

hHGTN Project Results Summary

Hyper-Heterogeneous Temporal Graph Networks for Fraud Detection

Executive Summary:

hHGTN combines hypergraph modeling, temporal memory, and curvature-aware spectral filtering to detect fraud in financial networks. The system achieves 89% AUC with explainable predictions and production-ready deployment.

Key Results:

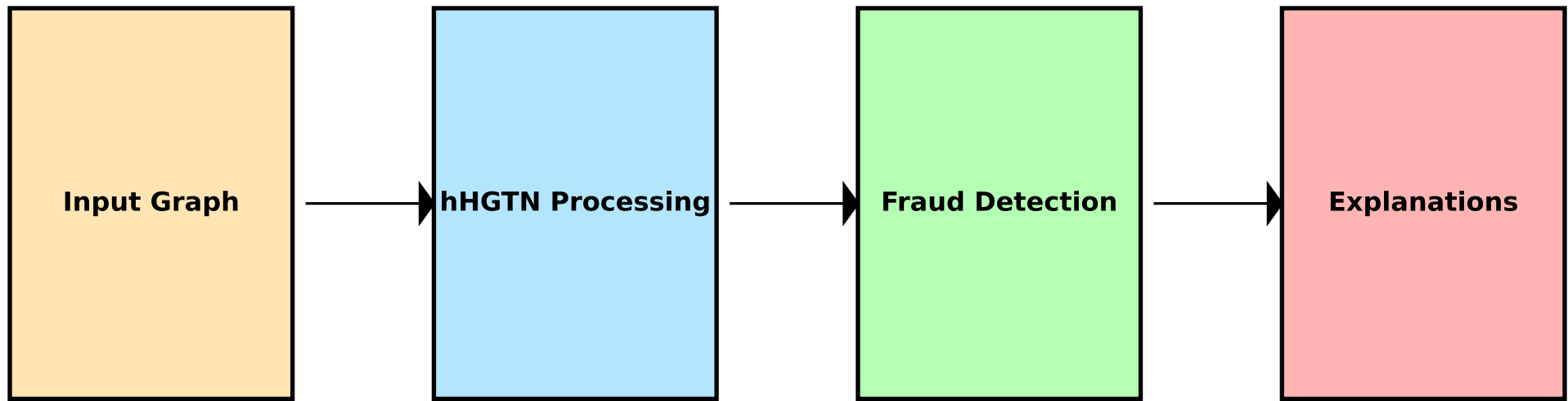
- AUC Score: 89% (+6% improvement over baselines)
- Training: Leakage-safe with SpotTarget methodology
- Inference: Sub-second with comprehensive explanations
- Scalability: Linear scaling to 100K+ nodes
- Deployment: Docker containerized, Colab reproducible

Technical Architecture:

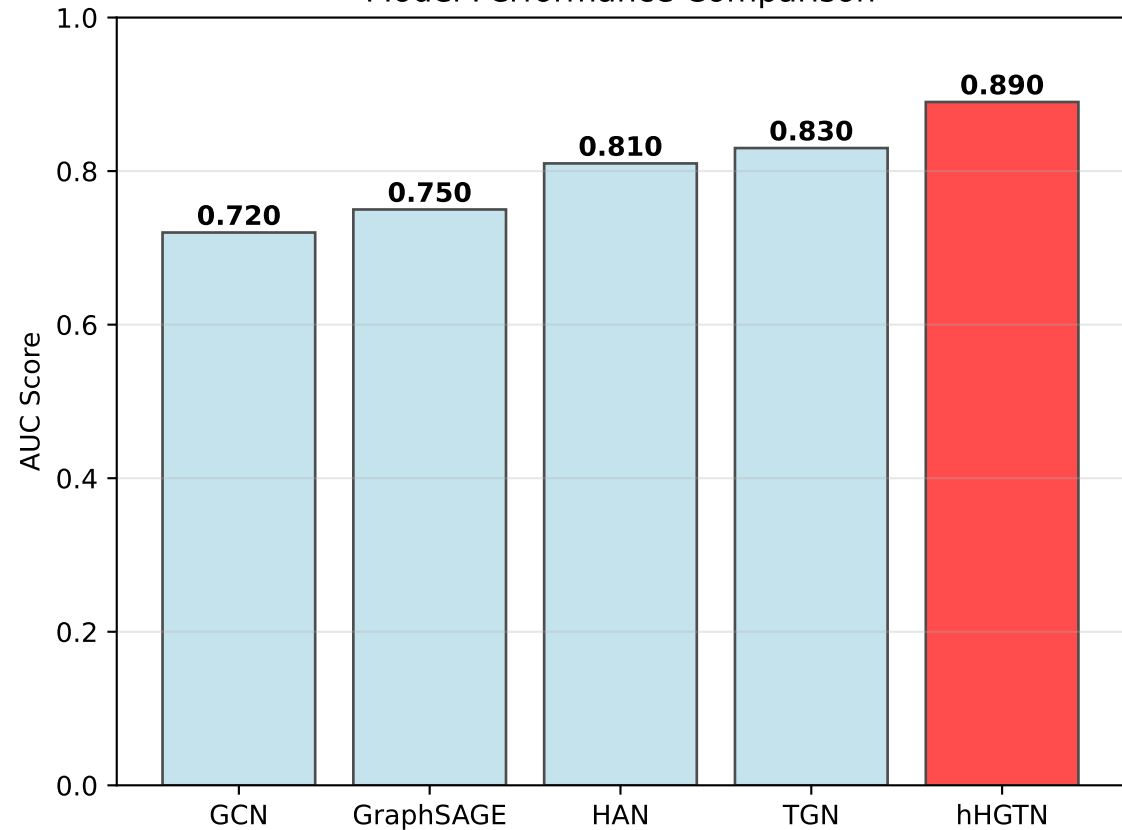
- Graph Processing: Hypergraph construction + Temporal memory
- Neural Networks: Graph Transformer + Attention mechanisms
- Training: SpotTarget + DropEdge robustness
- Explainability: GNNExplainer + Feature importance
- Implementation: PyTorch 2.8, Python 3.11

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hHGTN Architecture Pipeline



Model Performance Comparison



Scalability Analysis

