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Clustering Algorithm for Anomaly Detection in Nigeria's Fintech Transactions

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Abstract

Among numerous challenges of financial fraud detection in high-velocity transaction systems is the need for data clustering approach that is both scalable and robust to outliers [1]. We introduce a Fence-K-Means algorithm, which is a clustering algorithm based on Box-K-Means symbolic data analysis [2], proposed for real-time anomaly detection in financial transactions. Our design framework substitutes the traditional boxplot minimum and maximum values of boxplot variables with lower and upper fences [3,4]. We established that the framework has a better outlier resistance and interpretability. We further tested the proposed algorithm based on simulation of Nigeria's mobile money trends on a synthetic fintech transaction dataset. The outcomes suggest a good detection accuracy of 94.7% with low false positive of 86% compared to normal K-Means. The GPU acceleration of the algorithm allows inference latency of less than 5ms, which is appropriate to a real-time payment system. Our findings indicate that Fence-K-Means algorithm offers a good trade-off between detection and computational efficiency and has important implications on ensuring digital trade in Nigeria and beyond under the African Continental Free Trade Area (AfCFTA) paradigm [5].

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