# RNN and LSTM model building on company stocks data

ASSIGNMENT 4

COMPANY : JUBILANT FOODWORKS

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# 1. About Jubilant Foodworks

Jubilant FoodWorks Limited (JFL/Company) is part of the Jubilant Bhartia Group and is India's largest food service Company.

The company was incorporated on 16 March 1995 as Domino's Pizza India Private Ltd. and began operations in 1996. It changed its name to Jubilant FoodWorks Ltd in 2009.

The company opened India's first Domino's Pizza outlet in New Delhi in 1996. The Company holds the master franchise rights for three international brands, Domino's Pizza, Dunkin' Donuts and Popeyes®addressing three different food market segments.

The company also operates two homegrown restaurant brands called Ekdum! and Hong's Kitchen.

Hong's Kitchen is in the Chinese cuisine segment & has also begun offering brand-owned ready-to-cook range of sauces, gravies and pastes, 'ChefBoss'. The former offers the widest range of Biryanis curated from various parts of India using authentic ingredients along with an extensive range of Kebabs, Curries, Breads, Desserts and Beverages.

The Company currently operates more than 1,435 outlets for Domino's Pizza, Dunkin' Donuts and Hong's Kitchen and is a market leader in the pizza segment. The Company has more than 30,000 brand ambassadors committed to deliver value to its customers.

On 1 January 2021, Jubilant FoodWorks purchased a 10.76% stake in Barbeque Nation Hospitality Limited for ₹92 crore (US$12 million).

.On 19 February 2021, the company announced that it would acquire complete ownership of Netherlands-based Fides Food Systems Coöperatief UA for £24.80 million through its subsidiary Jubilant Foodworks Netherlands BV. The acquisition marks Jubilant FoodWorks entry into the Eurasian market. Fides held a 32.81% stake in DP Eurasia NV, which is the master franchisee for Domino's Pizza in Turkey, Russia, Azerbaijan and Georgia. Jubilant Foodworks announced that it had acquired an additional 6.98% stake in DP Eurasia taking its total stake in the company to 39.79%.

## 2. Exploration of Jubilant Foodworks stocks

i) Shown below is the graph of the opening value of the stock from 2018 to 2019. The red line indicates 2018 stocks opening value and the green line represents 2019 stocks opening value.



Training Data Jan 2018- Dec 2019
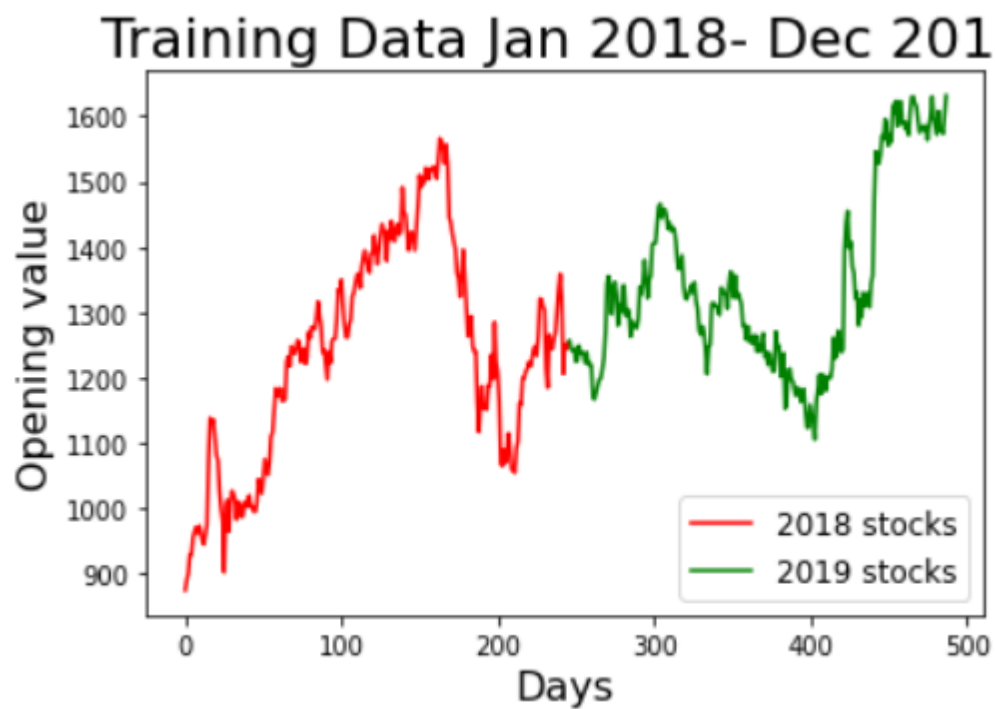
ii) Shown below is the graph of the test data of the study - the graph on the left is of the opening value of stocks from January to March 2020 and the graph on the right is of the opening value of stocks from April to June 2020.



Test set stocks Jan-Mar & Apr-Jun 2020
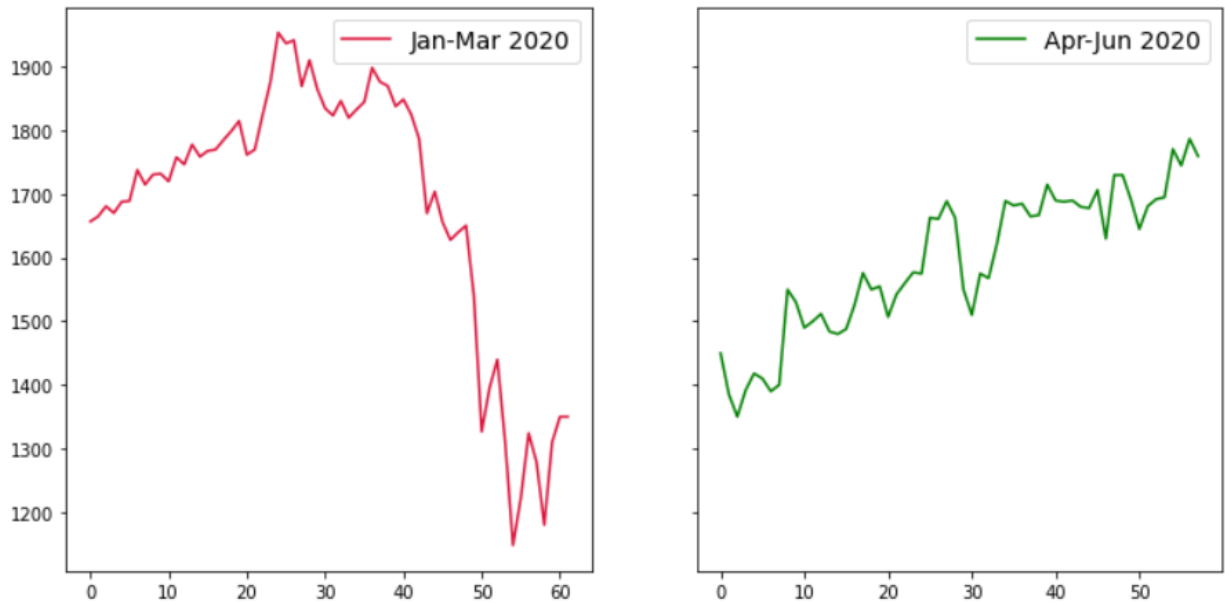
The line chart (left) shows that the stocks fell drastically towards March, when the lockdown was declared. In the line chart (right), when the unlock series started, the trend started to rise.

# Training Data Volume Jan 2018- Dec 2019
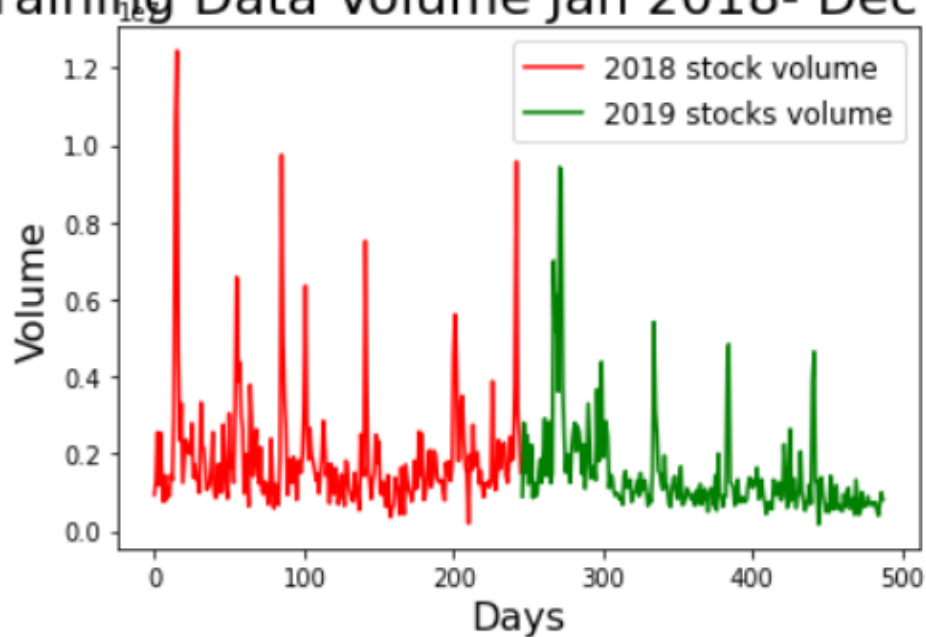
iii) The above chart shows the volume of stocks traded for the year 2018- 2019



# Test set Volume of stocks Jan-Mar & Apr-Jun 2020
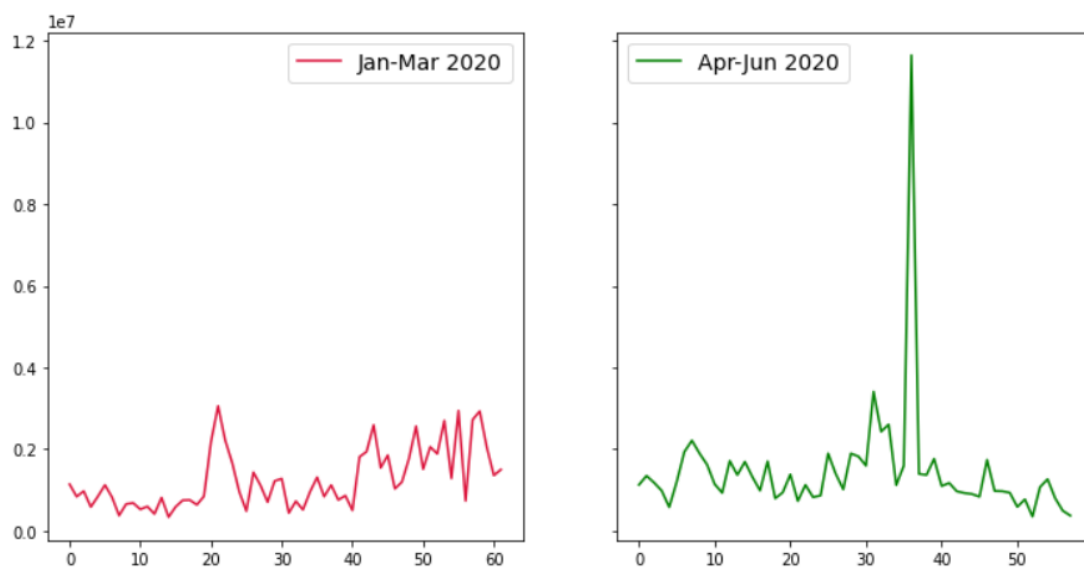
iv) The above chart shows the volume of stocks traded for the period Jan- Mar 2020 and Apr- Jun 2020.

# 3. Prediction of the stock prices using RNN for test data 1 and test data 2

The trend of opening value of Jubilant Foodworks stocks is generally going up in 2018 and 2019, as seen in the exploration part.

The real stock values in the Jan- Mar 2020 period were increasing till Jan 25, but when the first COVID case was inspected in India, people were being cautious and stopped eating fast food. So, the stock price decreased dramatically.
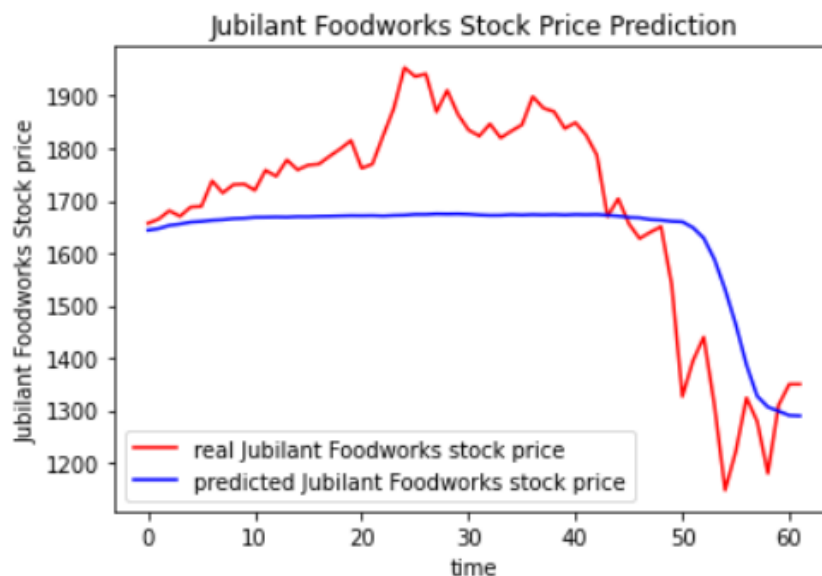
For the Apr-Jun 2020 period, the lockdown was getting unlocked and people started eating out. So, the stock price can be seen increasing.

The RNN Model has 4 SimpleRNN layers with 50 units each and a dense layer with 50 neurons before the final output dense layer.

50 epochs with 32 batch sizes are used to fit the model with the data.

# 4. Model Evaluation

**TEST DATA1 : Jan-Mar 2020**

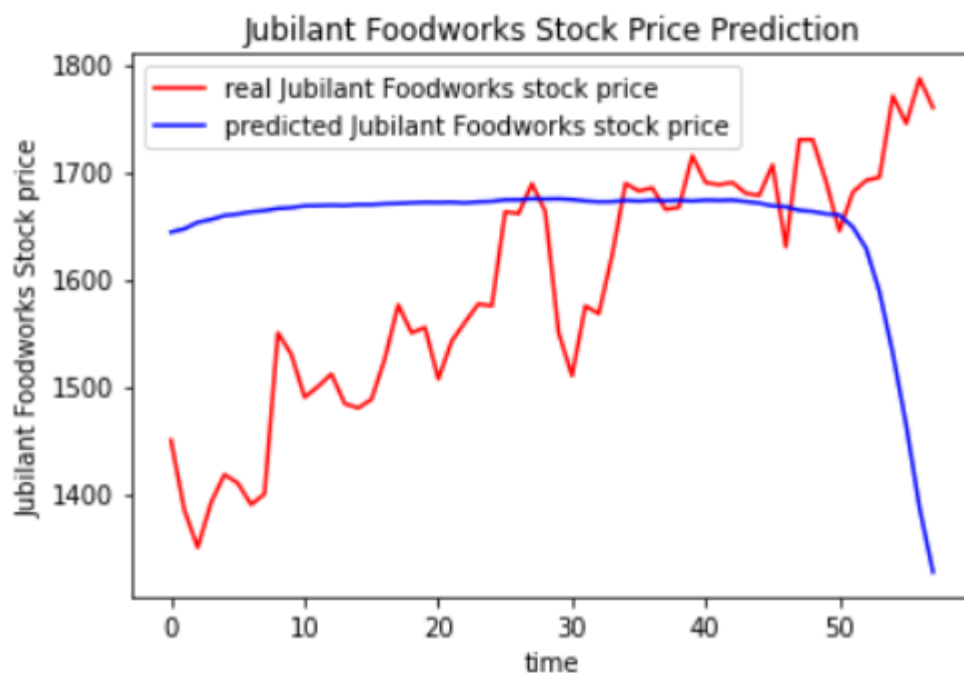This is the prediction for the Jubilant Foodworks stock price (blue line) for the period Jan-Mar 2020.

We can observe that the predicted stock price line is way over the side of the real stock price line.

**The RMSE value for the RNN model for Jan-Mar 2020 data set:**

```
        Total model error is -  154.56550502221307
```

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**TEST DATA2 : Apr-Jun 2020**



This is the prediction for the Jubilant Foodworks stock price (blue line) for the period Apr-Jun 2020.

We can observe that the predicted stock price line is way over the side of the real stock price line.

**The RMSE value for the RNN model for Apr-Jun 2020 data set:**

```
        Total model error is -  159.07227355757843
```

# 5. Prediction of the stock prices using LSTM for test data 1 and test data 2

The trend of opening value of Jubilant Foodworks stocks is generally going up in 2018 and 2019, as seen in the exploration part.

For the Apr-Jun 2020 period, the lockdown was getting unlocked and people started eating out. So, the stock price can be seen increasing.

The LSTM Model has 5 LSTM layers with 50 units each and a final output dense layer.

75 epochs with 32 batch sizes are used to fit the model with the data.

# 6. Model Evaluation

**TESTDATA 1 : Jan-Mar 2020**


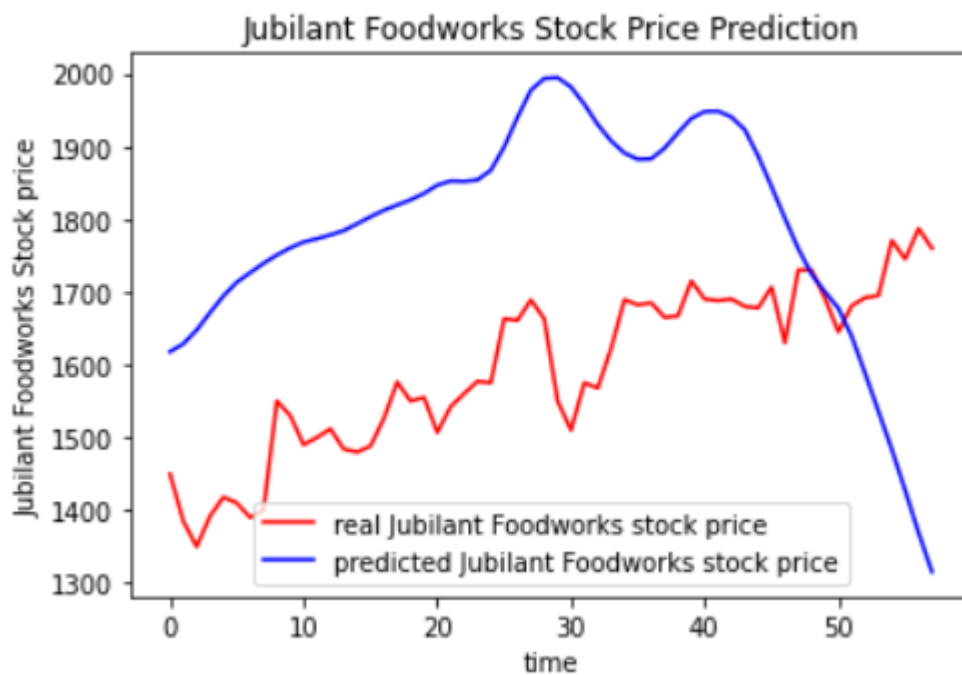
Jubilant Foodworks Stock Price Prediction

This is the prediction for the Jubilant Foodworks stock price (blue line) for the period Jan-Mar 2020. We can observe that the predicted stock price line is slightly over the real stock price line.

**The RMSE value for the LSTM model for Jan-Mar 2020 data set:**

        `Total model error is -  118.990135967807`

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**TESTDATA 2 : Apr-Jun 2020**



This is the prediction for the Jubilant Foodworks stock price (blue line) for the period Apr-Jun 2020. We can observe that the predicted stock price line is way away from the real stock price line.

**The RMSE value for the LSTM model for Apr-Jun 2020 data set:**

           `Total model error is -  273.6790481120225`

# 7. Observations and impact of Covid 19 on the stock prices

Stock Prices for the food industry were the worst hit. Jubilant Foodworks has the contract of functioning of three international fast food chains - Domino's Pizza, Dunkin Donut and Popeyes and two homegrown brands - Ekdum and Hong's Kitchen.

So, the stock prices of Jubilant Foodworks were hit in the lockdown and as the lockdown was lifted people started eating outside again. The stock prices drastically went down in the lockdown due to COVID-19.