

## Semi-Supervised Performance Inference for Consumer Credit Origination

### Abstract

A sound consumer credit origination model requires inferring the performance of the rejected and uncashed applications to combine them with booked applications with known performance and build the final origination models that capture the nature of entire through-the-door population. The art-and-science of inferencing the unknown performance of an application is known as the process of “performance inference” in the consumer credit analytics. This paper proposes an innovative approach, focusing on the intrinsic differences across different application pools. This method divides through-the-door applications into different pools (clusters) that are vastly different from each other, but homogenous within each pool using a clustering method through unsupervised learning. After that, it conducts the performance inference for unknown population through segmented supervised learning models built on each homogenous cluster, and the similarity of applications in key attributes. Compared with traditional approach, this new method provides an alternative that not only delivers better inference results and model performance but also generates a much more transparent and explainable inferencing process for an unknown account, rejected, or uncashed, based on its profile and cluster. The new method gives lenders an additional tool to generate insights into the entire application population, through clustering, to better understand the through-the-door population across multiple dimensions. A case study is conducted to show that this innovative method not only generates better performance results as demonstrated through comparative study, but also provides a more transparent, explainable inferencing process for reject and uncashed application through the process for consumer credit origination.

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