A Nested Bayesian Model for Inferring Customer Life-Changing Events Based on Financial Transaction Data

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Life-changing events may trigger customers' financial status and credit risk changes. Practitioners have used life-changing event data for their direct marketing strategies and gained insight into cultivating positive customer relationships and gaining competitive advantages. Predicting customers' life-changing events helps seize financial opportunities and offer the right product/services at the right time. Existing literature on marketing through life-changing events is scant; we fill in this gap by reviewing contemporary applied work and developing a novel hierarchical Bayesian model that exploits individual-level financial transaction data to infer life-changing events. The proposed nested Bayesian model enables learning across related transaction time series and dynamically grouping time series based on their similarities and information extracted from transaction descriptions. Semi-structured transaction description information is efficiently integrated into a dynamic knowledge graph, which may be of independent interest and can also provide feedback to the time series. Our methodology can be applied to many other applications (e.g., inventory data, stock market data) as it integrates text labels that describe transactions as well as the numeric and date information of the transactions.