Mid-Sem Presentation

Data Science for Financial Market

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Paper Overview

Hybrid Deep Learning model for stock price prediction

Introduction

- Used hybrid Deep Learning models (LSTM and GRU)
- Used S&P 500 Index
- Dynamic nature of stock price
- Stock Price prediction is a regression based problem.
- To solve the problem, we are using DNN based hybrid model to solve the problem faster and more accurate.
- The model is capable of handling the large variations in stock price by avoiding over-fitting.

Dataset

S&P 500 Index

20% Testing set

80% Training set

10% Valid. data
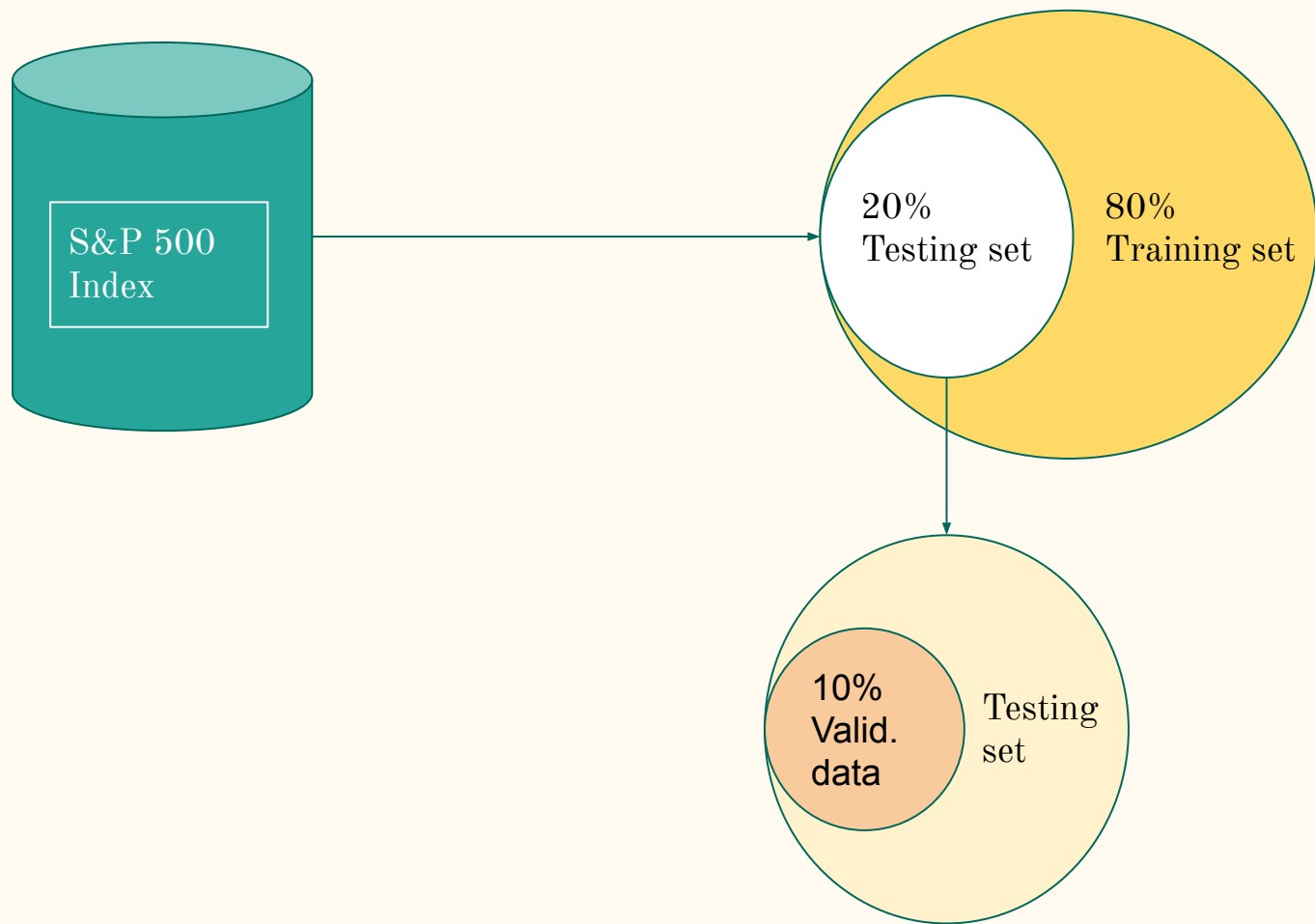
Testing set

Methodology

- First, we pass the input vector to the LSTM unit with one hidden layer and we get the output .

- Next, we Pass this output as the input of GRU unit. At the second layer we get the output of GRU unit.
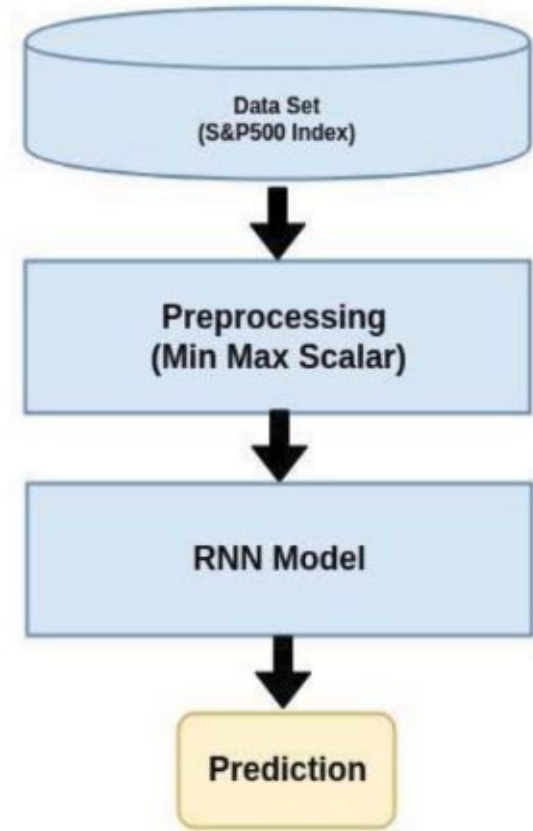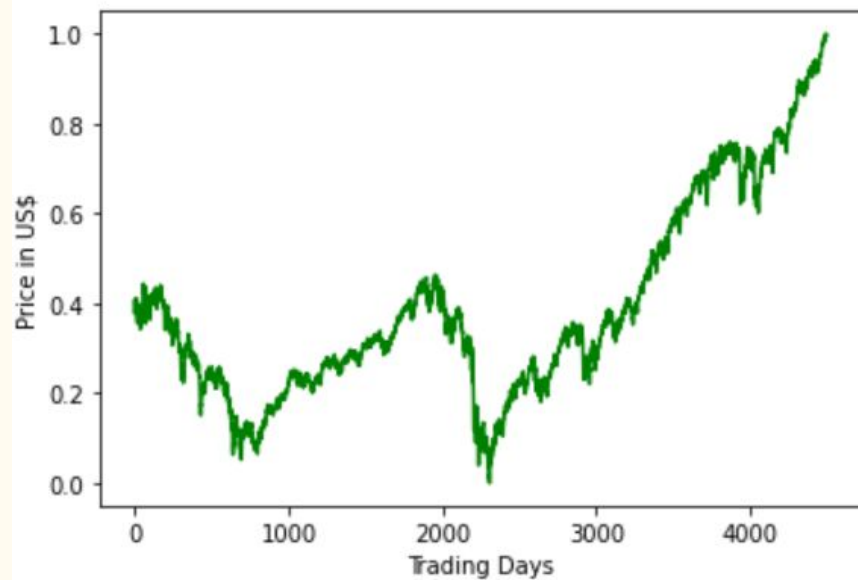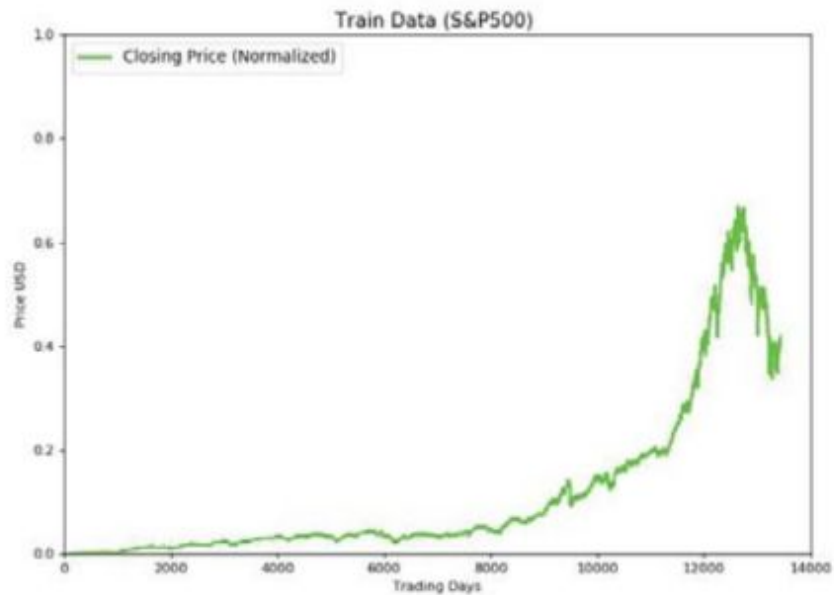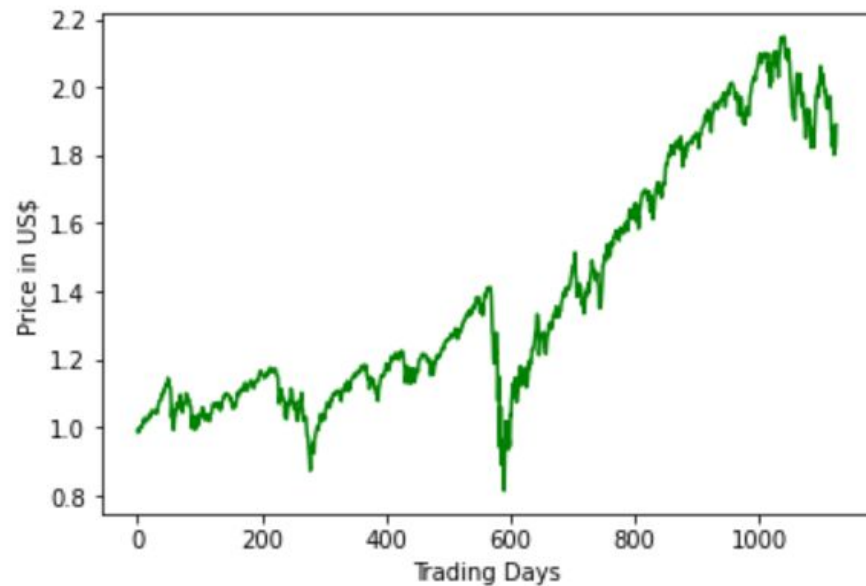

Fig. 3. Proposed Network

Testing Set

Train Data (S&P500)
Closing Price (Normalized)

Training set

LSTM

- It is **special kind of recurrent neural network that is capable of learning long term dependencies in data**.
- LSTMs **use a series of 'gates' which control how the information in a sequence of data comes into, is stored in and leaves the network**. There are three gates in a typical LSTM; forget gate, input gate and output gate. These gates can be thought of as filters and are each their own neural network.

Long term dependencies - those problems for which the desired output depends on inputs presented at times far in the past
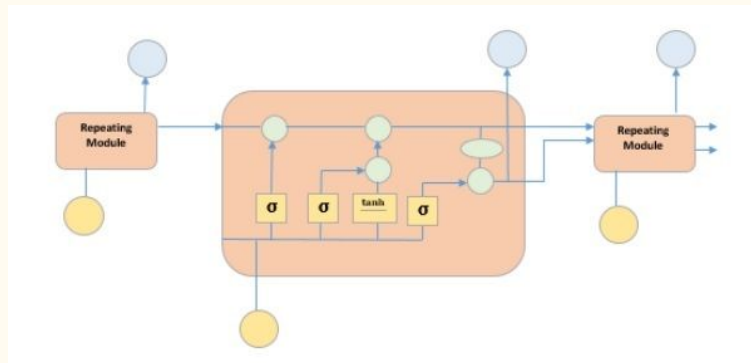
GRU

The GRU is like a long short-term memory with a forget gate, but has fewer parameters than LSTM, as it lacks an output gate.

The key difference between GRU and LSTM is that **GRU's bag has two gates that are reset and update while LSTM has three gates that are input, output, forget**. GRU is less complex than LSTM because it has less number of gates. If the dataset is small then GRU is preferred otherwise LSTM for the larger dataset.

The Gated Recurrent Unit (GRU) is a type of Recurrent Neural Network (RNN) that, in certain cases, **has advantages over long short term memory (LSTM)**. GRU uses less memory and is faster than LSTM, however, LSTM is more accurate when using datasets with longer sequences
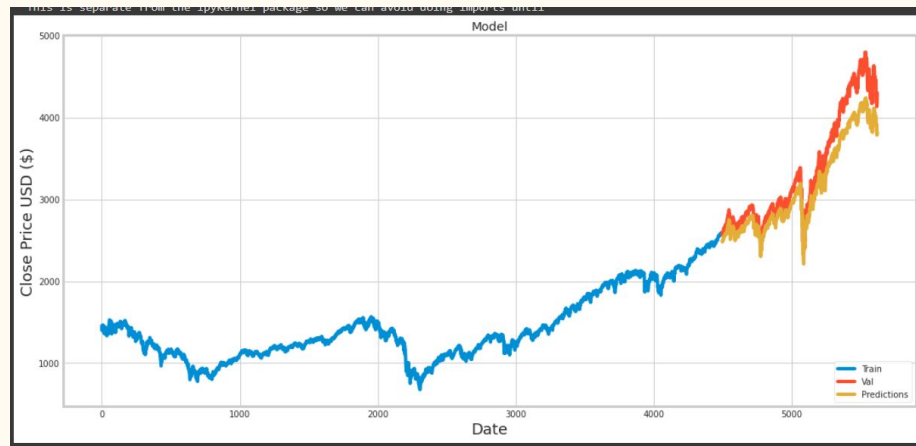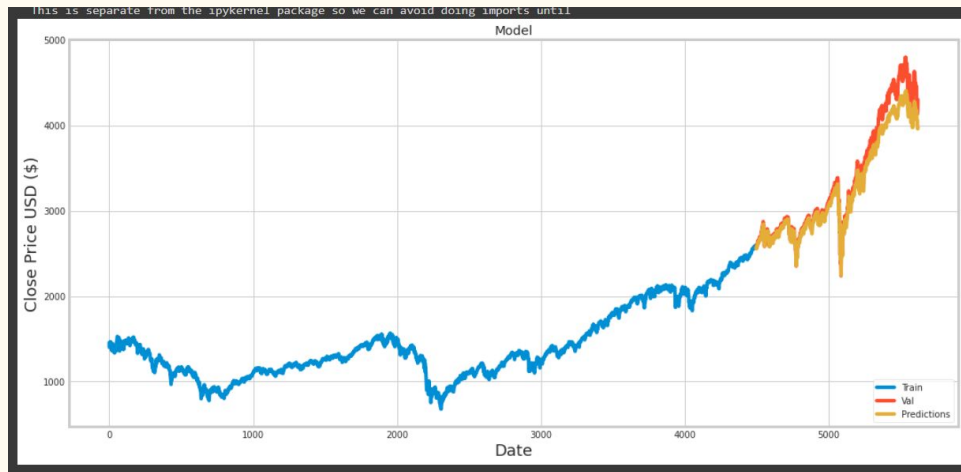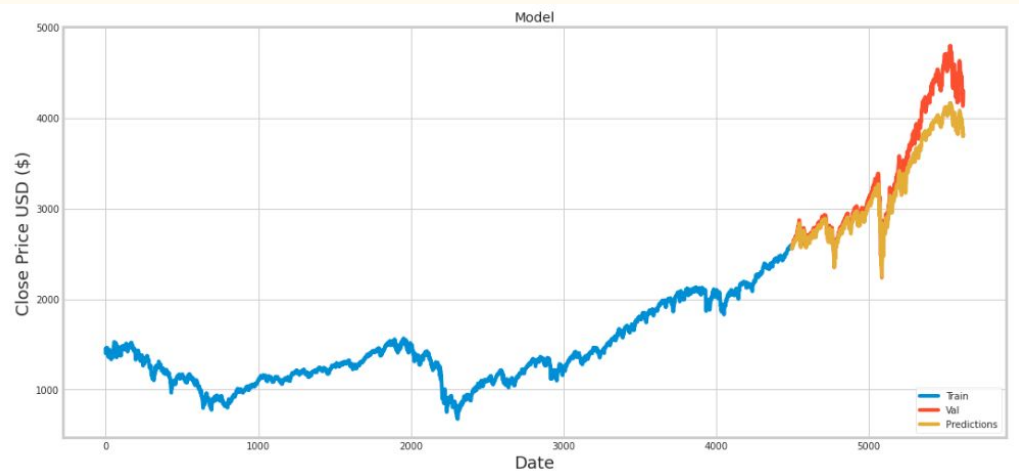
Results
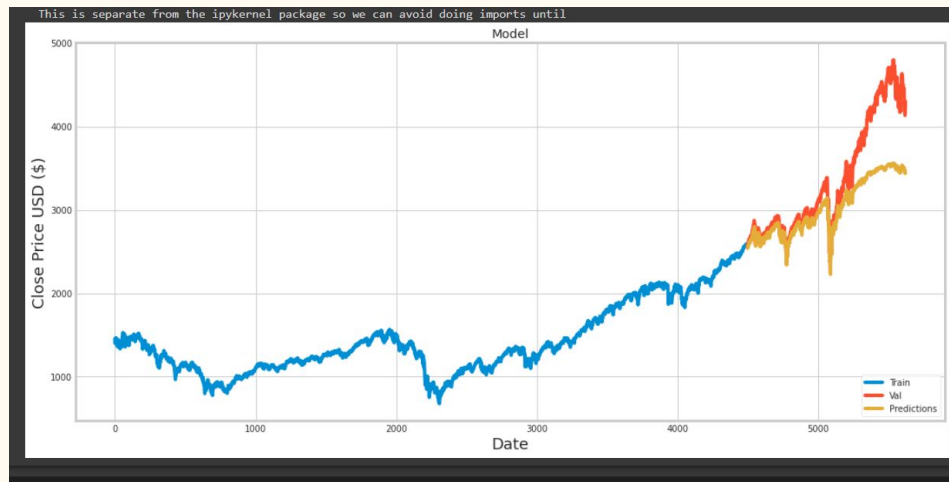
LSTM layer - 1
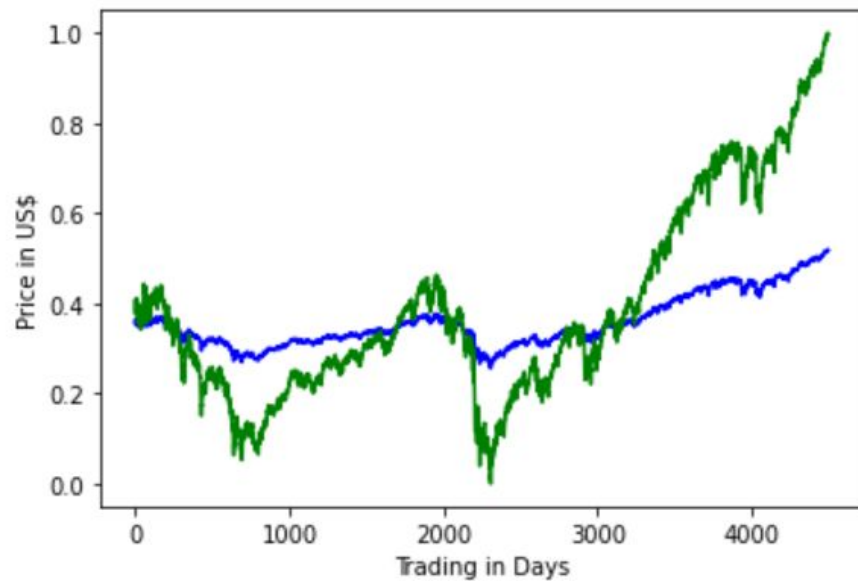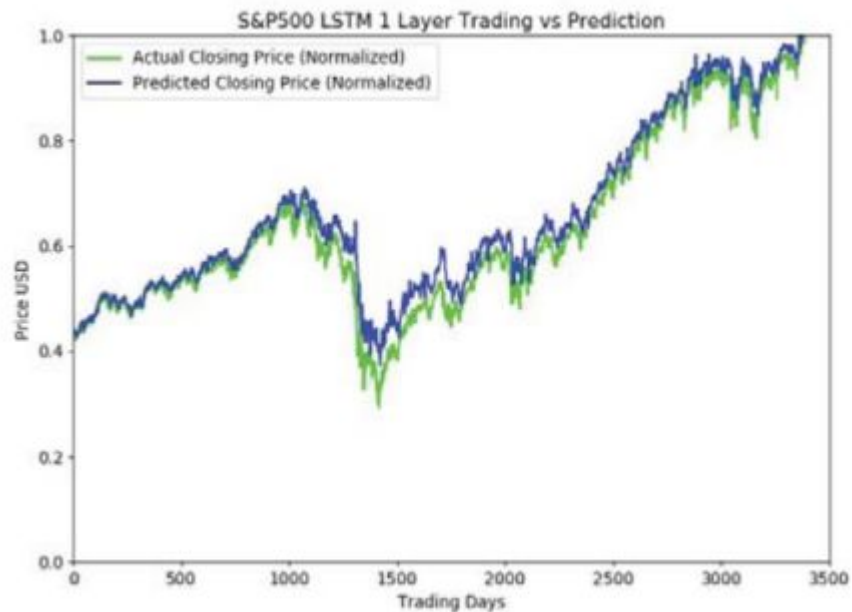
LSTM layer - 2

LSTM layer - 3

GRU layer - 1

GRU layer - 2

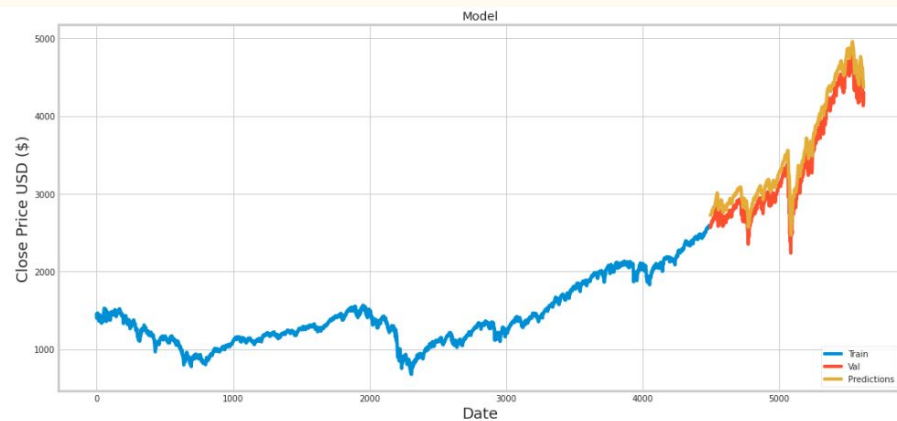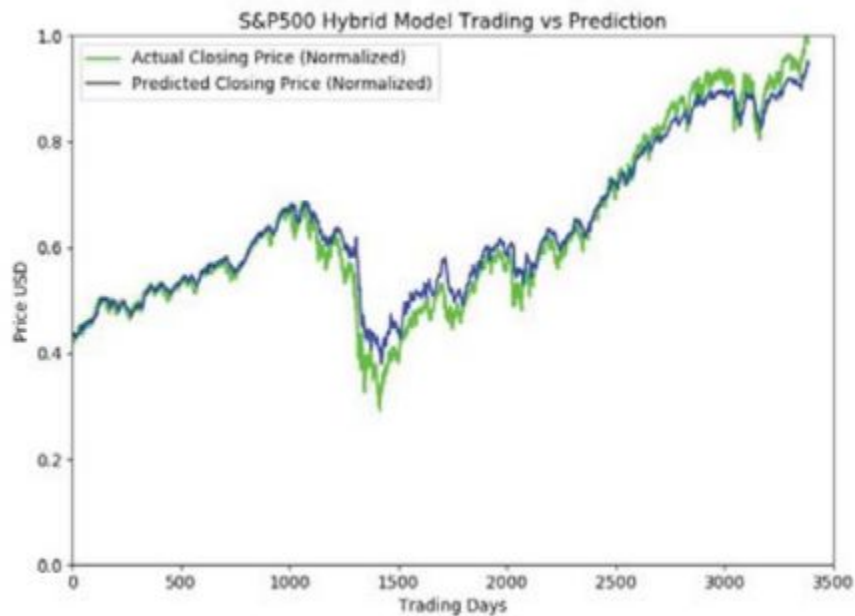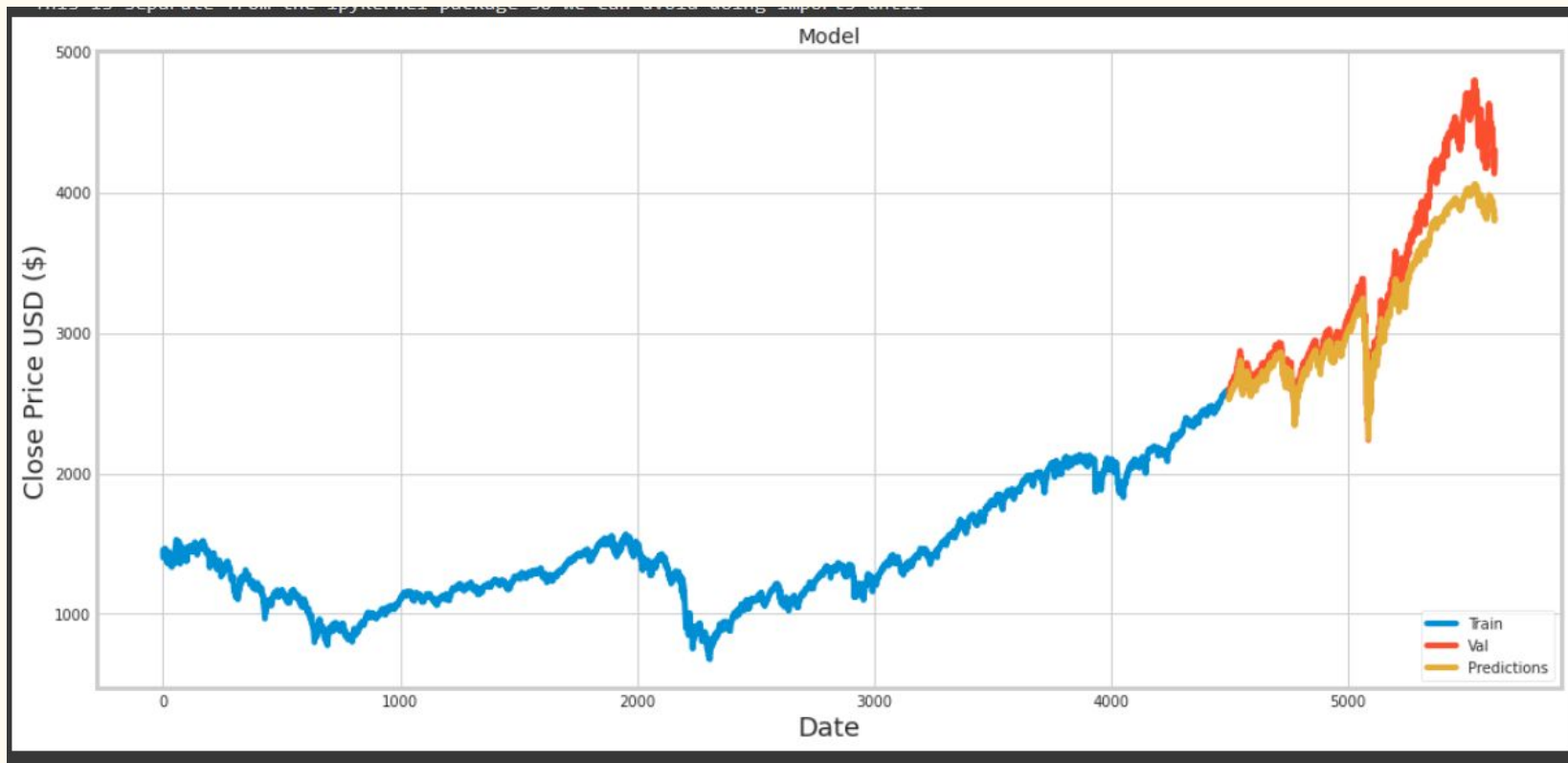# Hybrid Model without dropout

Hybrid Model with dropout

Conclusion