

# CRYPTO FORECAST ANALYZER IN MACHINE LEARNING

Team Members Group 49

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# PROBLEM STATEMENT

## Cryptocurrency Market Volatility

- High **volatility** in cryptocurrency prices.
- Offers **profit** potential but also risks.
- Challenges in anticipating **price swings** for informed trading.
- Traditional financial forecasting fails to capture bitcoin's **complex dynamics**.



# DATA COLLECTION AND PREPROCESSING

- Correcting missing numbers, eliminating inconsistencies, and outliers.
- Aligning disparate scales through normalization or standardization processes.
- Introducing new variables to reveal hidden trends among cryptocurrencies.

Date	id	Name	High	Low	Open	Close	Volume	Marketcap	Target	assetid
2017-07-26 23:59:59	0	Binance Coin	0.109013	0.099266	0.105893	0.105138	2.003950e+05	1.051380e+07	0	1
2017-07-27 23:59:59	1	Binance Coin	0.108479	0.100888	0.105108	0.107737	3.444990e+05	1.077370e+07	1	1
2017-07-28 23:59:59	2	Binance Coin	0.109019	0.101473	0.107632	0.104067	3.425680e+05	1.040670e+07	0	1
2017-07-29 23:59:59	3	Binance Coin	0.111264	0.101108	0.104782	0.107811	3.402180e+05	1.078110e+07	1	1



**Date:** Timestamps identify each entry, enabling chronological analysis and modeling of time-dependent patterns.

**Open:** The price at which a cryptocurrency is first traded when the exchange opens on a given day.

**High:** The highest price at which a cryptocurrency traded during the day.

**Low:** The lowest price at which a cryptocurrency traded during the day.

**Close:** The price at which a cryptocurrency was last traded when the exchange closed on any particular day.

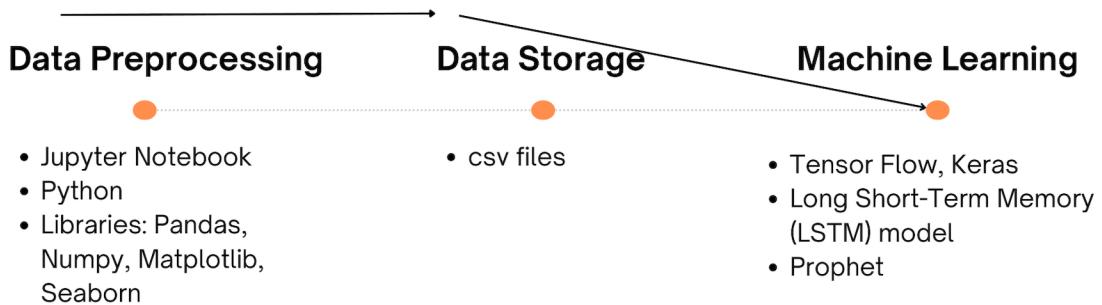
**Volume:** The total volume of cryptocurrency exchanged in a 24-hour period.

**Market Cap:** The overall market value of cryptocurrencies circulating supply.

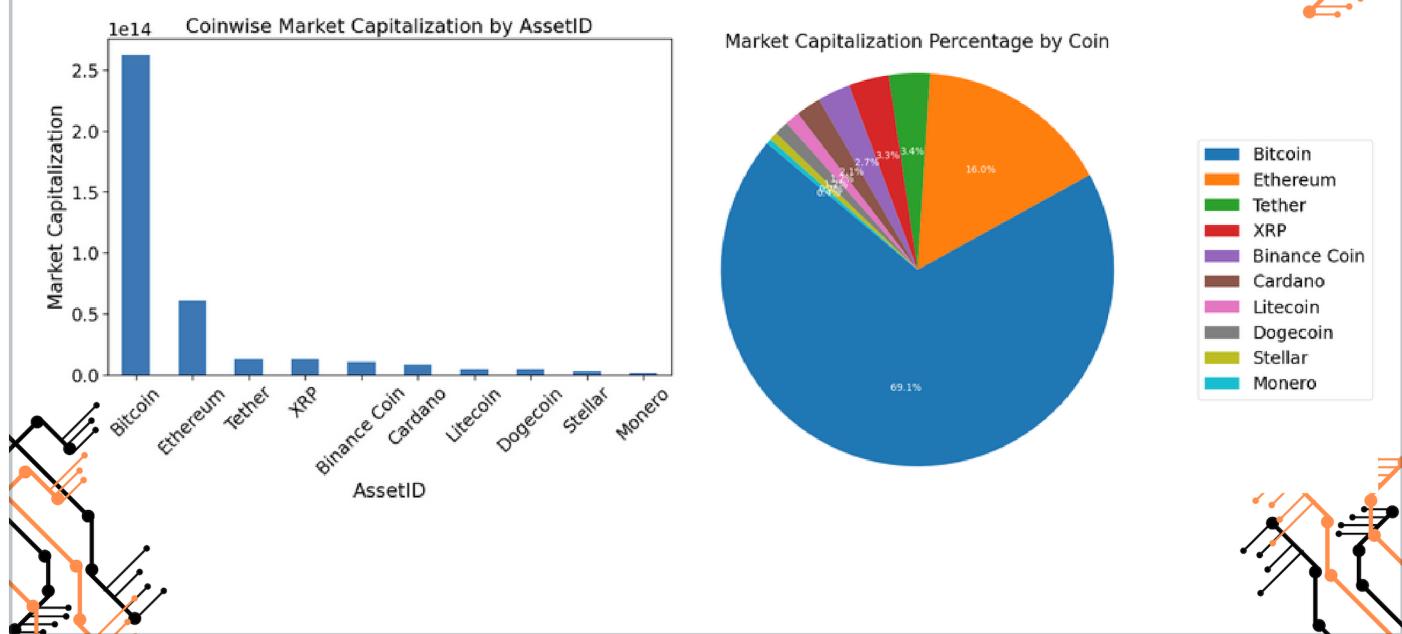
Datasource Link:

<https://www.kaggle.com/sudalairajkumar/cryptocurrencypricehistory>

# Tools Used

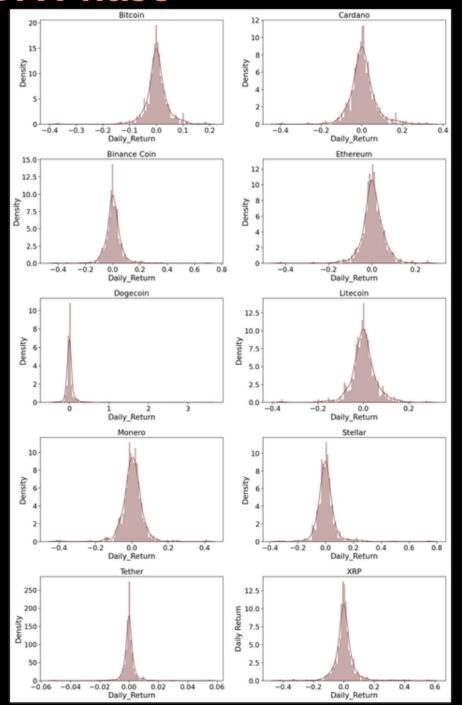
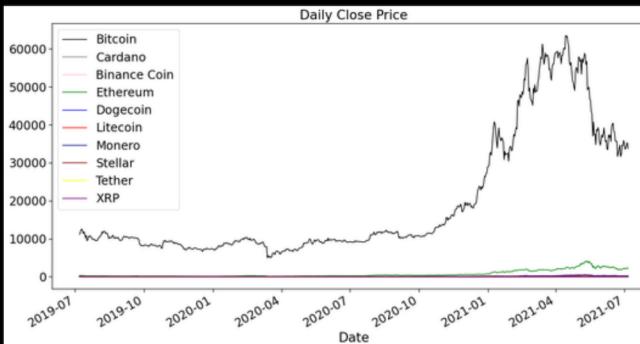


# Worldwide Cryptocurrency Exchanges



# Cryptocurrency Forecasting Research: The EDA Phase

- Used analytical and visualization tools to find patterns, trends, and irregularities in bitcoin market data.
- Generated line graphs representing the closing values of ten main cryptocurrencies: Bitcoin, Cardano, Binance Coin, Ethereum, Dogecoin, Litecoin, Monero, Stellar, Tether, and XRP.
- Visualization of cryptocurrencies' risk profiles and return characteristics.
- Analyzing daily return distributions is essential in cryptocurrency EDA to gain insights into risk and return dynamics, helping to tailor forecasting models like LSTM and Prophet to accurately capture market complexities.

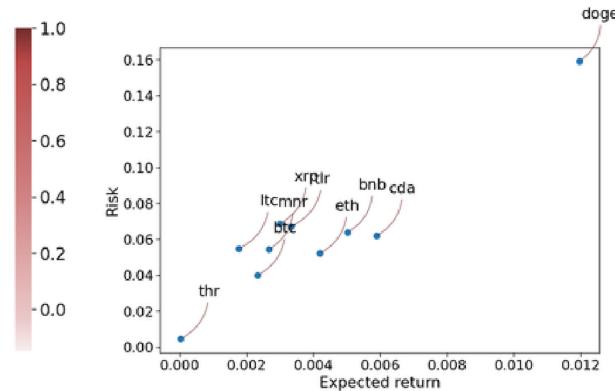


# Correlation Risk

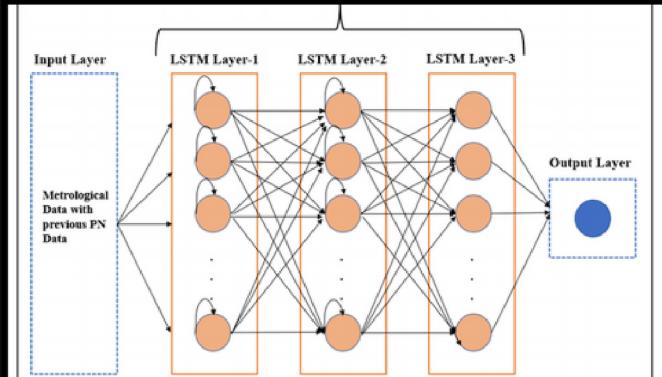
Correlation Among Ten Cryptocurrencies' Closing Prices

btc	1	0.64	0.65	0.8	0.28	0.8	0.7	0.57	-0.13	0.53
cda	0.64	1	0.58	0.72	0.24	0.69	0.61	0.7	-0.11	0.53
bnb	0.65	0.58	1	0.66	0.15	0.65	0.63	0.51	-0.11	0.5
eth	0.8	0.72	0.66	1	0.24	0.84	0.69	0.63	-0.15	0.58
doge	0.28	0.24	0.15	0.24	1	0.28	0.23	0.28	-0.031	0.18
ltc	0.8	0.69	0.65	0.84	0.28	1	0.71	0.63	-0.12	0.63
mnr	0.7	0.61	0.63	0.69	0.23	0.71	1	0.54	-0.093	0.5
tir	0.57	0.7	0.51	0.63	0.28	0.63	0.54	1	-0.11	0.67
thr	-0.13	-0.11	-0.11	-0.15	-0.031	-0.12	-0.093	-0.11	1	-0.081
xrp	0.53	0.53	0.5	0.58	0.18	0.63	0.5	0.67	-0.081	1
	btc	cda	bnb	eth	doge	ltc	mnr	tir	thr	xrp

Risk and Expected Return of Ten Cryptocurrencies



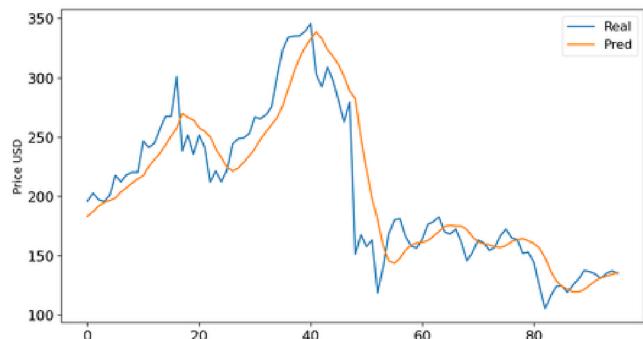
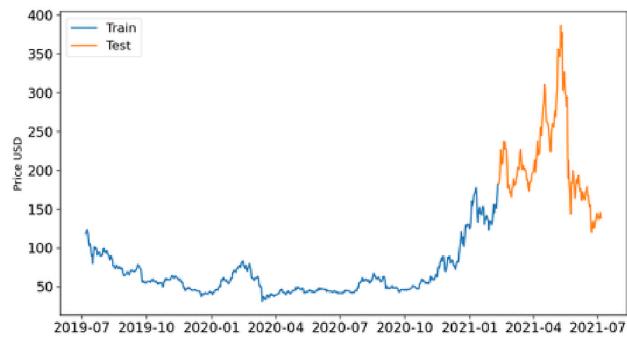
## LSTM Architecture



## Bitcoin Price Prediction Using LSTM Model

- **Input Layer:** Accepts sequence data.
- **LSTM Layers:** One or more layers with fixed number of neurons each.
- **Output Layer:** Single neuron predicts Bitcoin price.
- **Data Integration and Preprocessing:** Combine Bitcoin price data with attributes from a Wikipedia dataset.
- Normalization of 'close' price with MinMaxScaler improves performance.
- Sequences from pricing data estimate future points.
- **Model Architecture and Training:** Two LSTM layers separated by dropout layers.
- Post-training, model forecasts Bitcoin values.
- **Visualization of model's predictions compared to actual Bitcoin values.**

# LSTM Implementation



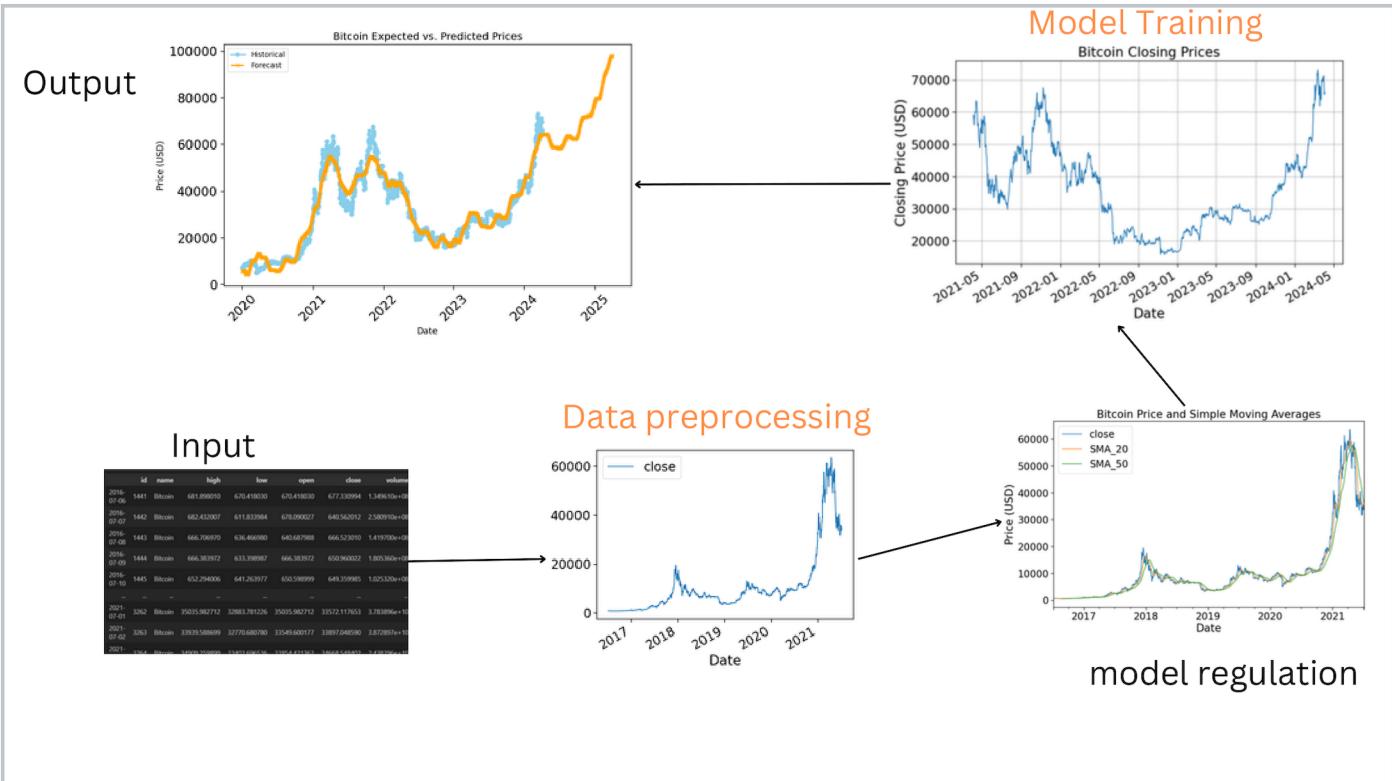
# Prophet Architecture & Implementation

## Architecture Overview

- Linear Process Flow: The model follows a linear process from data collection through preprocessing, configuration, and forecasting.
- Adaptable to New Data: Can be updated with real-time data to refine predictions.
- Handles Multiple Seasonalities: Capable of handling daily, weekly, and yearly seasonal patterns.
- Extensible: Allows for the incorporation of additional regressors to capture external influences on price movements.

## Implementation Steps

- Collection and preprocessing of cryptocurrency price data.
- Collection of historical cryptocurrency pricing data.
- Cleaning and preprocessing to guarantee uniform formatting.
- Configuring the Prophet model to account for seasonality, trends, and holidays.
- Add external regressors to increase predicting accuracy.
- Real-time data retrieval via APIs for up-to-date predictions.
- Forecasting and visualizing future periods versus previous data for performance evaluation.



## Comparison of Models

Model	Mean Squared Error	Root Mean Squared Error	Mean Absolute Error
0 Prophet	0.009962	0.099809	0.082741
1 LSTM	0.037021	0.192409	0.156150

- The Prophet model has a lower Mean Squared Error (MSE), suggesting that it tends to be more precise in its predictions compared to the LSTM model.
- With a smaller Root Mean Squared Error (RMSE), the Prophet model's predictions are generally closer to the true values, indicating better overall predictive performance.
- The lower Mean Absolute Error (MAE) for the Prophet model points to its predictions having less deviation from the actual values than those of the LSTM.
- Overall, the Prophet model demonstrates superior accuracy in forecasting over the LSTM model for the given dataset, making it the preferable choice in this specific case.

## Conclusion

- Demonstrates the ability of machine learning models, specifically LSTM and Prophet, to reliably estimate Bitcoin prices.
- Emphasizes the use of modern computational technology and financial analytics to improve bitcoin trading methods.
  - Demonstrates the practical use of LSTM and Prophet models for predicting price fluctuations.
  - Emphasizes the need for continuous model development to increase forecast accuracy.
  - Emphasizes the importance of machine learning in providing strategic insights for cryptocurrency investors.

# Thank You