

## ABSTRACT

# MERCHANT ACQUISITION USING GRAPH MACHINE LEARNING

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Artificial Intelligence (AI) is increasingly deployed by financial institutions in the midst of the abundance of available data and the increase of affordability of computing capacity. AI has been used to do underwriting decision-making, credit loss forecasting, anti-money laundering (AML), fraud monitoring and detecting, natural language processing (NLP) for sentiment analysis, and also insurance. One of the few processes financial institutions are trying to automate using AI is merchant acquisition. Automation in merchant acquisition has become prevalent as the abundance of data continues to increase and the process of classifying merchants becomes more complex. However, a few literature utilizes machine learning methods to acquire merchants by utilizing GCNs on large-scale transaction networks to classify potential merchants based on their transaction history and demographic data.

This paper will address the research gap by implementing a GCN-based algorithm, called PinSAGE, on a transaction network to efficiently represent data in an embedding space crucial to building large-scale merchant acquiring systems. The data used in this experiment is a snapshot of transactions over the course of a month. This data will be converted to a graph representation and used to train the PinSAGE model.

After conducting the experiment, the PinSAGE model was able to achieve 81.48% of model accuracy score, with an F-beta score of 0.8122 (with beta parameter set to 0.5). This model outperforms both the comparable GCN model such as BGNN and RGCN by 20% model accuracy margin. The PinSAGE model was able to generate and learn rich embeddings and shows great potential in handling heterogeneous, transactional dataset.

**Keywords:** Artificial Intelligence, Machine learning, Node classification, Graph Convolutional Networks, Merchant Acquisition.