Self-Organizing Maps for Credit Card Fraud Detection

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Abstract : This study focuses on the application of self-organizing maps (SOM) technology in analyzing credit card transaction data, aiming to enhance the accuracy and efficiency of fraud detection. Som, as an artificial neural network, is particularly suited for pattern recognition and data classification, making it highly effective for the complex and variable nature of credit card transaction data. By analyzing transaction characteristics with SOM, the research identifies abnormal transaction patterns that could indicate potentially fraudulent activities. Moreover, this study has developed a specialized visualization tool to intuitively present the relationships between SOM analysis outcomes and transaction data, aiding financial institution personnel in quickly identifying and responding to potential fraud, thereby reducing financial losses. Additionally, the research explores the integration of SOM technology with composite intelligent system technologies (including finite state machines, fuzzy logic, and decision trees) to further improve fraud detection accuracy. This multimodal approach provides a comprehensive perspective for identifying and understanding various types of fraud within credit card transactions. In summary, by integrating SOM technology with visualization tools and composite intelligent system technologies, this research offers a more effective method of fraud detection for the financial industry, not only enhancing detection accuracy but also deepening the overall understanding of fraudulent activities.