VII. Conclusion

In this work, based on the second dataset, we first visualised the user's consumption patterns, cycle variations and consumption category distributions in detail, and selected a user with a high transaction volume for a case study. The analysis shows that consumption patterns are closely linked to specific months and events (e.g. holidays), providing an important basis for banks to adjust the timing of their products and services. In the meantime, consumers tend to spend on personal and techno-cultural categories immediately after receiving their salaries, which provides direction for the design of relevant financial products. There are also, through detailed case studies of the largest volume users, we are able to gain a deeper understanding of the spending patterns and financial needs of HNW individual customers, which has important implications for banks in terms of providing personalised services and wealth management advice.

Next, we evaluated the efficacy of various machine learning models such as linear regression, SVR, random forest, decision tree and neural network in predicting the amount of bank transactions. The linear regression model was found to exhibit the highest prediction accuracy among all models and is suitable for application scenarios that require high interpretability. Neural networks and random forests, on an alternative note, perform better in handling large amounts of non-linear data and are suitable for complex market trend analyses. Each model has its unique strengths and limitations, and banks can choose the right model by considering its predictive performance, operational complexity, and fit with business strategy. By implementing these advanced analytics models, banks are able to improve decision-making efficiency, optimise the customer experience and strengthen risk control while ensuring compliance.

Finally, through cluster analysis and heat maps of transaction frequency, we gained insights into the distribution of income, expenditure and account balances of user groups, which helped the bank to more accurately target the market and design personalised products. This method of analysis not only enhances the effectiveness of marketing campaigns, but also promotes co-operation between banks and merchants, enhancing user satisfaction and loyalty. It also allows the bank to gain a share of the merchant's revenue through co-op promotions and transaction sharing, adding a new source of profitability to the bank's business.

Using comprehensive data analytics and advanced machine learning technologies, we have conducted a comprehensive exploration and analysis of bank users' consumption patterns. Through these in-depth insights, banks are able to better understand customer behaviour, optimise product design and adjust service strategies in a timely manner, thereby significantly improving service quality and market responsiveness. Going forward, we plan to continue to expand these analytics to utilise a wider range of datasets and more sophisticated algorithmic models to further enhance forecasting accuracy and operational efficiency, ensuring the Bank's continued leadership in the highly competitive financial market.