

# Subject: 2nd International Conference on Software, Systems and Information Technology (SSITCON-2025) : Submission (1672) has been created.



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Hello,

The following submission has been created.

Track Name: SSITCON2025

Paper ID: 1672

Paper Title: TMR-GGNN: Credit Card Fraud Detection based on Time-Aware Multi-Relational Guided Graph Neural Network

## Abstract:

In recent years, credit card fraud detection has faced significant challenges due to highly imbalanced data, evolving fraud patterns, and complex relational structures among transaction entities. To address these issues, this research proposes a novel framework called Time-aware Multi-Relational Guided Graph Neural Network (TMR-GGNN). Particularly, the proposed TMR-GGNN extends the encoder-decoder Graph Neural Network GNN architecture by modeling heterogeneous interactions across customers, merchants, devices, and IPs over temporal windows. Subsequently, the proposed TMR-GGNN approach constructs a dynamic, multi-relational graph and incorporates time-aware relational attention mechanism within the encoder to adaptively weigh the transaction relevance based on temporal proximity and semantic context. Consequently, the decoder employs contrastive learning module to distinguish between real and synthesized transaction patterns while improving the model's generalization of rare fraud cases. Additionally, to effectively manage severe class imbalances and emphasize discriminative learning, a composite loss function combining Information Noise-Contrastive Estimation (InfoNCE)-based contrastive loss with Focal Loss is introduced. This integration assists in improving fraud identification while mitigating false negatives.

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Secondary Subject Areas: Not Entered