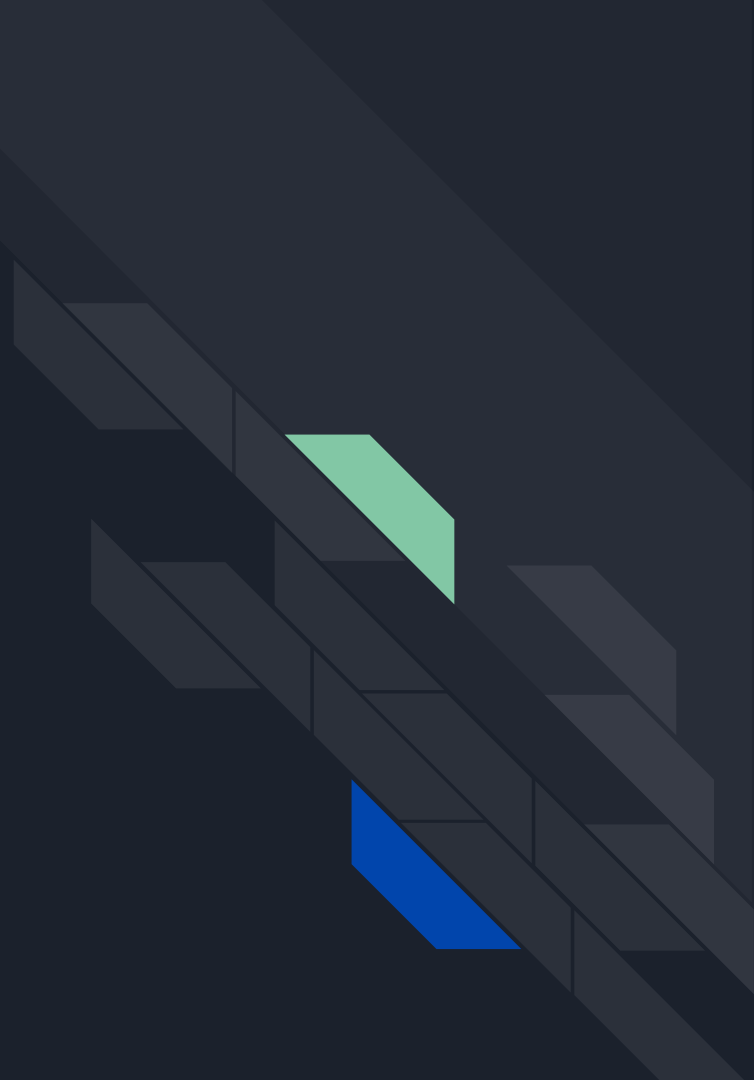# Stock Price Predictor

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A stock market, equity market, or share market is the aggregation of buyers and sellers of stocks (also called shares), which represent ownership claims on businesses.

Buy Low ,Sell High!

Agenda

- ➢ Introduction : Stock Market Prediction
- ➢ Technologies
- ➢ Data Pre Processing
- ➢ Design of LSTM Model
- ➢ Performance Metrics
- ➢ Challanges
- ➢ Demo

Introduction

- Stock market prediction is the act of trying to determine the future value of a company stock or other financial instrument traded on an exchange.
- Prediction methodologies fall into three broad categories which can (and often do) overlap. They are fundamental analysis, technical analysis (charting) and technological methods.
- Fundamental analysis: Evaluate a company's past performance as well as the credibility of its accounts. Many performance ratios are created that aid the fundamental analyst with assessing the validity of a stock, such as the P/E ratio.
- Technical Analysis: They seek to determine the future price of a stock based solely on the trends of the past price (a form of time series analysis).

➢ **Technological Methods:** Due to advances in computer technology,stock market prediction has since moved into the technological realm. The most prominent technique involves the use of artificial neural networks (ANNs) and Genetic Algorithms(GA).

➢ It uses historical data to learn the patterns and predict future prices .
➢ A Recurrent neural network (RNN) is most commonly used Neural network for training.
➢ LSTM, a type of neural network is used in this project. It uses a certain time window to learn the features.

Technologies

- Python
- Keras
- Google Colab
- Streamlit

Data Pre-Processing

➢ Historical data for last 10 years is collected from Yahoo Finance (yfinance).

➢ It has data like Date, Open Price, Close Price, Adjusted Price, Volume, High, Low.

➢ For prediction we have used Open, Close, High, Low, Adjusted Low from this dataframe.

➢ New variables like "7 days Moving Average" and "14 days Moving Average" are introduced for each data point which i believe have a certain impact on Stock Price and will be useful for predictions.

➢ Re-formatted data to adjust the 7MA and 14MA.

Final Data Frame

- ➤ State bank of India (SBIN.NS) was selected for training.
- ➤ Data ranges from '2010-01-01' to '2021-11-30'

	Open	High	Low	Close	Adj Close	7MA	14MA
0	227.500000	230.000000	227.500000	229.119995	202.633774	227.691428	221.631786
1	230.800003	231.000000	228.009995	229.205002	202.708954	227.691428	221.631786
2	229.699997	231.500000	228.500000	230.580002	203.925018	227.691428	221.631786
3	230.600006	231.000000	228.110001	229.289993	202.784119	227.691428	221.631786
4	229.399994	230.389999	228.009995	228.604996	202.178329	227.691428	221.631786
...	...	...	...	...	...	...	...
2932	485.250000	495.399994	480.000000	493.049988	493.049988	499.199995	511.471433
2933	495.799988	500.000000	489.049988	493.149994	493.149994	496.599993	509.432146
2934	490.000000	495.450012	486.299988	490.549988	490.549988	494.314279	506.782144
2935	486.250000	487.899994	467.100006	470.500000	470.500000	490.799992	502.500000
2936	470.000000	477.750000	454.299988	465.100006	465.100006	486.078565	498.346429

2937 rows × 7 columns

Design of Neural Network

Using LSTM

- ➢ A stacked Long short-term memory (LSTM) of 3 layers model is designed.

- ➢ Number of layers of LSTM was decided through trial and error.

- ➢ LSTM layers were followed by a dense layer and output layer.

- ➢ The input layer would take 7 features as mentioned before.

- ➢ Output layer would give output for Predicted Open Prices.

Design of Neural Network

➢ Input Shape = n_samples x timesteps x n_features

➢ Training Data = 80%
  ○ 2349x 14 x 7

➢ Testing data = 20%
  ○ 574 x 14 x 7

➢ Here we are considering timesteps as 14 as we assume that past 14 days trend will decide the prediction ie. LSTM will learn from last 14 days and predict the 15th day prices.
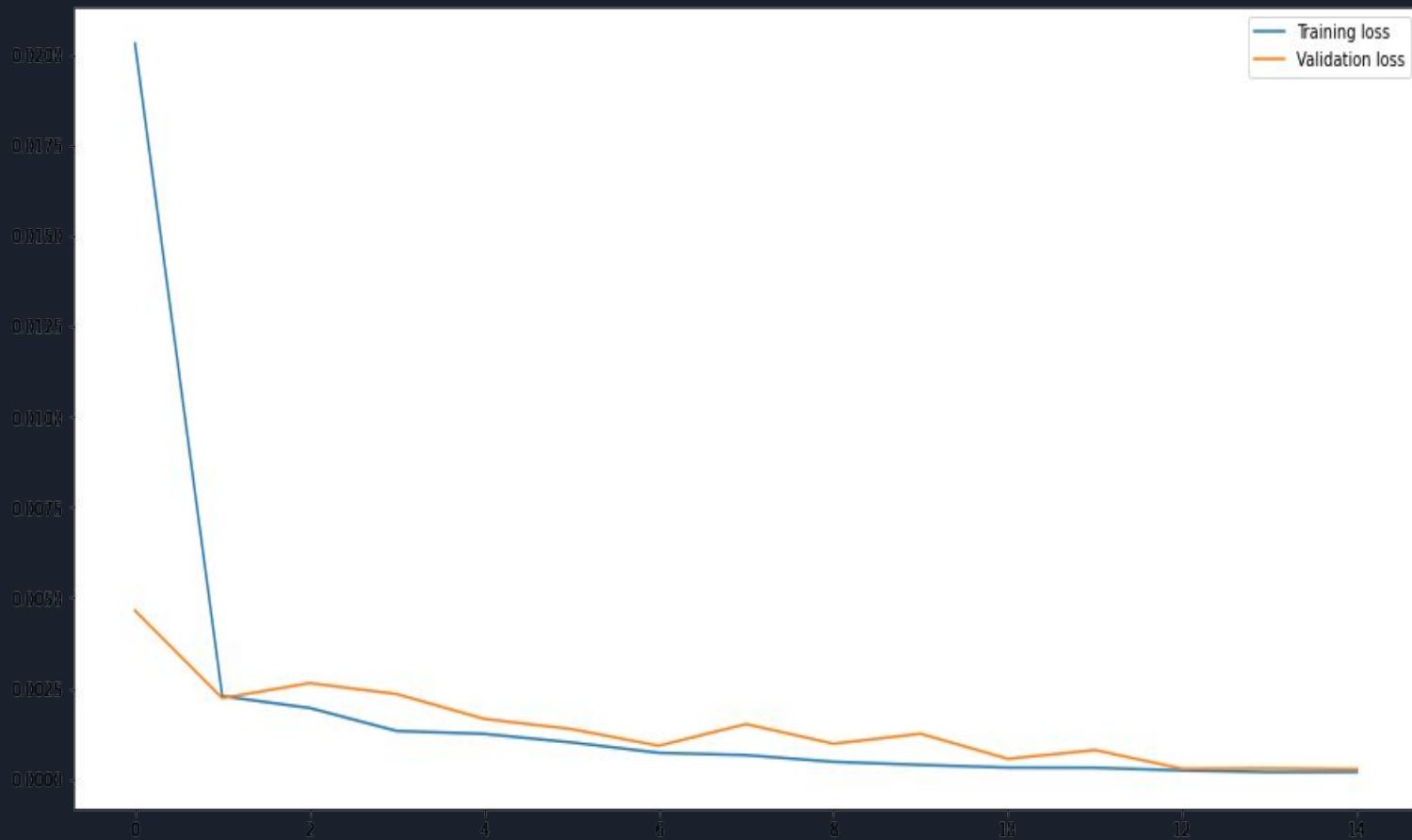
Design of Neural Network

*Best fitted

➢   Number of Epochs   = 15

➢   Validation set = 20%

➢   Batch size = 16.

➢   The input layer would take 7 features as mentioned before.

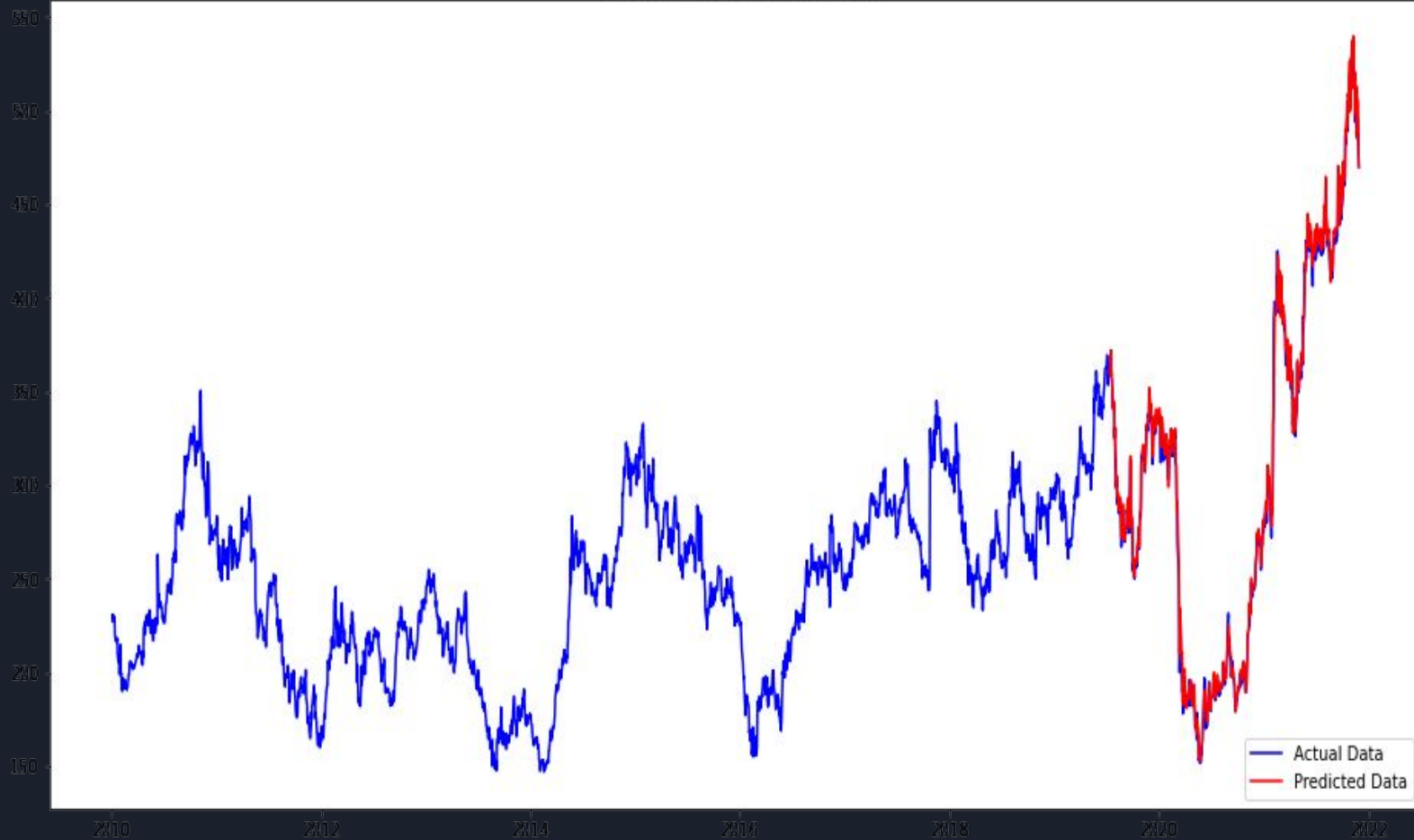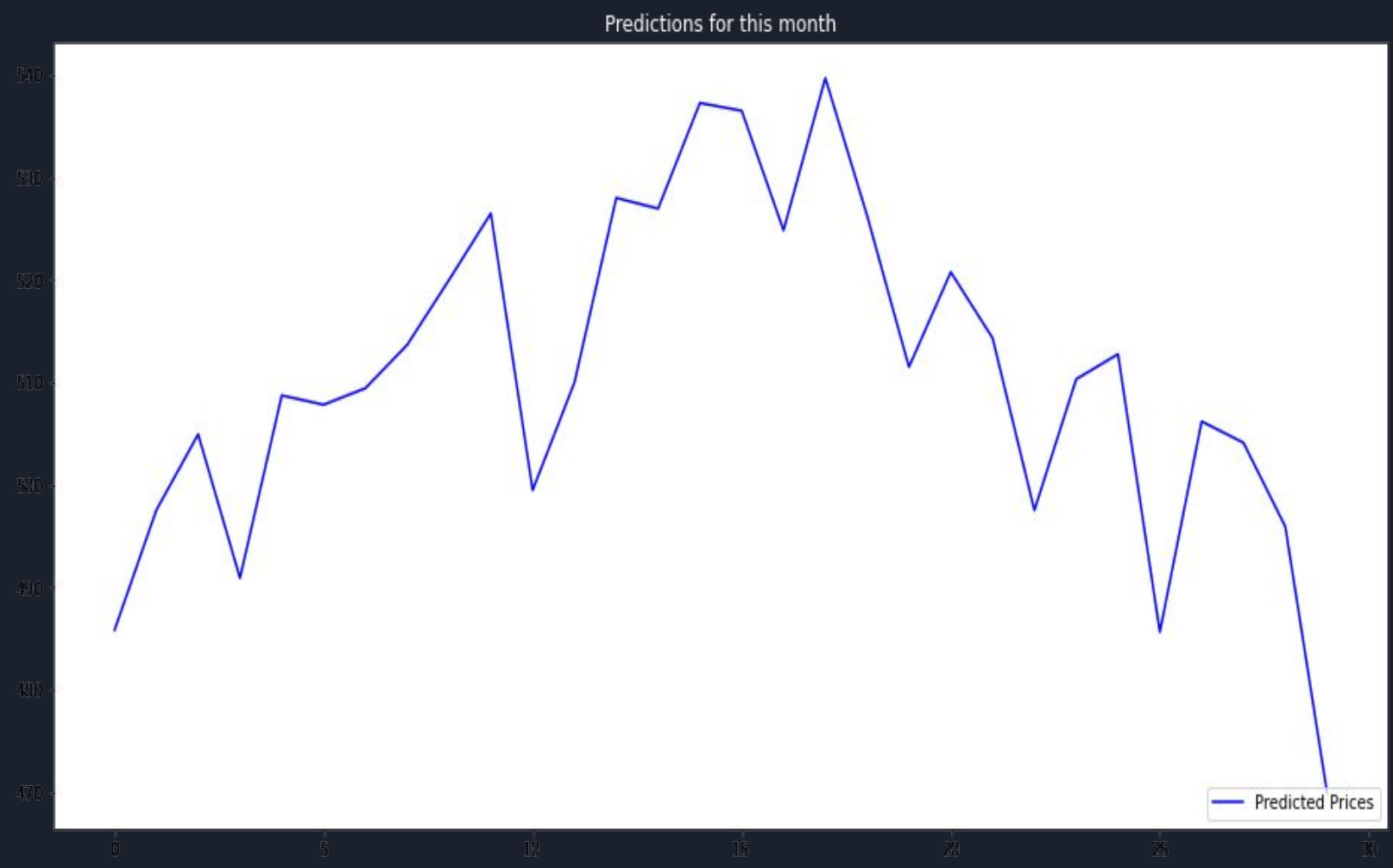➢   Output layer would give output for Predicted Open Prices.

Model Architecture
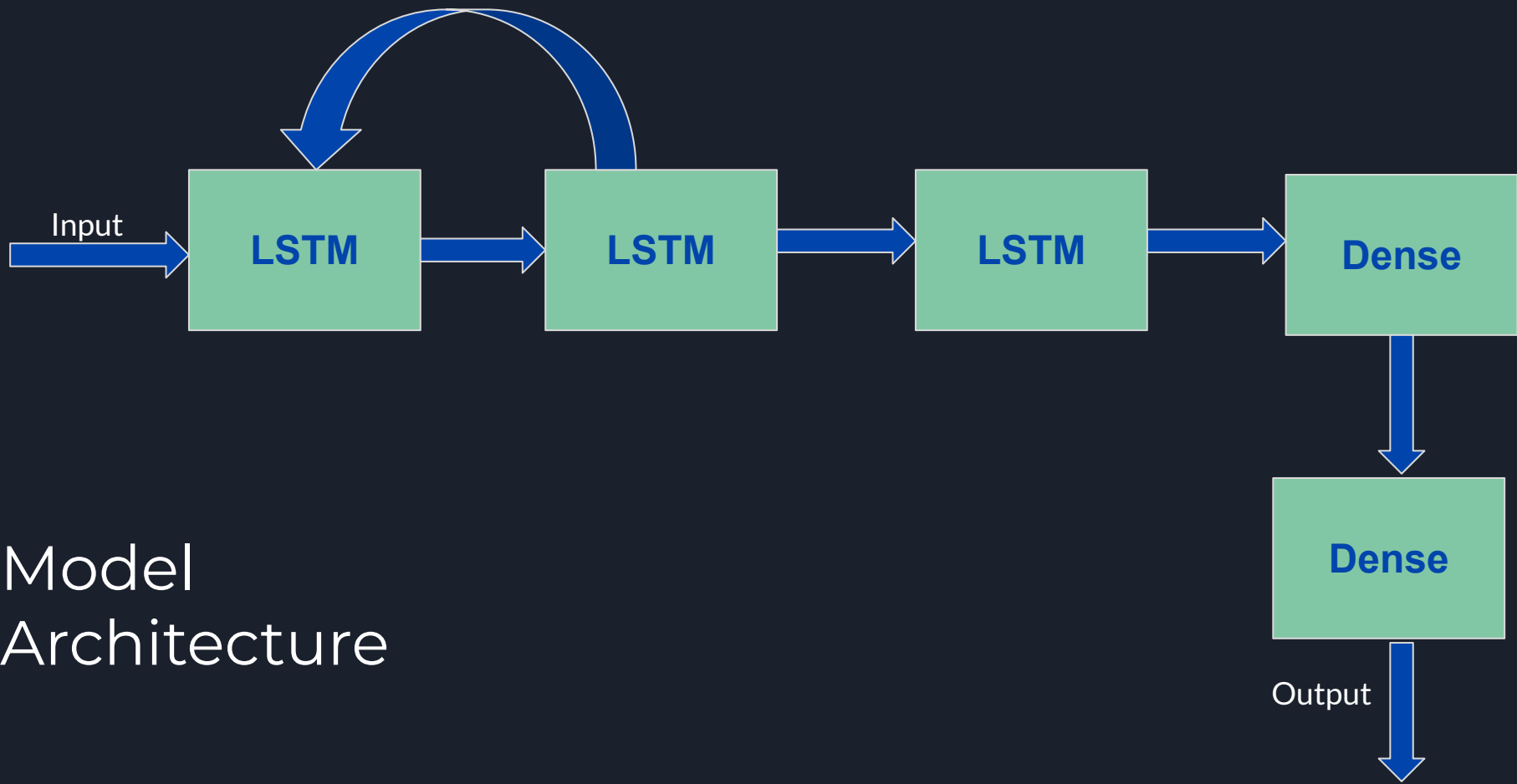
Train-Validation Loss Graph

Demo

Predicted vs Actual Prices Graph

Month Prediction Graph

Predictions for this month

Performance Metrics

➢ **Mean Absolute Error:** The numerical Absolute difference between the predicted value and the actual value.
  ○ Observed Value: 3.64

➢ **Root Mean Squared Error:** Standard deviation of the residuals (prediction errors). Residuals are a measure of how far from the regression line data points are.RMSE is a measure of how spread out these residuals are.
  ○ Observed Value: 5.08

Trading Strategy

➢ When the 7MA crosses above the 14MA, it's a BUY signal, as it indicates that the trend is shifting up. This is known as a "golden cross."

➢ When the 7MA crosses below the 14 MA, it's a SELL signal, as it indicates that the trend is shifting down. This is known as a "dead/death cross."

Thank You!