

FinTech Project Part B
Data Design and Analysis Report

Option #2 NeoBank Project

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Station #3 Model Design

a. What model have you designed and aiming to use in the implementation

The ARIMA (Autoregressive Integrated Moving Average) Model would be used in the implementation. The ARIMA model could generate predictions using time series forecasting based on the historical data. Therefore, based on data that been processed by station #1 and station #2, The ARIMA model could generate predictions of features that related with agriculture, including average temperature, rainfall, etc.

b. Any model assumptions

ARIMA models only work under the stationarity assumption, which means variables must keep constant variance and mean over time.

ARIMA assumes that there is a linear relationship between historical data and current reality observations.

c. Any restrictions, computing speed, capacity, accuracy issues

The ARIMA model cannot be used if variables and data do not have a constant variance and mean, which means the model is non-stationary. The non-stationary data needs to be transformed before using ARIMA model if really want to use it, but the accuracy would be reduced, and the error would be more because some variables that cause unexpected fluctuations in the data may need to be sacrificed. (Hyndman & Athanasopoulos, 2018) Therefore, any anomalies and unexpected extreme value will significantly impact the forecasting accuracy of ARIMA model. Besides, The ARIMA model may not be accurate when dealing with complex nonlinear time series data or highly nonlinear relationship between data. In addition, ARIMA applies to a single variable, this also leads to ARIMA models that rely solely on historical data to make predictions that limit capacity to capture complex relationships without considering complex external factors or variables.

d. What do you expect to see in model implementation

ARIMA model uses time series forecasting based on data that be processed from stations #1, #2 and #3 to generate accurate predictions of average temperature, rainfall, corn and wheat settlement price, open interest and so on. Besides, it could generate graphs that show the trend of prediction and could compare the prediction and reality to show the accuracy for further improving the model framework and details.

e. Do you see any boundaries of the model

The ARIMA model major aims to describe the autocorrelations in the data not the trend and seasonality. (Hyndman & Athanasopoulos, 2018) Therefore, it is difficult to determine where the peaks and troughs of the cycle are before observing the sequence,

because cycles do not have a fixed length.

The ARIMA model as a stationary time series does not perform well in the long time, because the trend shows stable over a long-term period with constant variance and mean value even though some cyclic behaviors may happen.

The ARIMA model is suitable for processing relatively small-scale time series data and can be challenging for large-scale datasets.

ARIMA has difficulty quantifying the uncertainty of its forecasts and needs to calculate confidence intervals and prediction intervals separately to account for the uncertainty of the forecasts.

f. How would you define Station #3 from Data Management Perspective

Station #3 will use data and features that have been prepared and processed by Station #1 and Station #2. In this station, define and build a sustainable model to further manage and analyze data, and iterate and test to improve the model and to re-assess features. The model could be used to include regression, portfolio optimization, ARIMA forecasting, recurrent neural networks and so on. The critical essential part of this stage is selecting and building the most appropriate model based on the current product background, client requirements and data characteristics. Finally, using model design and analysis, providing infographics and interactive reports, and transforming the above data into analyzable data into actionable business decisions under the premise of ensuring data clarity and simplicity, and then these results will be passed to the final fourth station for final implementation.

Station #4 Model Implementation

a. Product Design

First, the product has strong data integration capabilities, integrating data from a variety of data sources, including financial markets, news media, weather forecasts, shipping data and social media sentiment, effectively improving the accuracy of the algorithm. Second, the product relies on powerful algorithms to provide financial experts and clients with up-to-date information and a comprehensive understanding of market movements to predict future price movements. In addition to this, this product offers personalized and customizable dashboards that allow clients to prioritize the data and metrics that are most relevant to their business. They can set reminders of key events and monitor key performance indicators in real-time. Finally, this product provides reports that summarize the most important trends and opportunities in the agricultural sector, market risk alerts, analysis of the company's situation from financial experts, and provides investment recommendations based on the company's risk preference. These reports help clients keep abreast of the latest developments and make informed strategic decisions.

b. What step you took when implementing this solution

Firstly, I wrote down the product design. Then based on the product design, I built the wireframes outline of Figma, the client journey outline. Thirdly, collect all data and results I need and get data and prediction results using Python based on the ARIMA

model built in station #3. Fourthly, finish and improve the wireframes of Figma and the client journey, then design the product using the Figma website.

c. What difficulties you faced

1. Time limit
2. Cannot get real feedback from clients, so I hardly to find the inadequacy of the product from multiple aspects.
3. Learning and using Python and Figma from scratch is quite a challenge

d. What steps do you recommend applying when introducing this financial tool product to your clients

Before introducing the product, communicate with the client to gain insight into their specific needs and problems and understand their challenges, goals and risk preference in agriculture to provide them with customized solutions.

Clearly explain the advantages and value of this financial-based product to the client. Highlights how products leverage a wide range of data streams to provide deep business insights that help clients make more informed decisions and optimize business value. Provide product demonstrations that show how the product can be applied to similar agricultural business scenarios, showing the practical effects and benefits of the product. Provide real life examples and share stories of how clients have achieved success and added value by using this financial instrument product.

Then, provide a transparent pricing policy that clarifies the product's price and payment methods. Make sure clients clearly understand the value of what they are buying and that there are no hidden fees. Finally, let clients know this product has a perfect after-sales, including the following content. 1. Provide training, a detailed user guide and technical support to ensure that clients can fully understand and use this financial instrument product and overcome any problems in the use process. 2. Provide a trial period or refund policy, so that clients have the confidence to try this financial-based product, which will reduce clients' sense of risk and increase the enthusiasm of purchasing. 3. Emphasize the product's commitment to data security and privacy protection. Ensure product compliance with relevant regulations and protection measures for client data.

After the proactive introduction, if the client has any concerns, actively respond to the client's concerns and questions. Establish an open platform of communication with clients to answer their questions and address their concerns. Finally, listen to client needs, collect client needs that cannot be addressed by this product, and use feedback as an important basis for improving products and services.

e. Describe your client journey

First, this product will be advertised on agricultural websites, the agricultural section of news websites, social platforms, agricultural we-media bloggers or influencers, and NeoBank's homepage to let potential clients know about this product.

If clients are interested in the functions and services of this product, clients read reviews of this product on the Internet, compare it with similar products, and visit

NeoBank's website. The advertisement on the home page of the NeoBank website will guide clients directly to the product introduction page, clients can have a deeper understanding of the product, and they can click 'Contact us' for further consultation. After much consultation, price comparison and investigation, clients decided to purchase the product online through the NeoBank website. They choose the service that best fits their needs and budget (prices vary, the level of detail reported and additional services offered may vary).

When using this product, the client first needs to enter the account number and password on the mobile device to complete the login, the client can view the future trend of different data, and view the customized report according to the client's company information and investment and risk preference. After a period of application, clients who explore the various functions and services may have some questions and confusion. If there is a technical problem with the website, clients can click 'Contact us' to contact Neobrand's client support team via live chat to get help. If there is a product issue, clients can click on 'Go talk to our financial expert online' and contact Neobrand's financial expert, who will quickly assist them to handle the issue.

After a period of use, the client may have some advice, suggestions, or be particularly satisfied with a certain feature, and the client may leave positive reviews or constructive feedback on the NeoBank website. In the following years, clients continued to use this product and were satisfied. When the product is upgraded or new services are offered, they consider continuing to choose the product because of their positive experience with it. Clients become loyal supporters of the product, discussing the features and benefits of the product on social media and forums. They also participate in the product's loyalty program to earn preferential rewards for future product renewals. Clients may recommend this product to family, friends, vendors, suppliers, and partners.

f. Wireframes FIGMA design

1. The first page would be the NeoBank Home page with this financial-based product advertisement to attract clients to learn more.
2. The second page is the detailed product introduction.
3. The third page is the user login page.
4. The fourth page is a comprehensive guided web page, which means it allows clients to click the button to check the future trend of weather, corn price, wheat price, and commodity news (it will show in pages from the fifth to eighth). Besides, if clients don't want to check them, they can also click next to get further information.
5. The fifth page shows the prediction of average temperature and rainfall trend, the client can click Go back to get other predictions.
6. The sixth page shows the prediction of corn's settlement price, the last price, the spread, the open interest, and the trading volume. Besides, clients can click 'Go back' to get other predictions.
7. The seventh page shows the prediction of wheat's settlement price, the last price, the spread, the open interest, and the trading volume. Besides, clients can click 'Go

back' to get other predictions.

8. The eighth page shows the sentiment score from commodity news. Besides, clients can click 'Go back' to get other predictions.
9. The ninth page follows from the fourth page, clients will see five choices, and they can choose what they want. Firstly, clients could choose to update their business information and preference, which can make the customized report more accurate and more in line with the client's requirements. Secondly, clients could choose to check their future financial performance trend, the tenth to fourteenth pages show the future balance and flow trend of clients one to five. Then, clients could click and check the customized report for further analysis and more information. Fourthly, clients could choose to talk to a financial expert online if they get confused with the customized report or want to get further help. Fifthly, clients could click to give NeoBank feedback with advice or suggestions.
10. The tenth page shows the client 1's prediction of future flow and balance.
11. The eleventh page shows the client 2's prediction of future flow and balance.
12. The twelfth page shows the client 3's prediction of future flow and balance.
13. The thirteenth page shows the client 4's prediction of future flow and balance.
14. The fourteen page shows the client 5's prediction of future flow and balance.

g. How would you define Station #4 from Data Management Perspective

Station #4 as the final step is the implementation stage of the data management process and needs to deliver the final product or services to clients according to all pre-processed from Stations #1, #2 and #3. Using graphs, tables and dashboards to show data visualization at first, then analyze and interpret data to provide business insight to the client and help clients to improve business value through a series of data reporting and presentation under the premise of complying with and responding to strict regulations. Finally, collect all feedback and deliver feedback to all four stations, constantly improve these four stations, and try to update the product to further satisfy clients' needs and requirements and to create a more marketable, competitive and concise product and service.

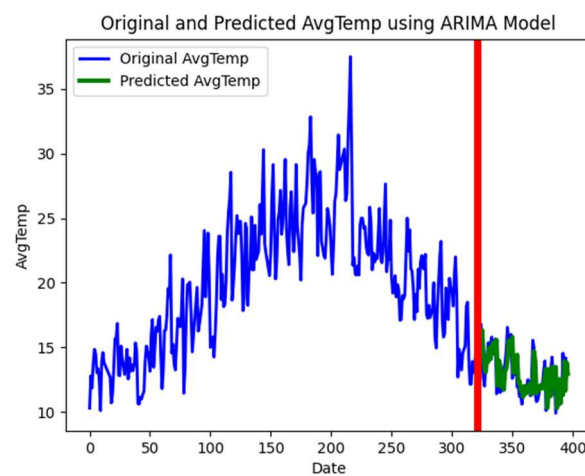
Reference

Hyndman, R.J. and Athanasopoulos, G. (2018). *Forecasting : Principles and Practice*. 2nd ed. [online] Heathmont, Vic.: Otexts. Available at: <https://otexts.com/fpp2/>.

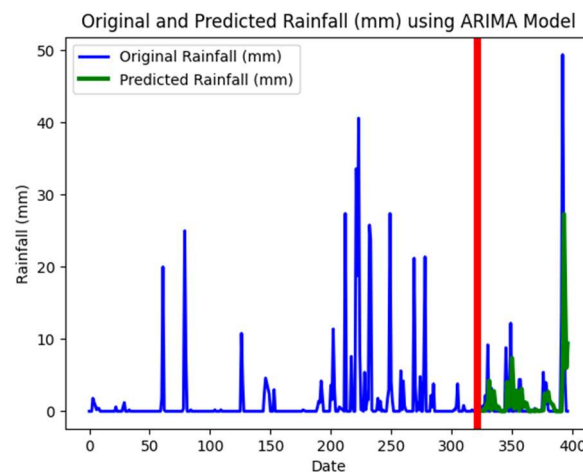
APPENDIX

1. Weather

a) Average temperature prediction through ARIMA Model



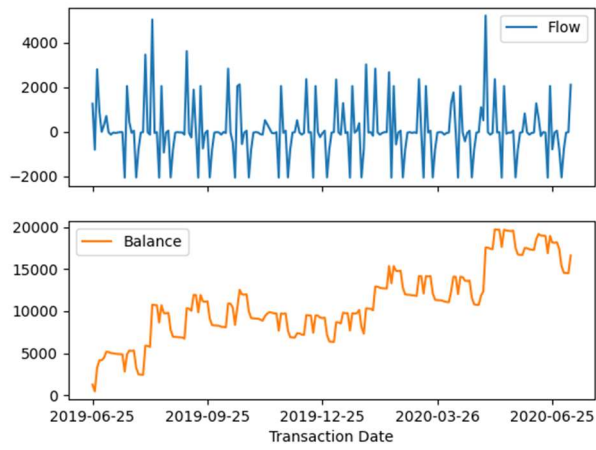
b) Rainfall prediction through ARIMA Model



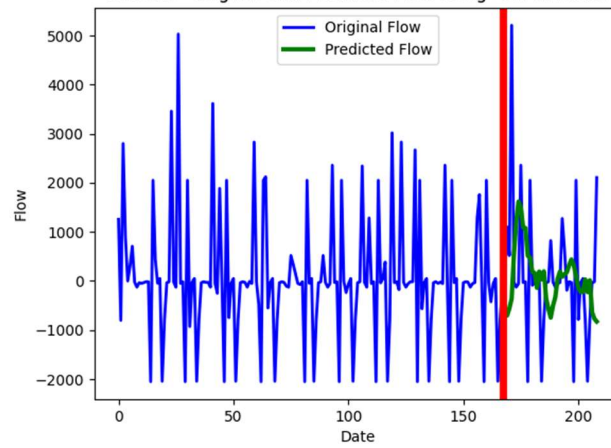
2. Clients' information

a) Client 1

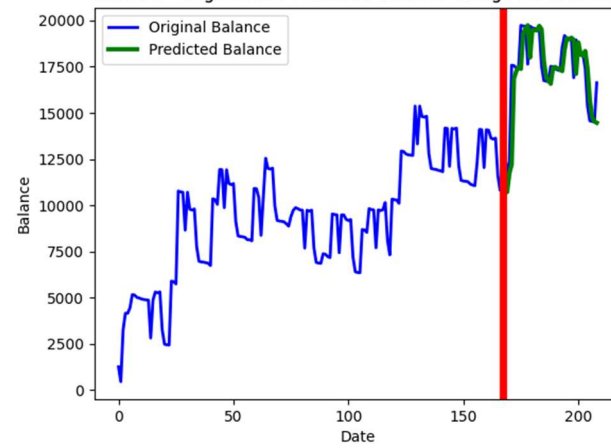
Client 1



Client 1 - Original and Predicted Flow using ARIMA Model

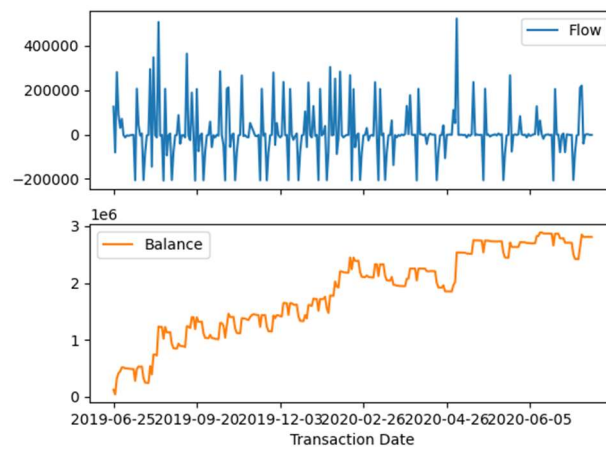


Client 1 - Original and Predicted Balance using ARIMA Model

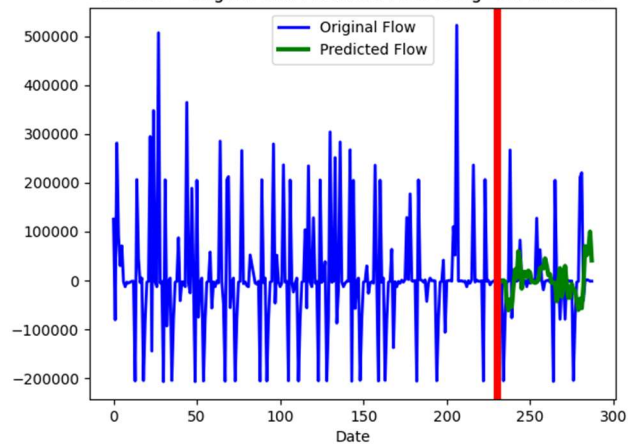


b) Client 2

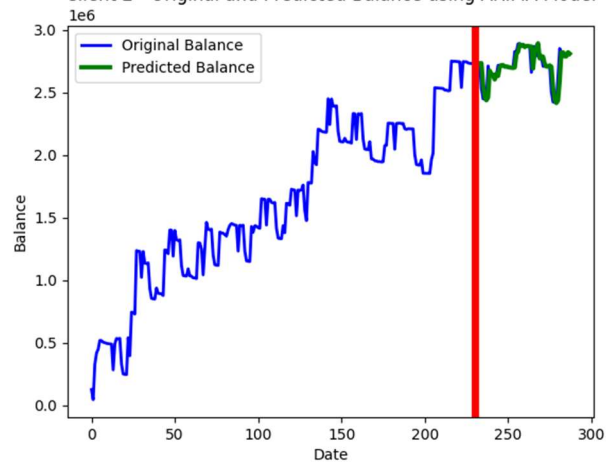
Client 2



Client 2 - Original and Predicted Flow using ARIMA Model

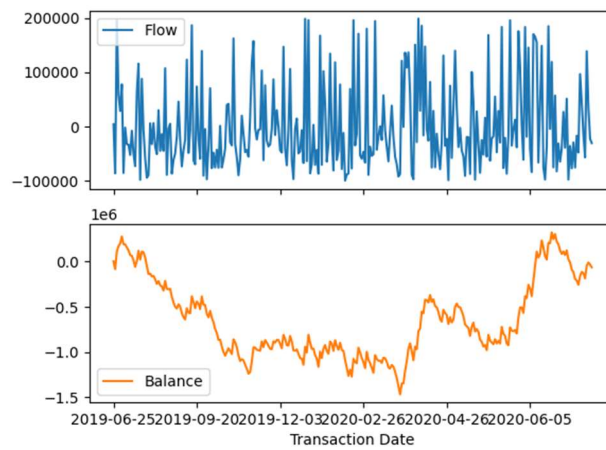


Client 2 - Original and Predicted Balance using ARIMA Model

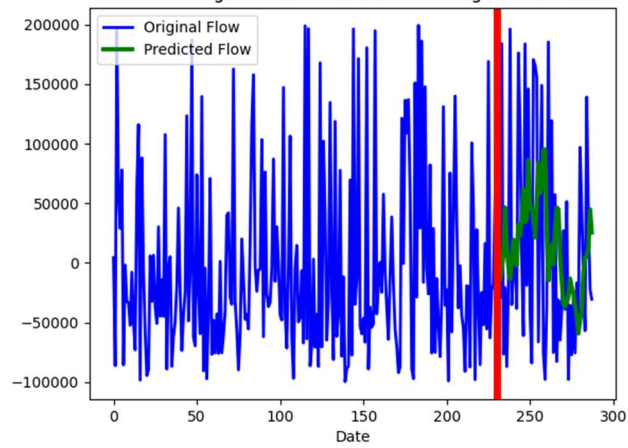


c) Client 3

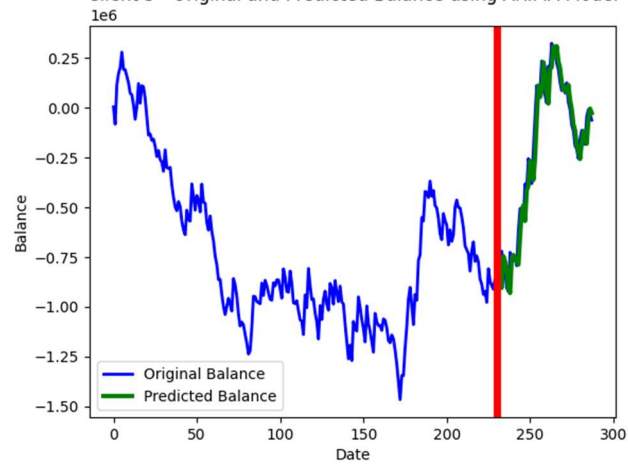
Client 3



Client 3 - Original and Predicted Flow using ARIMA Model

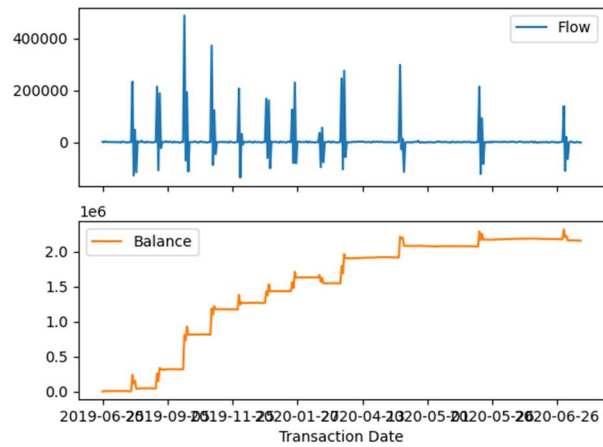


Client 3 - Original and Predicted Balance using ARIMA Model

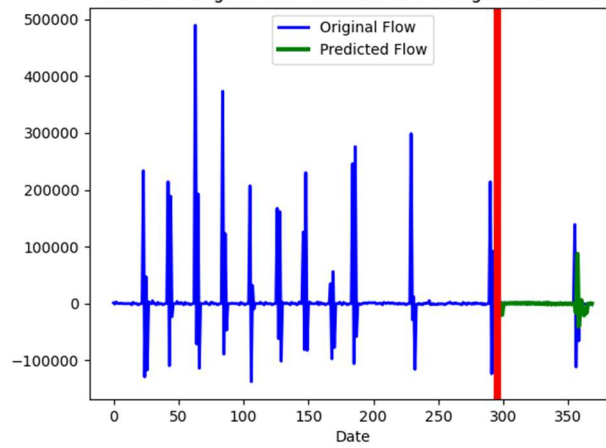


d) Client 4

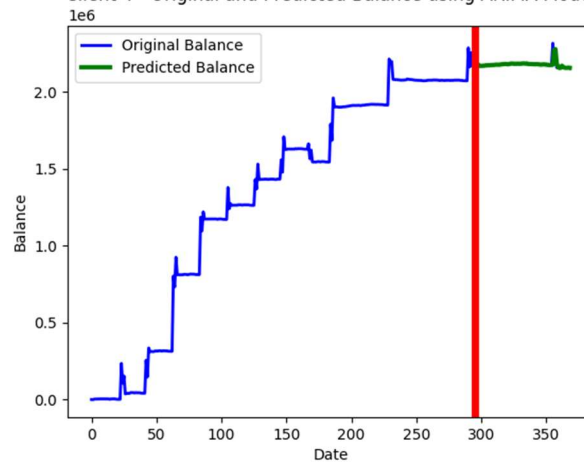
Client 4



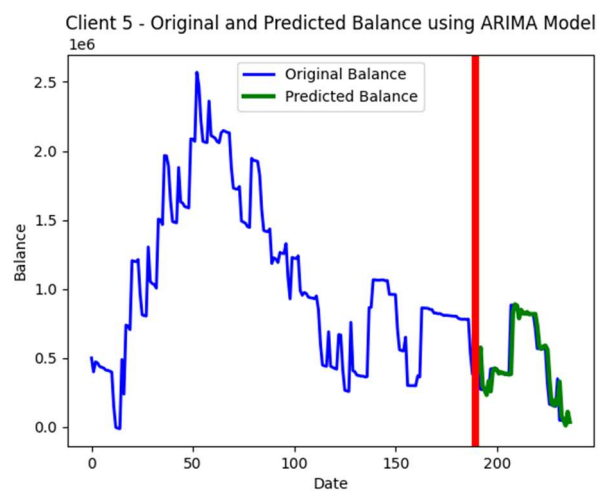
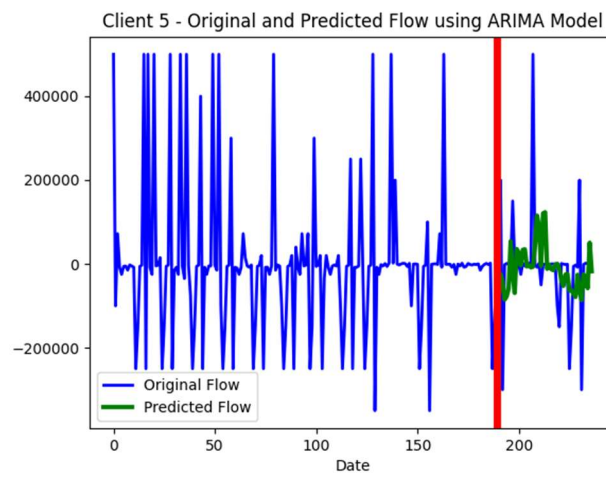
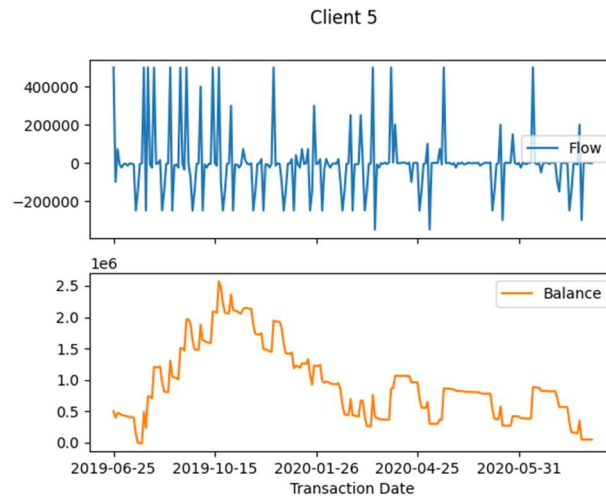
Client 4 - Original and Predicted Flow using ARIMA Model



Client 4 - Original and Predicted Balance using ARIMA Model

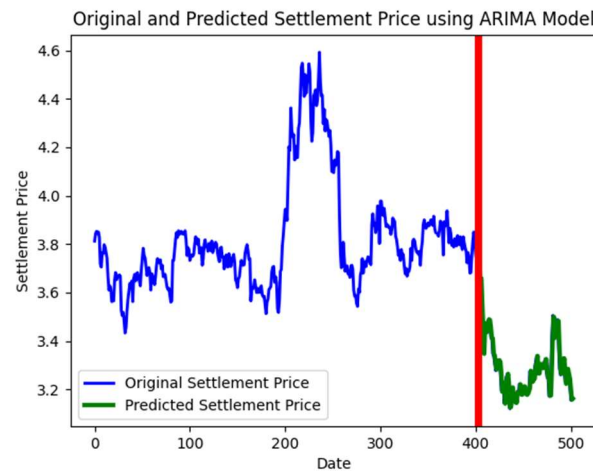


e) Client 5

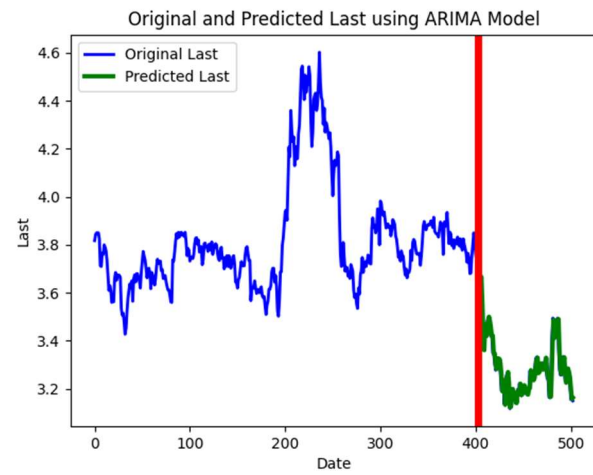


3. Corn Price History

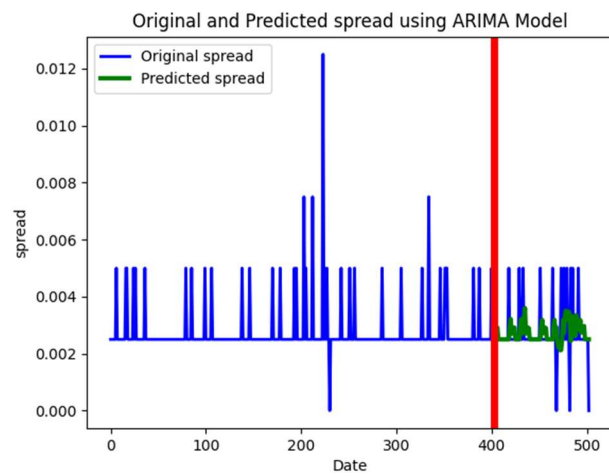
a) Corn Settlement Price



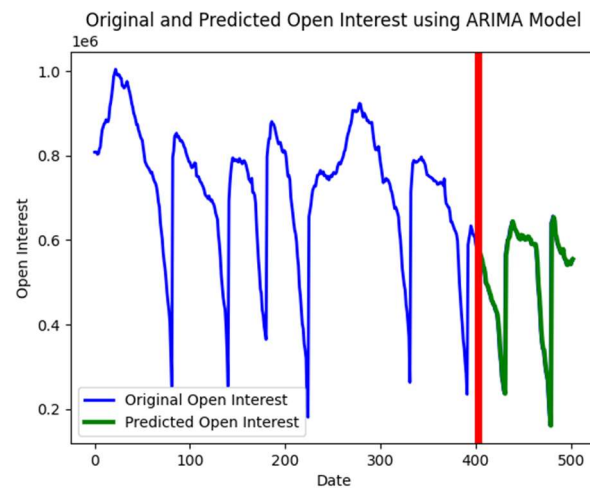
b) Corn Last



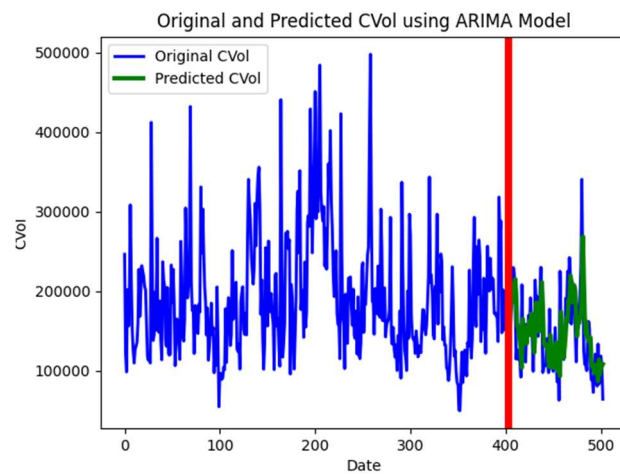
c) Corn Spread



d) Corn Open Interest

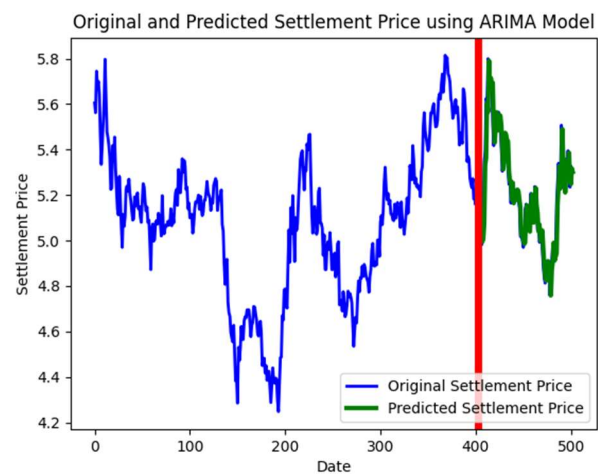


e) Corn CVol

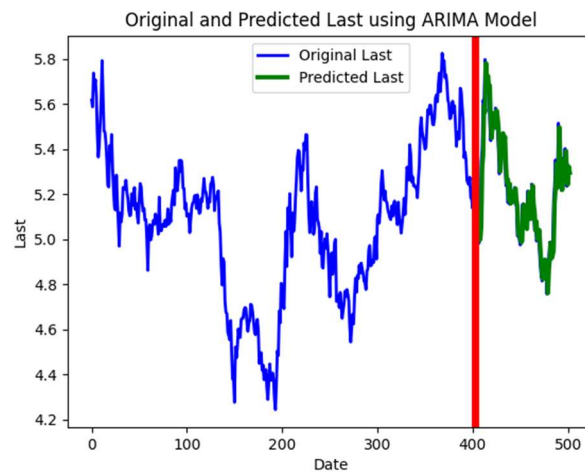


4. Wheat price history

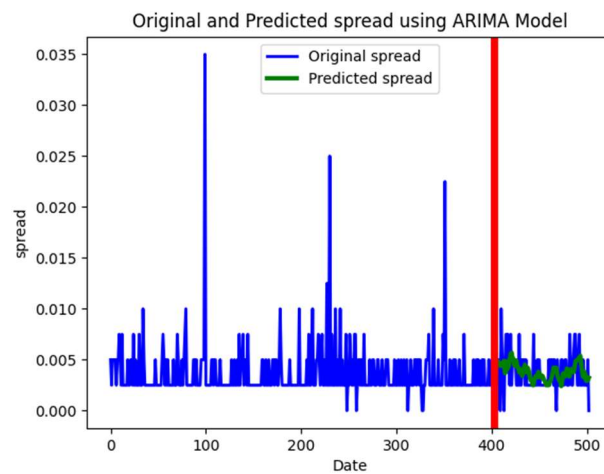
a) Settlement Price



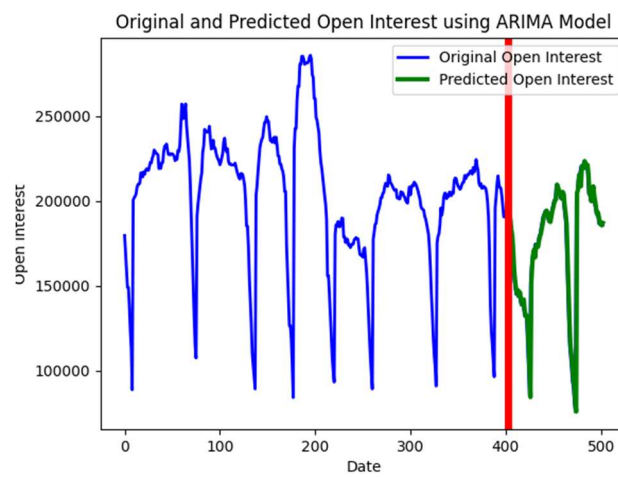
b) Wheat Last



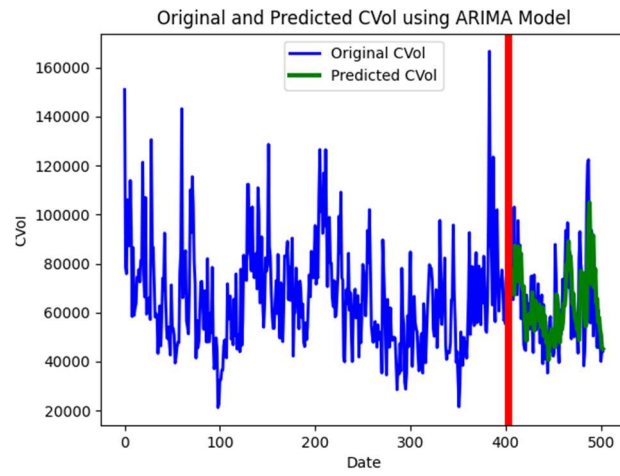
c) Wheat Spread



d) Wheat Open Interest



e) Wheat CVol



5. Unstructured data: commodity news

