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Ferhat Musa Uysal, Tarik Ziya Bilgin

Turkcell Payment and Electronic Money Services Inc. (Paycell R&D Center), Istanbul, Turkey

Dynamic Customer Segmentation and Smart Campaign Recommendation System in Digital Wallets

Especially since the onset of the COVID-19 pandemic, customer spending behavior has shifted toward cashless payments. Accordingly, financial services have experienced the accelerated adoption of digital wallets, which extensively require customer experience improvement aiming to maintain customer retention and acquisition. In our study, for Paycell, one of Türkiye's digital wallet leaders, we introduce a Dynamic Customer Segmentation and Smart Campaign Recommendation System by proposing a four-stage architectural framework that combines dimensionality reduction, clustering, predictive modeling, and real-time campaign assignment. We use MongoDB to manage large-scale data, and Python for model training. Based on a sample exceeding 75,000 customers, after applying necessary conversion and scaling techniques, we perform PCA-enabled K-Means clustering, yielding five distinct customer clusters, validated through Elbow and Silhouette Methods. From a predefined campaign pool, these clusters are assigned with appropriate campaign responses generated by LightGBM, operationalized into dynamic real-time interaction by Apache Flink, and delivered through mobile applications via an API layer. Overall, our approach provides a dynamic and scalable framework that is beneficial for financial service providers to design more effective segment-specific marketing strategies, yielding enhanced customer engagement.

Keywords

Machine learning, flink, complex event processing, financial technology, digital wallet, big data

Biography

Ferhat Musa Uysal is a Technical Product Manager in the Technology Department at Turkcell Payment and Electronic Money Services Inc. (Paycell R&D Center). He started working as a Deployment Engineer at Ericsson in 2013. He then worked as an analyst on large projects in SAP Commerce Cloud for 6 years. He has been working as a Technical Product Manager on Digital Wallet Projects since the beginning of 2023. He is currently working on AI/ML usage in digital wallets.