# Machine Learning and Statistical Approaches to Assess Time Series Data in Profitability Analysis

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## Abstract

Customer-based firms are overwhelmed by the enormous availability of data. Nevertheless, the customer life cycle became an uncertainty factor due to the tremendous activities by competitors. In this context, observing customer lifetime value can reduce the losses associated with churn customers. The research aimed to observe the profitability sources to enhance decision making rather than trying to look for customer behaviours through a "foggy window". This research is believed to be the first empirical study of how the probabilistic models, which include Beta Geometric/Negative Binomial Distribution (BG/NBD), is superior to label time series transactional data in the retail industry. The data based on recency, frequency, monetary and lifetime of a given customer, are the crucial factors for the study of churn customers. The churn value is determined by the probability of being energetically active in the transactions. An investigative analysis is made using machine learning models (ML) .Despite the high-performance results, the data is suspected of having an imbalance problem. Hence, this is handled by Synthetic Minority Oversampling Technique. Subsequently, a comparative analysis of ML models results, is made before and after applying this technique. The high accuracy results in this research emphasized that time-series data were precisely labelled.

## Biography

Shiemaa Adlan is data scientist at Ergontec, Data Science (WiDS) Worldwide team Ambassador, Speaker at the 15th International Conference on Information Technology and Applications (ICITA 2021) conference Speaker and Event Organizer at Data Science Platform ,IEEE Brand Ambassador. She earned her Master's of science in data science and Bachelors in computer science. She has co-authored a peer-reviewed publication in the area of data science and network security at Springer. Her interdisciplinary background includes over 15 years of software development experience in possess strong IT skills including data bases, Machine Learning, Deep Learning, Data Visualization, Modelling, Statistics and Business Intelligence. Shiemaa develops tools and techniques that enable teams to make data-driven decisions, and applying these techniques to drive user growth. Scaling heights of success by leaving marks of excellence; targeting senior level assignments as a Data Scientist with an organization of high repute for mutual growth.