Stock Price Prediction of Moderna Using LSTM

Data Science Assignment 01

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moderna®

NasdaqGS - Nasdaq Real Time Price • USD

Moderna, Inc. (MRNA)

Follow Compare

54.10 -0.72 (-1.31%) **54.20** +0.10 (+0.18%)

At close: October 18 at 4:00 PM EDT After hours: October 18 at 7:59 PM EDT

Dec 10, 2018 - Oct 20, 2024 Historical Prices Daily

Currency in USD

Date	Open	High	Low	Close	Adj Close	Volume
Oct 18, 2024	54.53	55.10	53.55	54.10	54.10	6,752,500
Oct 17, 2024	57.08	57.15	54.82	54.82	54.82	5,423,700
Oct 16, 2024	57.82	58.45	57.12	57.46	57.46	3,258,200
Oct 15, 2024	57.64	58.62	57.12	57.31	57.31	4,087,300
Oct 14, 2024	57.90	58.96	57.05	57.73	57.73	3,361,300
Oct 11, 2024	56.71	59.73	55.70	58.29	58.29	6,261,000
Oct 10, 2024	58.41	58.70	56.64	56.83	56.83	4,415,000
Oct 9, 2024	58.33	59.52	57.90	58.86	58.86	2,974,700

Long Short-Term Memory (LSTM)

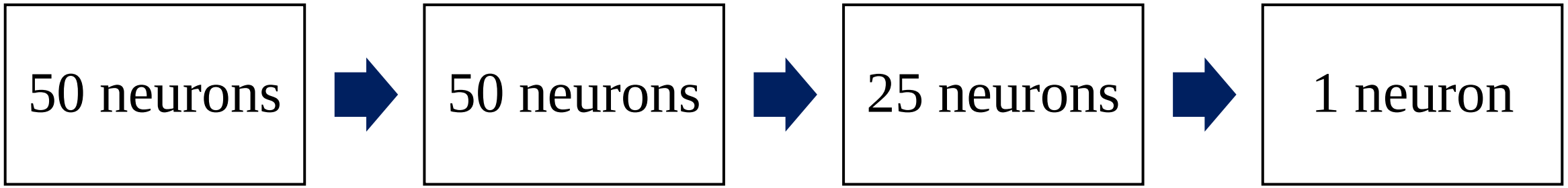
- A recurrent neural network (RNN)
- Used to model sequential data from historical data
- Can deal with random fluctuations that do not reflect the true underlying trend
- Memory cells help flatten short-term fluctuations and focus on the general trends over time.
- Effective for time series predictions, where the model must capture patterns and dependencies over time.

Steps in Model Development

(Code link in the description)

1. Stock data was downloaded and closing price was selected.
2. The values were scaled between 0 – 1 range.
3. Scaled data was split into 80% training and 20% testing.
4. Data for the past 60 days was used to predict the next day's closing price.
5. The model was structured.
6. Predictions were made by training the model.
7. Performance metrics were evaluated.

Model Structure



First LSTM Layer:
Sequence processing of 60 days

Second LSTM Layer:
Only passes the final output (60^{th} day)

First Dense Layer:
Learns complex patterns

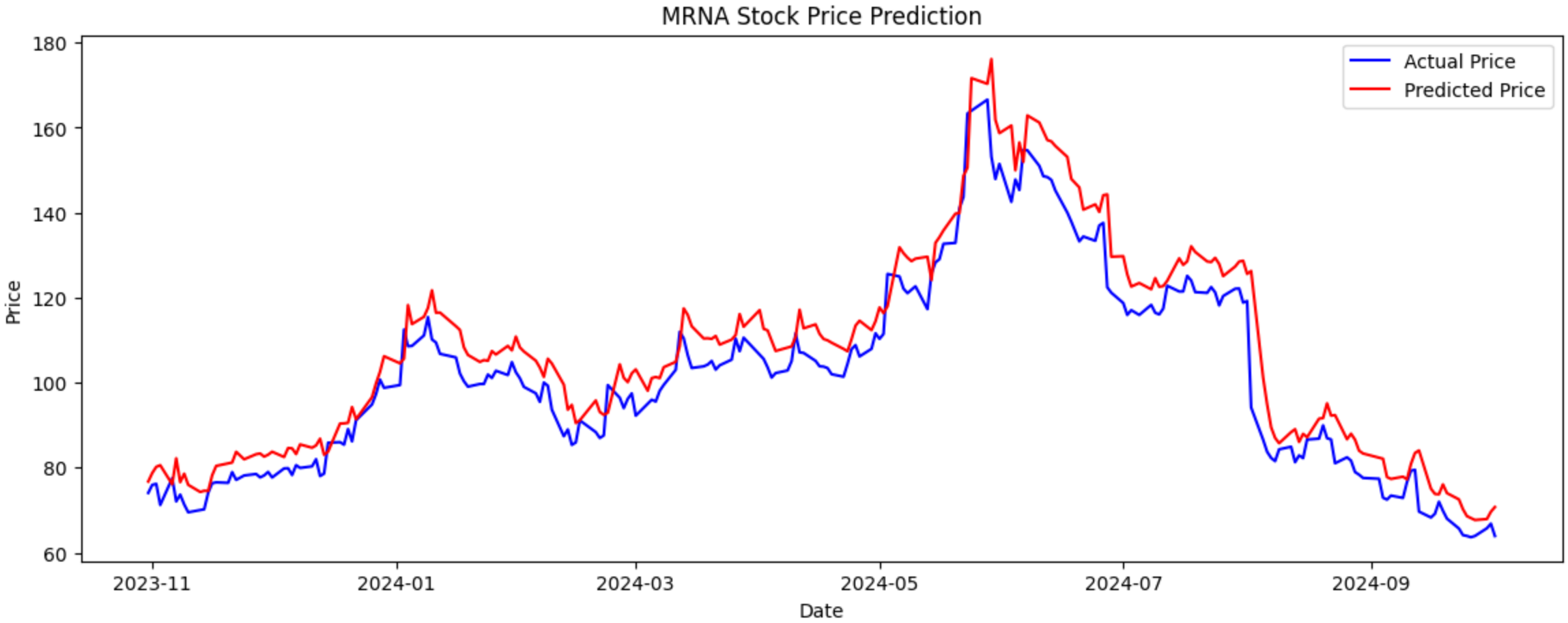
Second Dense Layer:
Produces final prediction

Results (Actual vs. Predicted Price)

For 5 entries,

Actual	Predicted
74.069	76.746
75.959	78.746
76.199	80.197
71.230	80.585
77.529	76.092

Visualization



Performance Metrics

Evaluating the model's performance

Metric	**Value**
Root Mean Squared Error (RMSE)	7.357753
Mean Absolute Error (MAE)	6.304151
Coefficient of Determination (R^2)	0.898834

Thank you!