Consultant: Alexander Wong

Stealth Wealth

Group 2020.56
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Motivation

Stock trading plays a vital role in economic development. It is important to learn about potential risks and trading strategies prior to investing money.

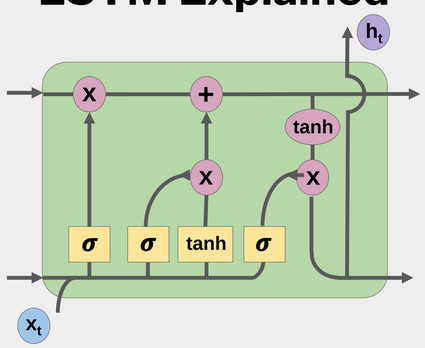
Objective

To provide an all-in-one educational platform that features stock information, recommendation and prediction.

Work Highlights

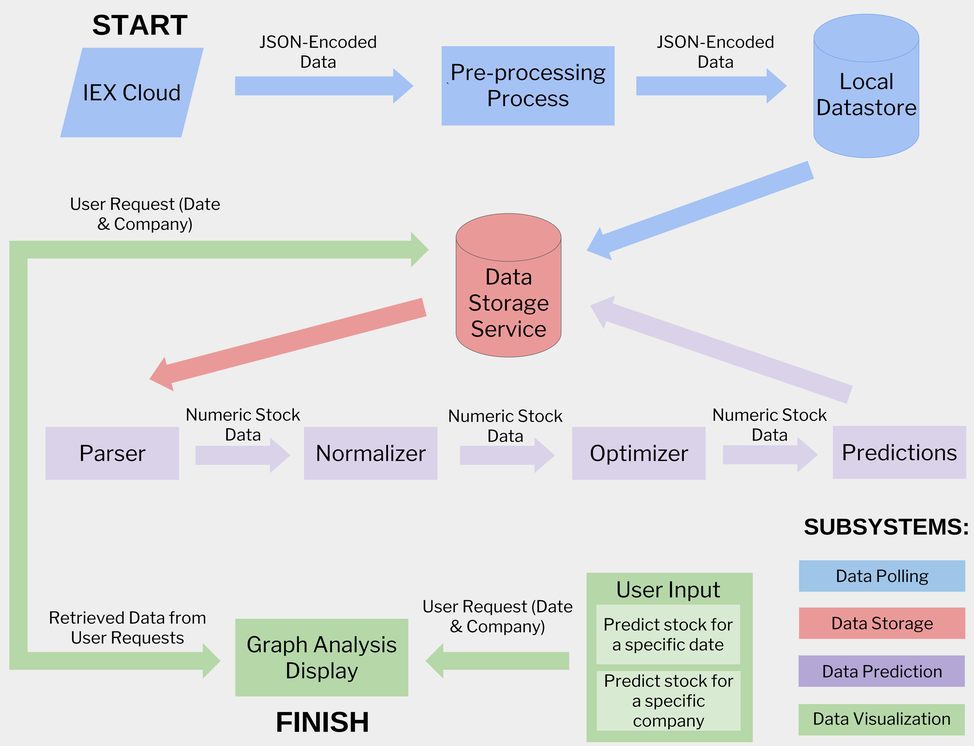
- Neural network
  - Input layer: past date and stock prices
  - Hidden layer: LSTM computation
  - Output layer: future date and prices
- Improved the model's accuracy
  - Minimized mean squared error using Adam optimization
- Generated insights by visualizing data

LSTM Explained



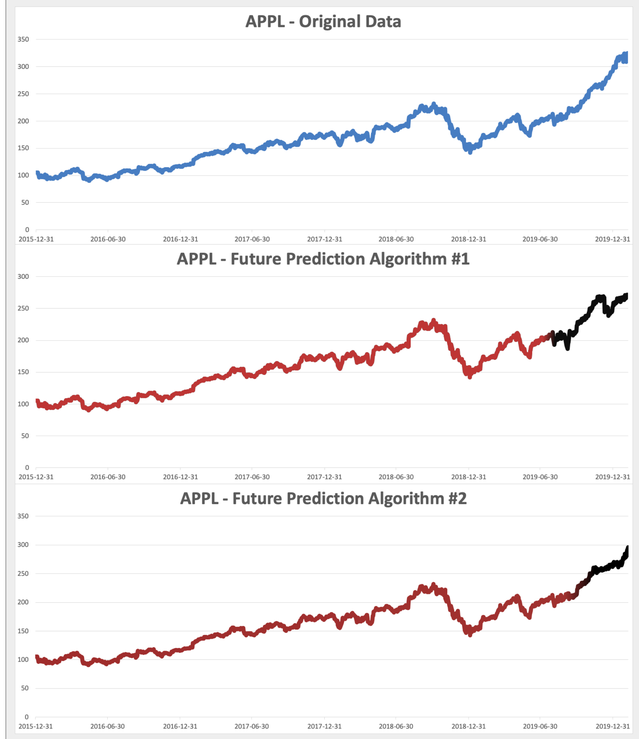
$f_t = s\,(W_f\,[h_{t-1}, x_t] + b_f\,)$ — f_t = forget gate layer
$i_t = \sigma(W_i\,[h_{t-1}, x_t] + b_i)$ — i_t = input gate layer
$\check{C}_t = tanh(W_C\,[h_{t-1}, x_t] + b_C)$ — $\check{C}_t$ = new candidate values
$C_t = f_t * C_{t-1} + i_t * \check{C}_t$ — C_t = new cell state
$o_t = \sigma(W_o\,[h_{t-1}, x_t] + b_o)$ — o_t = output sigmoid layer
$h_t = o_t * tanh(C_t)$ — h_t = output between -1 and 1

System Design



Alternatives

Subsystem	Alt 1	Alt 2	Alt 3	Justification
Algorithm	LSTM RMSE: 2.15	K_Nearest Neighbours RMSE: 71.19	ARIMA RMSE: 13.99	• Able to handle noise and distributed representations • Ideal for long-term sequence prediction
Cloud Service Provider	Microsoft Azure	Amazon Web Services	Google Cloud	• Extended services (automated backup) • Ease of use and payment flexibility
UX Platform	Tableau	QlikSense	Power Bi	• Team familiarity • Extensive features for customization



	Closing Price (Average)	Error (%)
Actual Data	317.84	
Algorithm 1 (Prediction)	266.81	16.06
Algorithm 2 (Prediction)	278.863	12.26

- Algorithm 1: LSTM with K-fold cross-validation
  - K = {4, 5, 6, 7, 8, 9, 10}
  - Best case: K = 5
- Algorithm 2: LSTM with train/test split
  - Training : testing = {60:40, 70:30, 80:20}
  - Best case: 70:30 training to testing ratio

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- Interested to learn more?
  - Product Feature Walkthrough[video]: https://youtu.be/UVivtcQOm2E
  - Detailed Design and Project Timeline[report]: https://shorturl.at/crQSX
  - ML Models Comparison[code]: https://github.com/lilydia/ML_stock_prediction
- Questions?
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