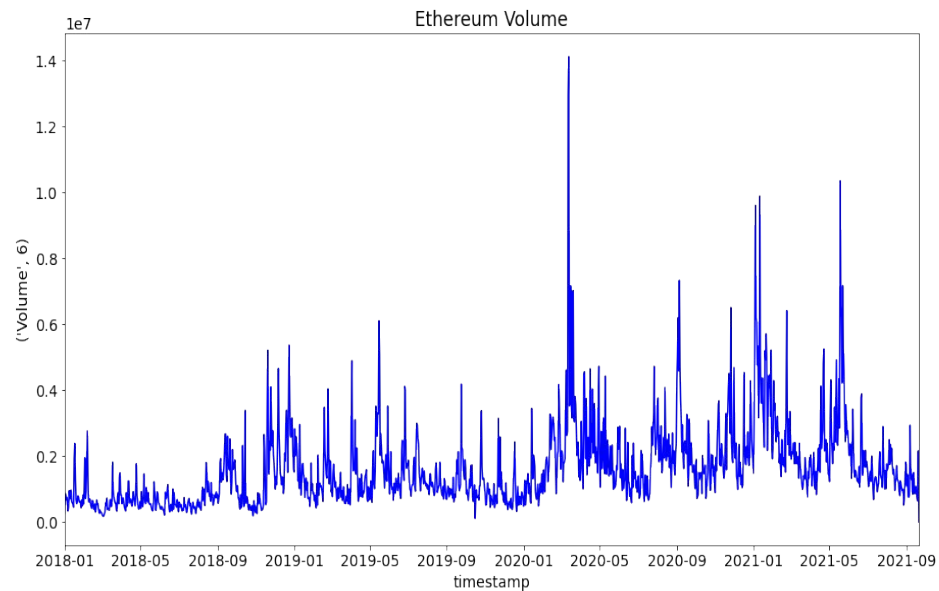
Price Trend vs. Volume for Bitcoin



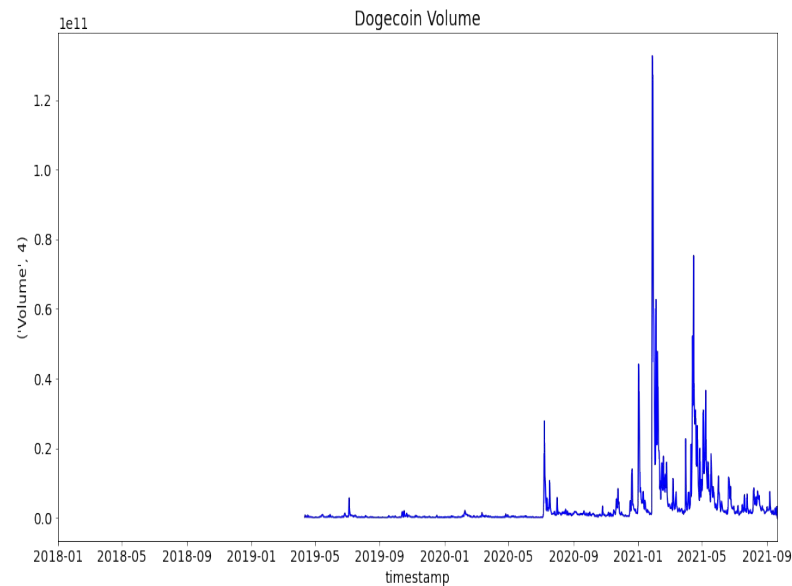
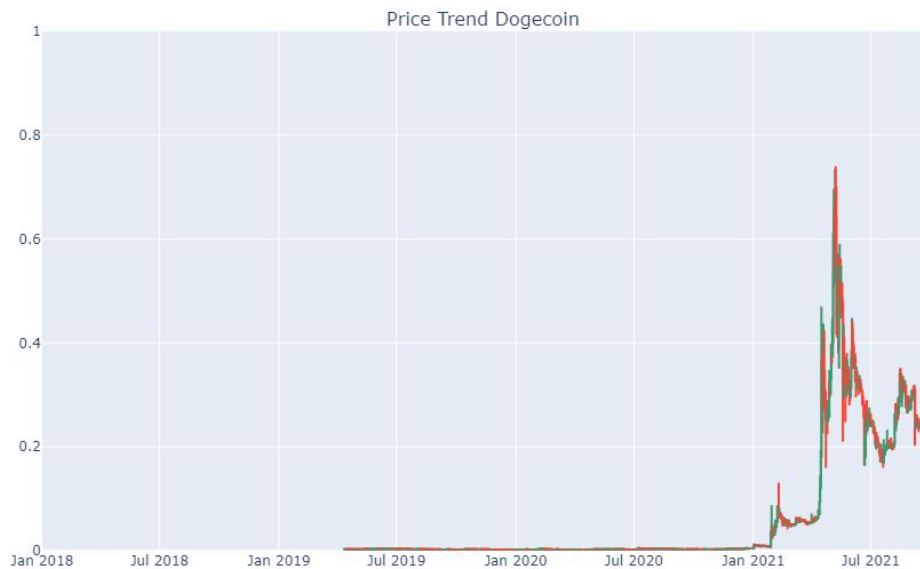
Bullish Started



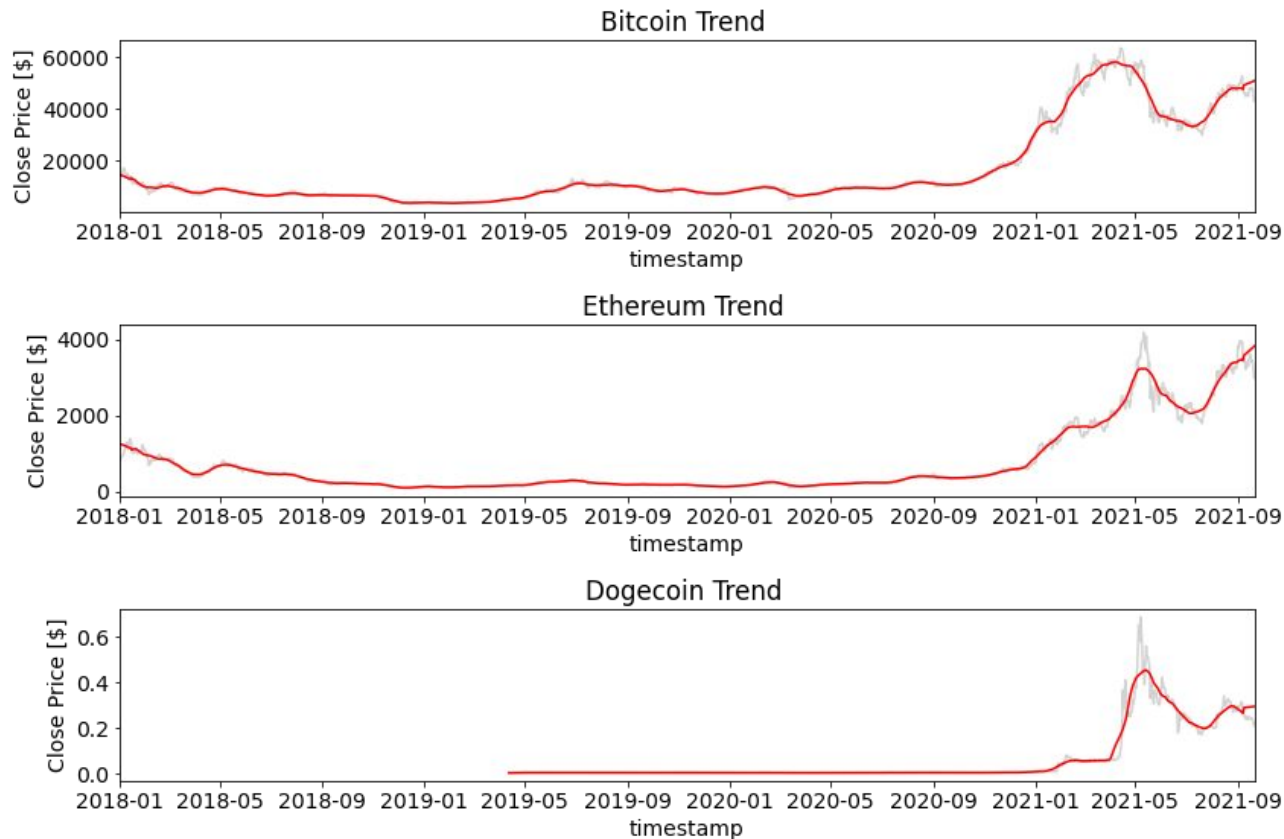
Price Trend vs. Volume for Ethereum



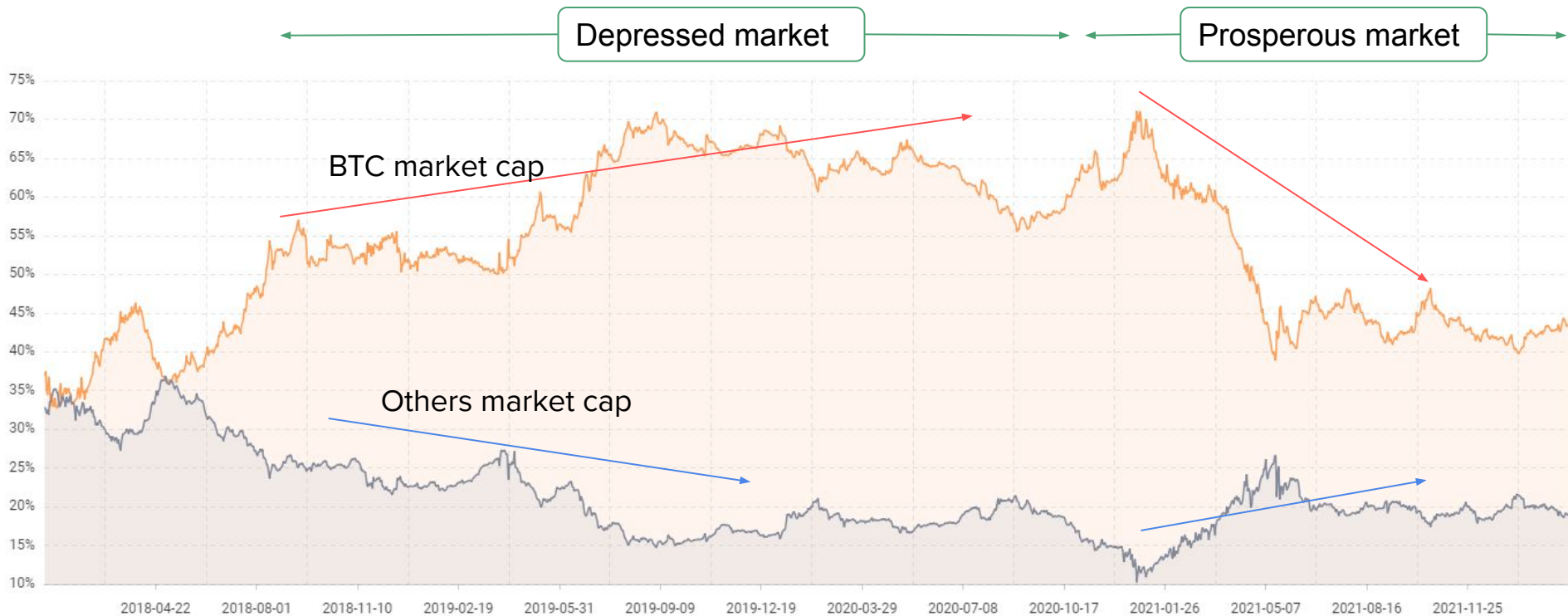
Price Trend vs. Volume for Dogecoin



Relationship between the price of Bitcoin, Ethereum, and Dogecoin



Market Cap



Technical Indicators (TI)

- Technical indicators are heuristic or pattern-based signals produced by the price, volume, and/or open interest of a security or contract used by traders who follow technical analysis
- By analyzing historical data, technical analysts use indicators to predict future price movements
- Examples:
 - SMA - Simple Moving Average : Created by taking moving average
 - VWAP - Volume-Weighted Average Price : It is calculated by taking the total dollar value of trading in the security and dividing it by the volume of trades during that period.

Technique Indicators Analysis

- Moving average convergence divergence (MACD) is a trend-following momentum indicator that shows the relationship between two moving averages of a price
- The MACD is calculated by subtracting the 26-period exponential moving average (EMA) from the 12-period EMA



MACD Analysis

- **Buy point:** MACD crosses above the signal line
- **Sell point:** MACD crosses below the signal line



MACD Analysis

	Date	open	high	close	low	Volume
2271	2019-07-18	9698.50000	10736.84000	10666.48000	9376.80000	25187024648.17000
2272	2019-07-19	10653.96000	10716.98000	10530.73000	10229.63000	20727426309.59000
2273	2019-07-20	10525.82000	11048.66000	10767.14000	10451.28000	20206615154.65000

$$SMA = \sum C_i / n \quad (1)$$

$$EMA = (K \times (C - P)) + P \quad (2)$$

$$K = 2 / (t + 1) \quad (3)$$

$$MACD = EMA_{12} - EMA_{26} \quad (4)$$

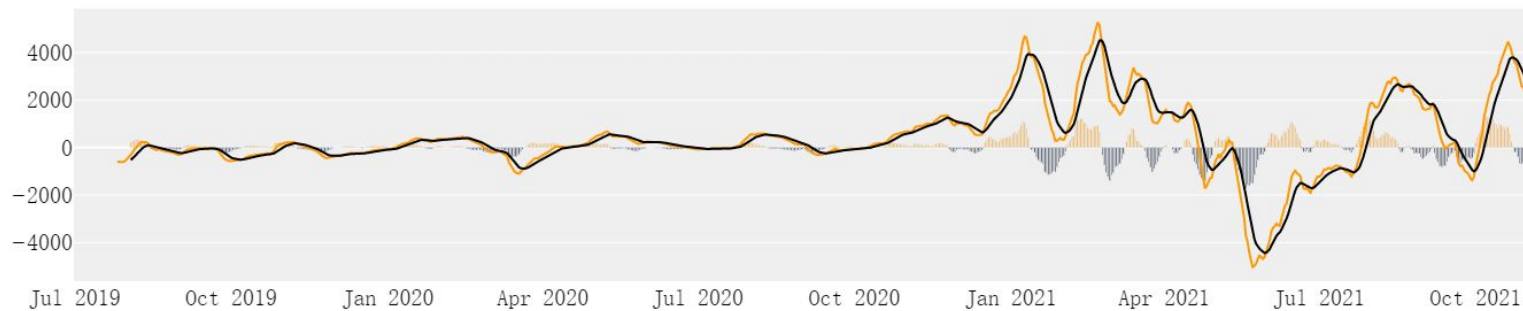
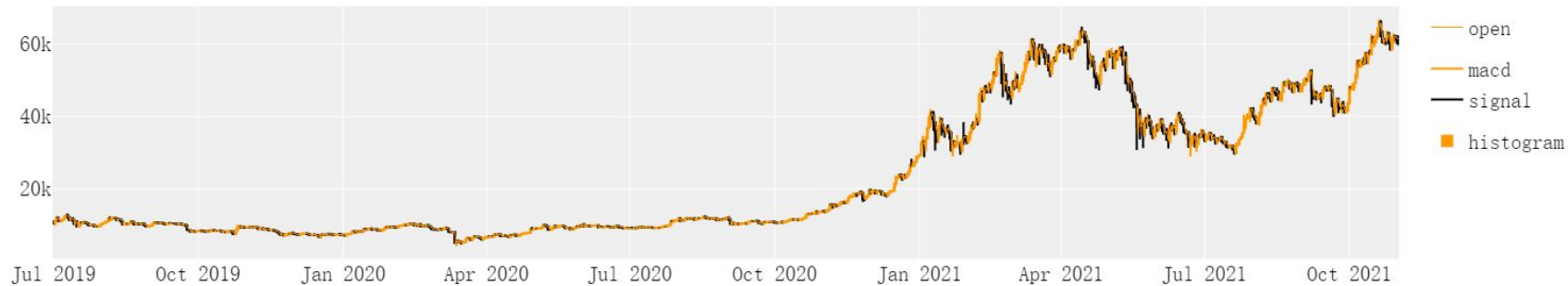
$$Signal = EMA_9 \text{ of } MACD \quad (5)$$

$$Histogram = MACD - Signal \quad (6)$$

	low	volume	macd_12_26_9	macdh_12_26_9	macds_12_26_9
2815	32697.98000	74773277909.46001	3922.05163	-10.48691	3932.53854
2816	32584.67000	69364315979.28000	3822.03756	-88.40078	3910.43835
2817	36868.56000	63615990033.01000	3849.37415	-48.85136	3898.22551

```
fig.append_trace(
    go.Scatter(
        x=df['date'],
        y=df['macd_12_26_9'],
        line=dict(color='#ff9900', width=2),
        name='macd',
        # showlegend=False,
        legendgroup='2',
    ), row=2, col=1
)
```





07/01/2019 - 11/01/2021	Total amount	Profit
Recurring investment	100,000	367604.324
MACD method	100,000	393081.407

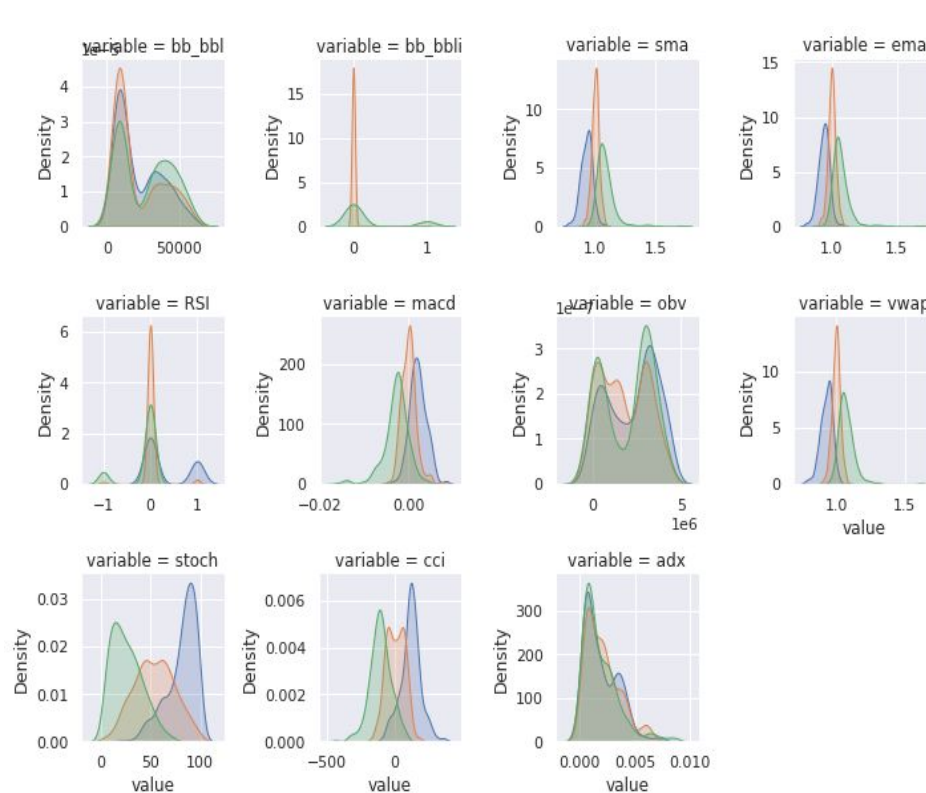
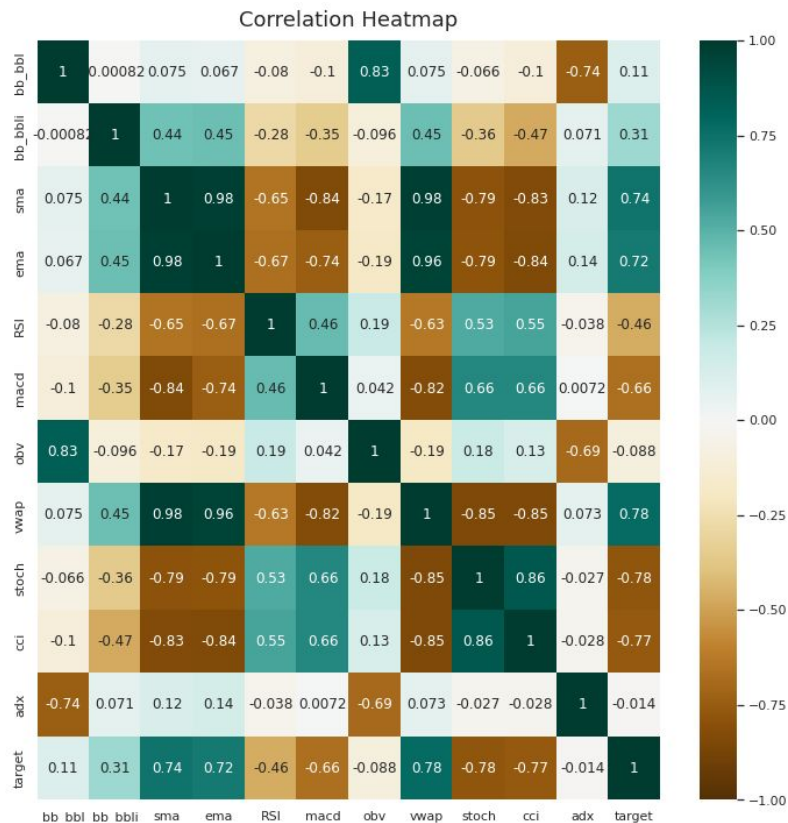
Creating TI from the given dataset

- We created the following technical indicators using the formula for corresponding indicator on the given dataset
- SMA (Simple Moving Average), EMA (Exponential Moving Average), VWAP (Volume-Weighted Average Price), OBV (On Balance Volume), BB (Bollinger Bands), RSI (Relative Strength Index), CCI (Commodity Channel Index), ADX (Average Directional Movement), MACD (Moving Average Convergence / Divergence), STOCH (stochastic oscillator)

Analysis of short term returns

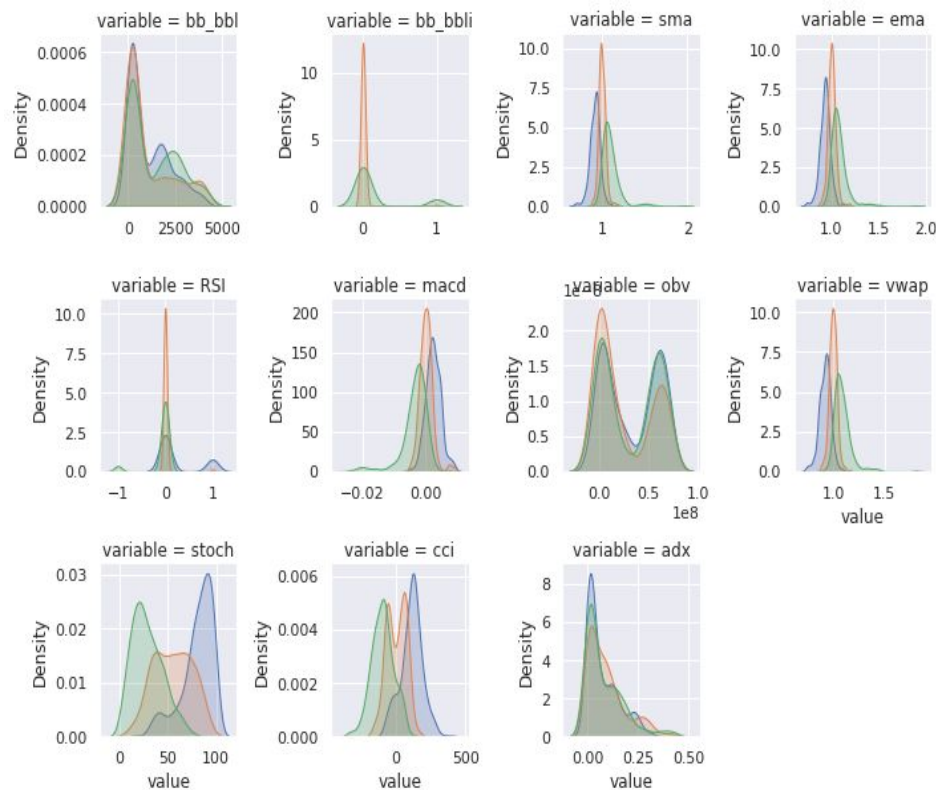
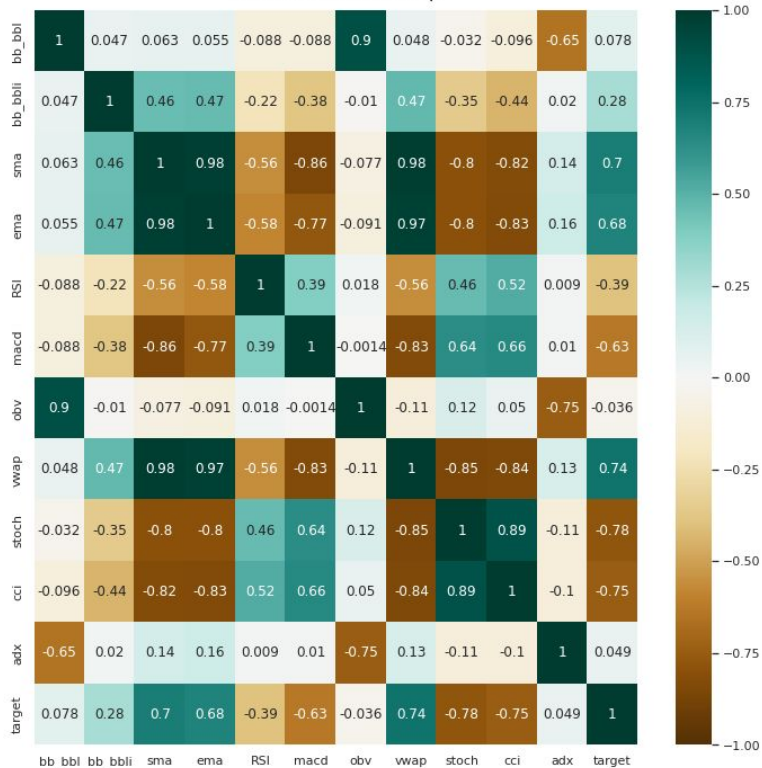
- **TARGET:** Target variable is set to a categorical variable with three categories - Bullish, Bearish and neutral
- **Bearish (Sell)** - When the price decreases over 4% in the next 7 days
- **Bullish (Buy)**- When the price increases over 4% in the next 7 days
- **Neutral (Hold)**- When the price does not oscillate more than 4% in the next 7 days
- **TI** - All TI in previous slide is used as features with window of 2 weeks

Analysis of TI for Bitcoin



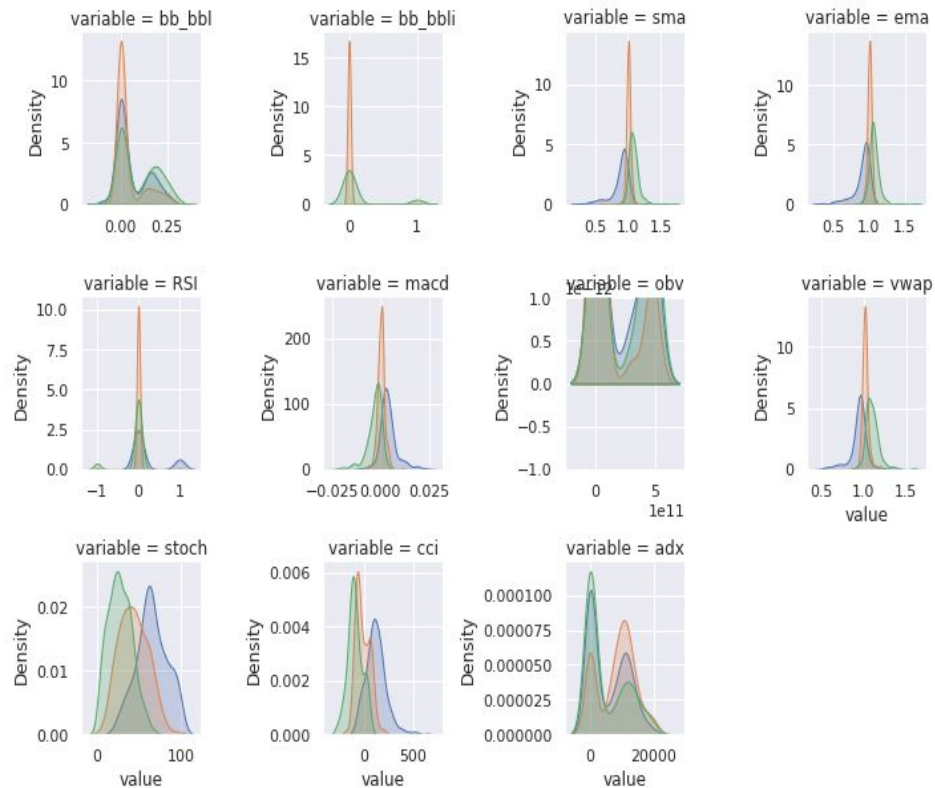
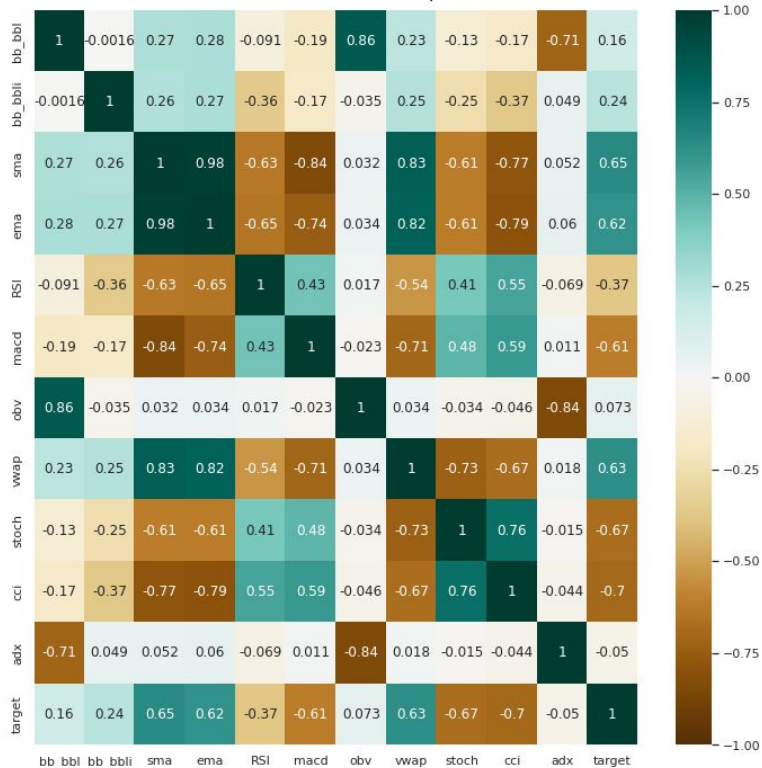
Analysis of TI Ethereum

Correlation Heatmap



Analysis of TI Dogecoin

Correlation Heatmap



Prediction using Logistic Regression

CRYPTO	ACCURACY
BTC	76%
ETH	74.4%
DOGE	72.6%

Review

- Crypto market has its personality: Bitcoin lead, volatility, greatly affected by social hot spots, etc.
- Many technique indicators used in stock market apply to crypto market
 - By choosing the right indicators we can use some of them to predict short-term price and help making investment decisions
- That is why lots of traditional finance companies started to participate in cryptocurrency
- Be careful with crypto investment!