WALMART STOCK CLOSING PRICE ANALYSIS USING DEEP LEARNING AND TIMESERIES

KARTHIK M K

CONTENTS

ABOUT

- Time series analysis(Machine Learning) is a method for analyzing sequential data and Recurrent Neural Networks(Deep Learning) is a type of neural network architecture that can be used for the same purpose.

- Both are used for extracting insights from data collected over time and make predictions about future trends.

- Recurrent Neural Networks (RNNs) have a "memory" mechanism that allows them to store information from previous time steps and use it to inform predictions at future time steps.

- In this project we are going to observe how Walmart stock price is going to react when run on both machine and deep learning models.

PROBLEM

To use deep learning and time series techniques to analyze historical closing stock price of Walmart, train different models such as Recurrent Neural Networks (RNNs), Long Short-Term Memory (LSTM) or other models, and compare their performance in terms of accuracy, with the goal of identifying the best model for stock price prediction.
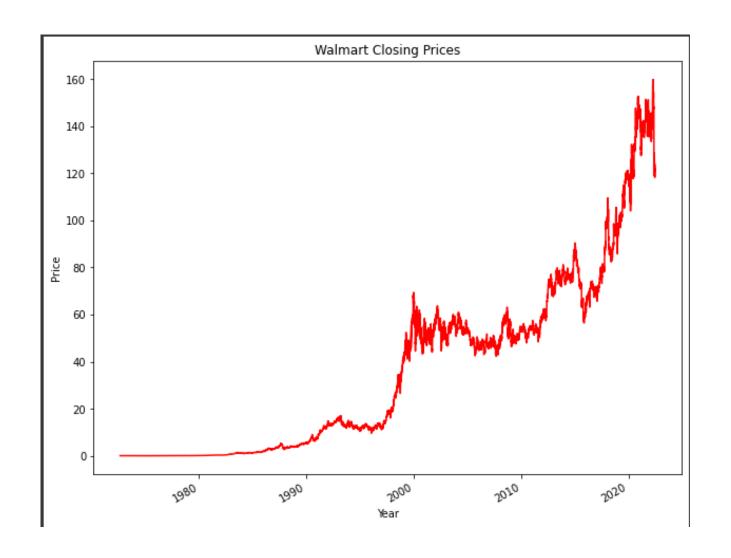
COLLECTION – PREPERATION

COLLECTION

The dataset is taken from Kaggle. It contains stock history i.e., date, open price, close price, high price for the day, low price for the day, adjusted closing price and volume of stocks for Walmart stock. The data is available from start date 1972-08-25 to end date 2022-06-24 with 12,566 entries recorded totally.

Date	Open	High	Low	Close	Adj Close	Volume
1972-08-25	0.063477	0.064697	0.063477	0.064453	0.036175	2508800
1972-08-28	0.064453	0.064941	0.064209	0.064209	0.036038	972800
1972-08-29	0.063965	0.063965	0.063477	0.063477	0.035627	1945600
1972-08-30	0.063477	0.063477	0.062988	0.063477	0.035627	409600
1972-08-31	0.062988	0.062988	0.062500	0.062500	0.035079	870400
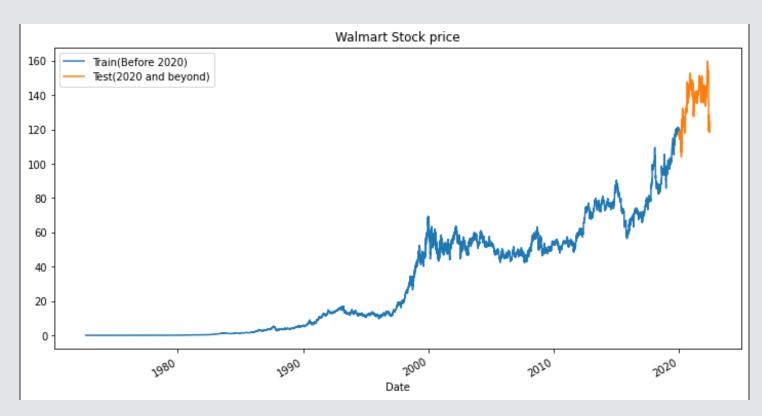
Date	Open	High	Low	Close	Adj Close	Volume
2022-06-17	120.019997	120.879997	117.970001	118.290001	118.290001	12166700
2022-06-21	118.300003	122.779999	118.220001	122.169998	122.169998	7972200
2022-06-22	122.099998	123.250000	120.589996	120.690002	120.690002	6745000
2022-06-23	121.750000	123.959999	121.199997	123.620003	123.620003	6013600
2022-06-24	124.089996	125.309998	123.160004	123.720001	123.720001	10611500

Sample Data Preview

Walmart Closing Prices
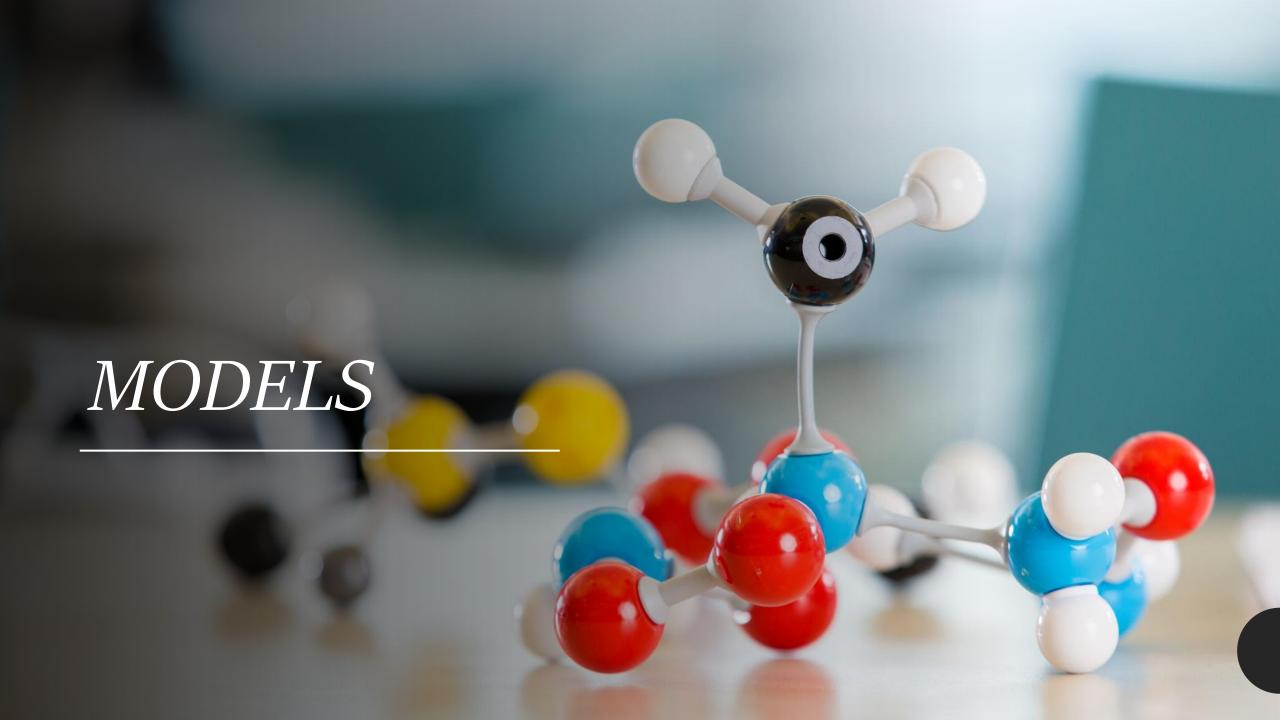
Visual preview of the target variable

PREPARATION

Walmart Stock price

- Used data from 1972 – 2020 as training and data after 2020 as test set for both machine and deep learning.

- Scaled the data for deep learning models using min-max scaler as the closing price varies from 0.0625 to 123.7200.

MODELS

Time Series

Exponential Smoothing(Simple Exponential Smoothing[Without Trend and Seasonality])

Holt-Winters(Double [Trend Only] and Triple Exponential Smoothing[With Trend and Seasonality])

Deep Learning

Long Short-Term Memory

Bidirectional Long Short-Term Memory

Gated Recurrent Unit

RESULTS

Evaluation metrics comparison

TIME SERIES (Machine Learning)

Model	RMSE
Simple Exponential Smoothing (Manual)	20.906652772609
Simple Exponential Smoothing (Auto)	20.888355900784
Holt with Trend (Manual)	15.925944573650
Holt with Trend (Auto)	17.771836827102
Holt With Trend and Seasonality(Manual)	20.379335856461
Holt With Trend and Seasonality(Auto)	20.888355900784
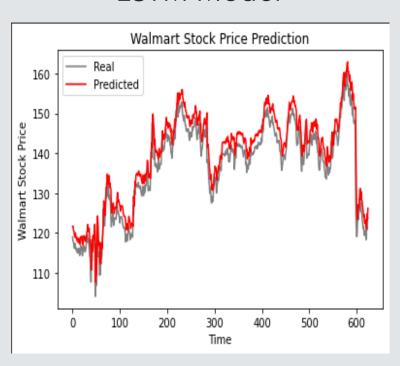
RECURRENT NEURAL NETWORKS (Deep learning)

Model	RMSE
LSTM	3.70
Bidirectional LSTM	3.22
GRU	2.43

We can observe significant difference between RMSE of deep learning and machine learning models. In deep learning GRU model is giving best model with 2.39 RMSE

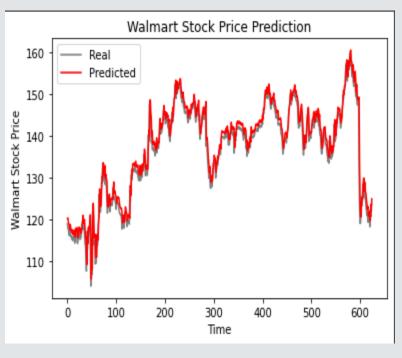# Visual representation of Recurrent neural network results
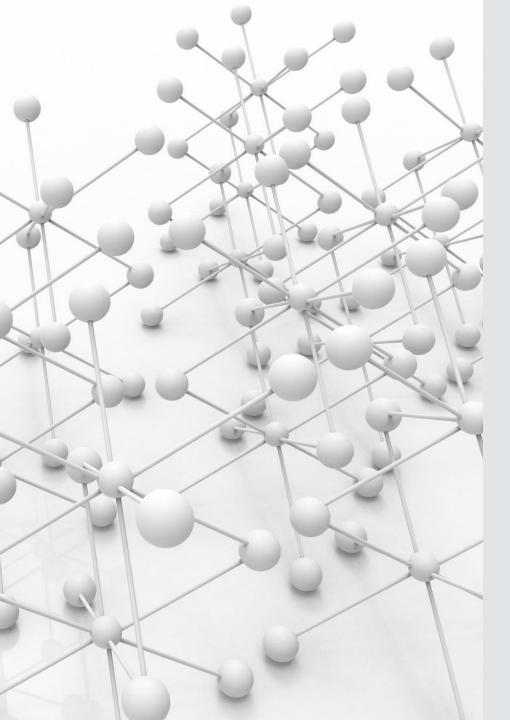

LSTM Model

Bidirectional LSTM Model

GRU Model

RMSE – 3.70

RMSE – 3.22

RMSE – 2.43

INFERENCE

Even though both time series and deep learning works better on sequential data. From the above analysis we can observe Recurrent Neural Networks gives better models for price predictions as the accuracy is more and running time in Neural network model is less compared to time series.

It is important to note that while deep learning and time series analysis can be very powerful tools for stock price analysis, they are not foolproof and there are many other factors that can influence stock prices. Therefore, it is important to use multiple sources of information, including fundamentals, technical analysis, and other data, when making investment decisions.

THANK YOU