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# Predicting Apple Stock Price



### Problems to solve

Predicting the stock price of a publicly traded company is a challenging task

Accurately forecasting stock prices is crucial for investors and traders to make informed decisions and maximize their returns.

The dynamic nature of financial markets and various factors that can affect the stock price.

The outcome of this project will provide insights and information for investors, financial analysts, and stakeholders in making informed decisions about the future of Apple's stock prices.

**Project objective** 

To develop a predictive model that can accurately forecast the future stock price of Apple Inc.

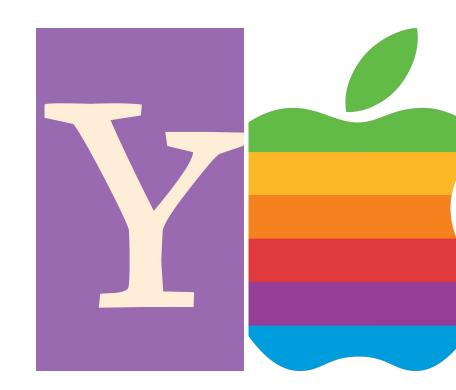
## **Data Information**

The dataset used was obtained from Yahoo Finance and covers a ten year period from 2013 to 2022

Number of Record: 2518 rows and 7 variables, required pre-processing

#### **Dataset features:**

- Adjusted Closing Price
- Close Price
- Open Price
- High Price
- Low Price
- Volume



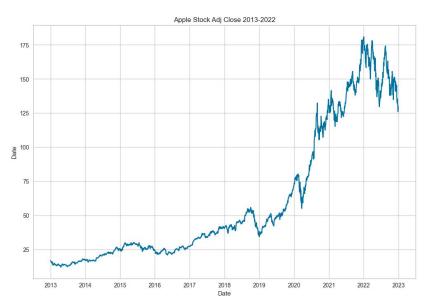
## Engineering Stock Data Features

- 1. Check for missing values
- 2. Convert the date column to datetime object
- 3. Resampled dataset into Months
- 4. Provide a more comprehensive understanding of the stock price trends
- 5. Linear interpolation was performed

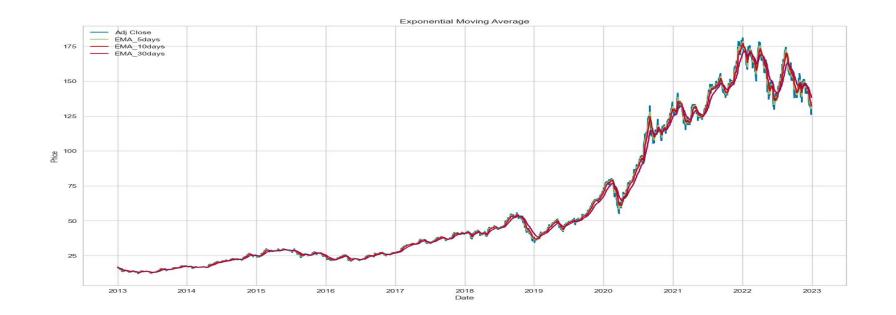
	Date	Open	High	Low	Close	Adj Close	Volume	
0	2013-01-02	19.779285	19.821428	19.343929	19.608213	16.862822	560518000	
1	2013-01-03	19.567142	19.631071	19.321428	19.360714	16.649977	352965200	
2	2013-01-04	19.177500	19.236786	18.779642	18.821428	16.186195	594333600	
3	2013-01-07	18.642857	18.903570	18.400000	18.710714	16.090992	484156400	
4	2013-01-08	18.900356	18.996071	18.616072	18.761070	16.134289	458707200	
2513	2022-12-23	130.919998	132.419998	129.639999	131.860001	131.860001	63814900	
2514	2022-12-27	131.380005	131.410004	128.720001	130.029999	130.029999	69007800	
2515	2022-12-28	129.669998	131.029999	125.870003	126.040001	126.040001	85438400	
2516	2022-12-29	127.989998	130.479996	127.730003	129.610001	129.610001	75703700	
2517	2022-12-30	128.410004	129.949997	127.430000	129.929993	129.929993	76960600	
2518 rows × 7 columns								



## Exploratory Data Analysis



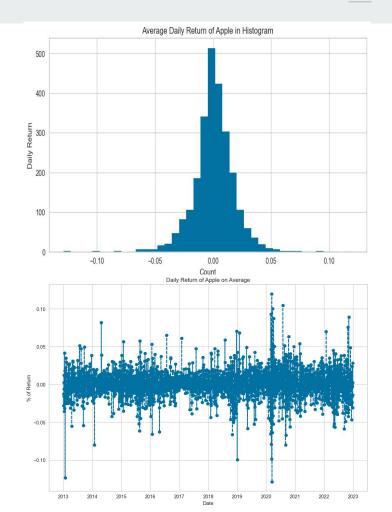
Moving averages were used to identify tends, smooth data, generate signals, and confirm trend strength



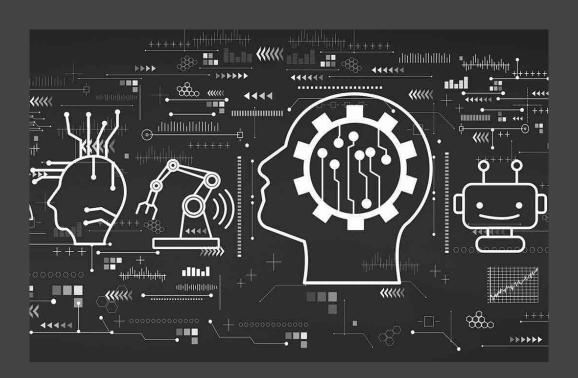
## Daily Return

01	Help measure the volatility	of a stock
OI	Help illeasure the voiatility	/ OI a SLOCK

- 02 | Its ability to generate consistent returns
- 03 | Crucial role in risk management
- 04 | Help identify trends in stock's price movement
- 05 | Not a complete picture!



### Modeling



## All Model



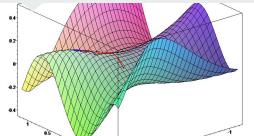
#### **Gradient Boosting**

With Conditional deseasonalization and detrending



#### **Decision Tree**

With Conditional deseasonalization and detrending

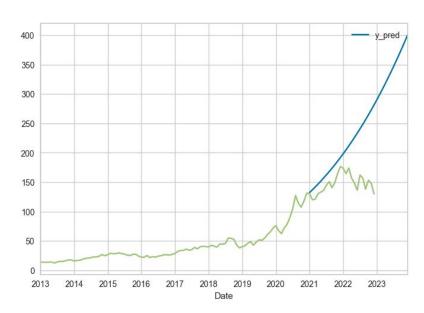


#### **Blended Model**

Combines the strengths of multiple models

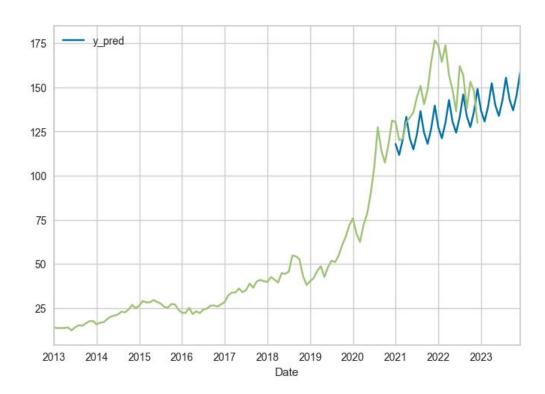
## **Decision Tree**

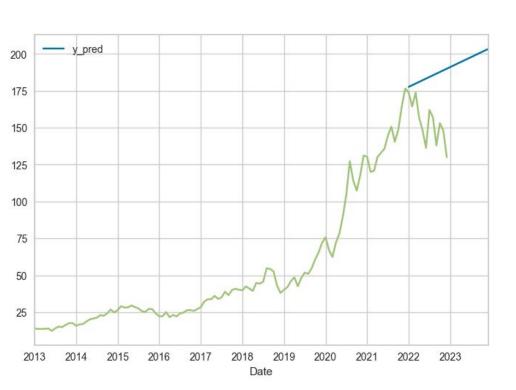
- Predicts generally upward trend, but significant mismatch with actual price movements
- Model not effective
- Limitations highlighted
- Performed worst with RMSE score of 92.23



## Gradient Boosting

- RMSE score of 27.02
- Not a guarantee of accuracy
- Continuously monitor
  and evaluate is needed





## Blended Model

- Slight upward trend
- But does not align with actual trend
- This approach can be beneficial, but not performing as well as expected
- RMSE score of 34.57
- Consider blending different models for better result

## **Ideas to improve**

- News API to enhance the predictions
- Provide a deeper understanding of what is being said about the company
- Need to consider additional factors
- Economic conditions, company performance, investor sentiment



## Conclusion

- The time series analysis of Apple stock price was performed using PyCaret and 3 machine learning models
- The Gradient Boosting model demonstrated the best with a RMSE score of 27.02
- The result of this study should not be used as the sole basis for investment decisions
- This study should be used only as one of many sources of information
- The potential for further improvement in stock price predictions

## Thank you

