Summary tables for financial applications

Reference	Feature [1]	Graph	Method	Evaluation metric	Baseline method
Chen et al. (2018)	7-day open, high, low, close prices and volume for CSI listed companies	Corporation shareholder network	LSTM + GCN	Accuracy	LSTM, GCN
Feng et al. (2019)	5/10/20/30 days moving average of close price for SP500/NYSE listed companies	Wiki company-based relation network & sector-industry stock relation network	RSR	MSE, IRR, MRR	SFM, LSTM, GBR, GCN
Matsunaga et al. (2019)	5/10/20/30 days moving average of close prices for Nikkei 225 listed companies	Supplier, customer, partner and shareholder relation graph	RSR	Return ratio, Sharpe ratio	Model with subsets of relations
Ying et al. (2020)	5/10/20/30 days moving average of close prices and stock description documents for SP500 or NYSE listed companies	Wiki company-based relation network	TRAN	MSE, MRR, IRR	RSR, GCN, LSTM
Li et al. (2020a)	News of TPX 500/100 listed companies	Stock correlation graph	LSTM-RGCN	Accuracy	Naïve Bayes, LR, RF, HAN, transformer, S-LSTM
Sawhney et al. (2020a)	Price and social media information for companies listed in the SP500 index or NYSE or NASDAQ markets	Wiki company-based relation network	MAN-SF	Accuracy, F1, MCC	ARIMA, RF, TSLDA, HAN, StockNet, LSTM+GCN
Sawhney et al. (2020b)	Text and audio features of earning calls for companies in the SP500 index	Stock earning call graph	VolTAGE	MSE, R-squared	LSTM, HAN, MDRM, HTML
Liou et al. (2021)	News and attributes for stock tags	News co-occurance graph	HAN	Accuracy, MCC	RF

[1]The red color format represents the acronym format and the full form could be found in the supplementary material section by clicking the acronyms.

Table 1: Summary of stock movement prediction literature

Reference	Feature	Graph	Method	Evaluation metric	Baseline method
Wang et al. (2019)	/	Multiple user networks	SemiGNN	AUC, KS	Xgboost, LINE, GCN, GAT
Cheng et al. (2019)	Active loan behavior, historical behavior, and user profile	Guarantee network	HGAR	AUC, Precision@k	GF, DW, node2vec, AANE, SNE, GAT
Cheng et al. (2020a)	Customer profile, loan information, guarantee profile, and loan contract	Guarantee network	TRACER	F1, Precision@k	LR, GBDT, DNN
Cheng et al. (2020b)	Loan behavior and company profile	Temporal guarantee network	DGANN	AUC	GF, GCN, node2vec, GAT, SEAL, RNN, GRNN
Yang et al. (2020)	Credit-related features, spatial features, and temporal features	Temporal smallbuiness en-trepreneur network	ST-GNN	AUC, KS	GBDT, GAT, STAR
Hu et al. (2020)	User credit exposure features	Alipay user and applet graph	AMG-DP	AUC, KS	MLP, Xgboost, node2vec, GraphSAGE, GAT, HAN, SemiGNN
Liang et al. (2021)	Device information and trading features	User relationship graph	MvMoE	AUC	GBDT
Xu et al. (2021)	User profile and transaction summary	Auto loan network	GRC	Precision, recall, F1	SVM, MLP, GCN
Lee et al. (2021)	Loan information, credit history, and soft information	Borrower's relation network	/	Accuracy, precision, recall, F1, AUC	SVM, RF, Xgboost, MLP, GCN

Table 2: Summary of loan default risk prediction literature

Reference	Feature	Graph	Method	Evaluation metric	Baseline method

Li et al. (2019a)	Features for item, user and comment	Xianyu comment graph	GAS	AUC, F1, recall	GBDT
Zhang et al. (2020)	Behavioral features	Yelp review network, Amazon review network	GraphRfi	MAE, RMSE, precision, recall, F1	RCF, GCMC, PMF, ICF, MF
Dou et al. (2020)	Behavioral features	Yelp review network, Amazon review network	CARE-GNN	AUC, recall	GCN, GAT, RGCN, GraphSAGE, SemiGNN
Kudo et al. (2020)	Behavioral features	Amazon review network	GCNEXT	AUC	RGCN, SIDE, SGCN
Li et al. (2019b)	Purchasing power, number of transactions, item category, and shipping costs	E-commerce user-item network	Bi-HGNN	Accuracy, AUC, F1	GraphSAGE, Diffpool
Li et al. (2020b)	Click and transaction logs	Taobao user-item network	HiGNN	AUC	DIN, GE

Table 3: Summary of literature on recommendation system of e-commerce

Reference	Feature	Graph	Method	Evaluation metric	Baseline method
Liang et al. (2019)	Insurance claim history, shipping history and shopping history	Device sharing graph	/	F1, DE	GBDT, node embeddings
Lv et al. (2019)	Purchase history of 1000 commodity categories	JD Finance anti-fraud graph	AutoGCN	AUC	GCN, GAT, GCN with attention
Rao et al. (2020)	Individual risk features	Transaction records graph	xFraud	AUC	LR, DNN, GAT, GCN, HGT
Zhu et al. (2020)	User features	Iqiyi user network	HMGNN	Precision, recall, F1, AUC	LR, Xgboost, MLP, GCN, GAT, ASGCN, mGCN
Jiang et al. (2019)	User behavioral features and content based features	Simulated user activity network	/	Accuracy, precision, recall	RF, SVM, LR, CNN
Liu et al. (2018)	User activities	Alipay one-month account-device network	GEM	F1, AUC, precision-recall	Connected subgraph, GBDT, GCN

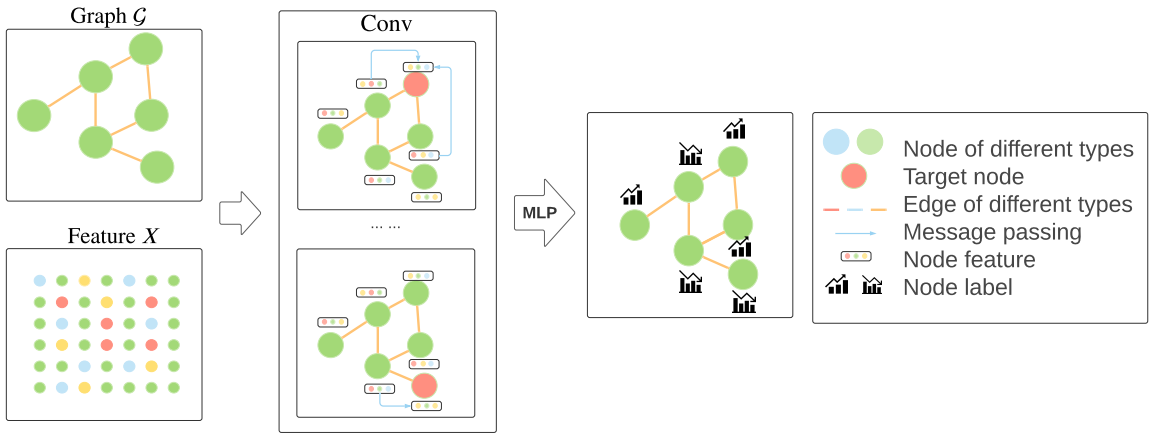
Liu et al. (2019)	User activities	Alipay one-week account-device network	GeniePath	Accuracy	MLP, node2vec, GCN, GraphSAGE, GAT
Rao et al. (2021)	Registration profile and transaction features	Account-registration graph	DHGReg	Precision	MLP, GCN, GAT
Zhao et al. (2021)	/	Bitcoin-alpha graph	GAL	Precision, recall, F1, AUC	GCN, GAT, GraphSAGE, DOMINANT

Table 4: Summary of fraud detection prediction literature

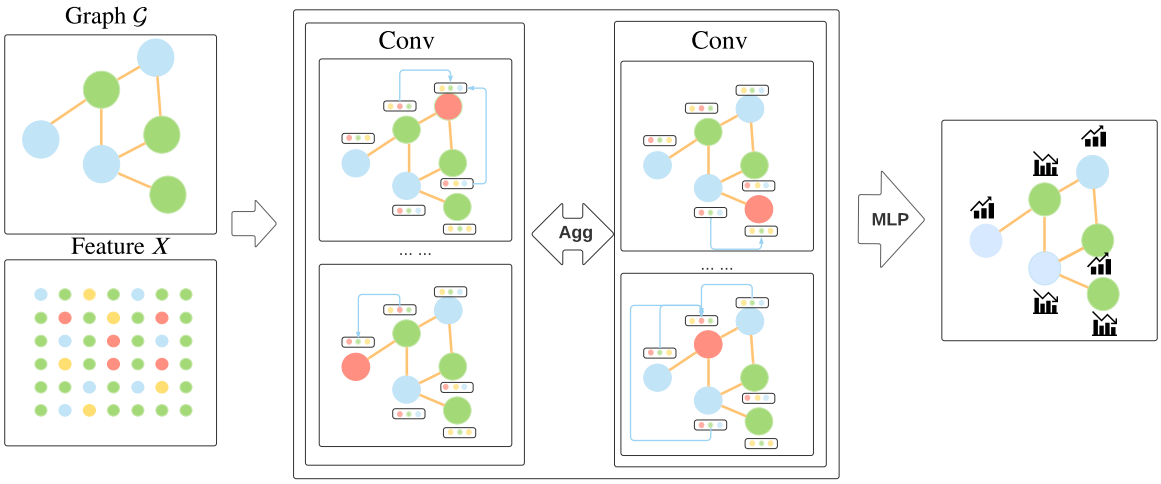
Reference	Feature	Graph	Method	Evaluation metric	Baseline method
Harl et al. (2020)	Event features	Loan application event graph	GGNN	Accuracy	/
Yang et al. (2019)	Financial news	Financial event graph	GGNN	Accuracy, precision, recall, F1	PMI, DW, LSTM

Table 5: Summary of event prediction literature

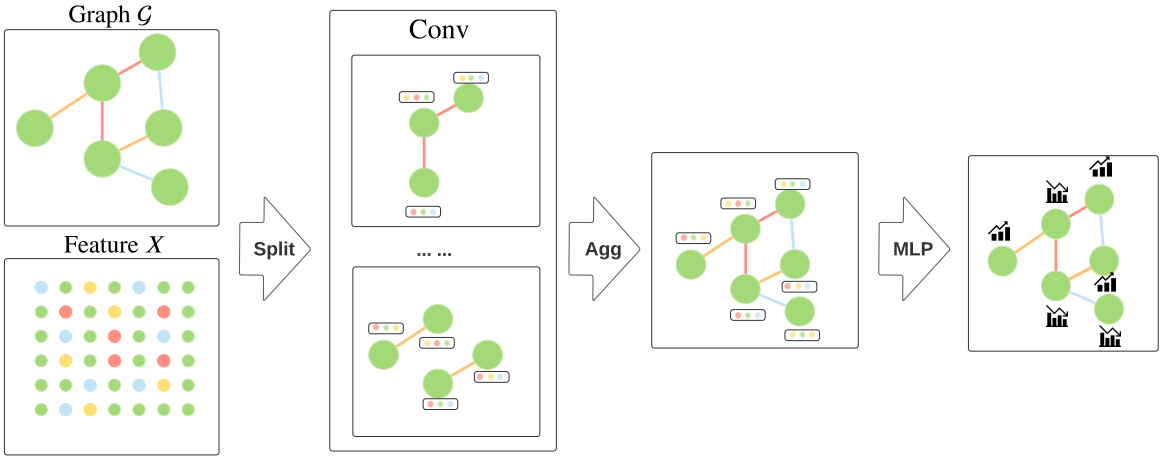
Figures on GNN methods for each graph type



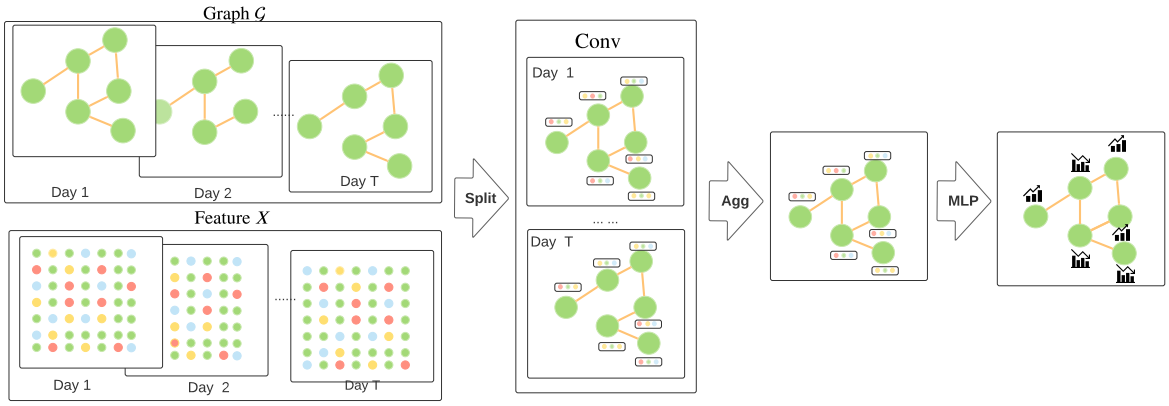
(a) Graph neural network models for homogeneous graphs. With a graph adjacency matrix and a feature matrix as inputs, the graph convolutional process generates a representation for each target node by aggregating the information of its neighbors. A multi-layer perception layer is then applied to generate the predicted labels.



(b) Graph neural network models for bipartite graphs. For nodes having the same type, the graph convolutional process updates their node representations using their own information and their neighbors' information. Aggregating functions are utilized to generate the node representations from the representations for both node types. A multi-layer perception layer is then applied to generate the predicted labels.



(c) Graph neural network models for multi-relation graphs. A multi-relation graph is split into several sub-graphs in which edges are of the same type. Within each sub-graph, the graph convolutional process takes place to update the node representations. Then between-graph aggregation is utilized to obtain the final node representations. A multi-layer perception layer is then applied to generate the predicted labels.



(d) Graph neural network models for dynamic graphs. A dynamic graph is often a sequence of graphs ordered by time. The graph convectional process generates node representations for graph at each time stamp. To get the most recent representation, node representations are aggregated using functions including the recurrent neural network. A multi-layer perception layer is then applied to generate the predicted labels.

Figure 1: Graph neural network models for different graph types. The term Conv denotes graph convolution process. The term MLP denotes the multi-layer perception. The term Agg denotes the aggregation process. The term Split denotes data splitting according to its characteristics.

Acronyms

AANE Accelerated Attributed Network Embedding. 2
AMG-DP Attributed Multiplex Graph based loan Default Prediction approach. 2
ARIMA AutoRegressive Integrated Moving Average. 1
ASGCN Adaptive Sampling Graph Convolutional Network. 3
AUC Area Under the Curve. 2, 3, 4
AutoGCN Auto-encoder based Graph Convolutional Networks. 3

Bi-HGNN Bipartite Hierarchical bipartite Graph Neural Network. 3

CARE-GNN CAmouflage-REsistant GNN. 3
CNN Convolutional Neural Network. 3
CSI China Securities Index. 1

DE Detection Expansion. 3
DGANN Dynamic Graph-based Attention Neural Network. 2
DHGReg Dynamic Heterogeneous Graph Neural Network. 4
Diffpool Differentiable graph pooling. 3
DIN Deep Interest Network. 3
DNN Deep Neural Network-based model. 2, 3
DOMINANT Deep anOMaly detectIoN on Attributed NeTworks. 4
DW DeepWalk. 2, 4

GAL Graph Anomaly Loss. 4
GAS GCN-based Anti-Spam model. 3

GAT Graph Attention Network. 2, 3, 4
GBDT Gradient Boosting Decision Tree. 2, 3
GBR Graph-Based Ranking. 1
GCMC Graph Convolutional Matrix Completion. 3
GCN Graph Convolutional Network. 1, 2, 3, 4
GCNEXT Graph Convolutional Network with Expended Balance Theory. 3
GE Graph Embedding-based method. 3
GEM Graph Embeddings for Malicious accounts. 3
GF Graph Factorization. 2
GGNN Gated Graph Neural Network. 4
GraphRfi GCN-based user Representation learning framework. 3
GraphSAGE SAmple and aggreGatE. 2, 3, 4
GRC Graph neural network with a Role-constrained Conditional random field. 2
GRNN Graph Recurrent Neural Network. 2

HAN Hierarchical Attention Networks. 1, 2
HAN Hybrid Attention Network. 1
HGAR High-order Hraph Attention Representation. 2
HGT Heterogeneous Graph Transformer. 3
HiGNN Hierarchical bipartite Graph Neural Network. 3
HMGNN Heterogeneous Mini-Graphs Neural Network. 3
HTML Hierarchical Transformer-based Multi-task Learning. 1

ICF Item-based Collaborative Filtering. 3
IRR Investment Return Ratio. 1

KS Kolmogorov-Smirnov distance. 2

LINE Large-scale Information Network Embedding. 2
LR Linear Regression. 1, 2, 3
LSTM Long Short Term Memory. 1, 4
LSTM-RGCN LSTM Relational Graph Convolutional Network. 1

MAE Mean Absolute Error. 3
MAN-SF Multipronged Attention Network for Stock Forecasting. 1
MCC Matthew's Correlation Coefficient. 1
MDRM Multimodal Deep Regression Model. 1
MF Matrix Factorization. 3
mGCN modified version of Graph Convolutional Network. 3
MLP Multi-Layer Perceptron. 2, 3, 4
MRR Mean Reciprocal Rank. 1
MSE Mean Squared Error. 1
MvMoE Multi-view-aware Mixture-of-Experts network. 2

NASDAQ NASDAQ stock exchange. 1
Nikkei 225 Nikkei Stock Average. 1
NYSE New York Stock Exchange. 1

PMF Probabilistic Matrix Factorization. 3

PMI model based on Pairwise Mutual Information. 4
Precision@k Precision of the top k nodes. 2

RCF Robust Collaborative Filtering model. 3
RF Random Forest. 1, 2, 3
RGCN Relational Graph Convolutional Network. 3
RMSE Root Mean Squared Error. 3
RNN Recurrent Neural Network. 2
RSR Relational Stock Ranking. 1

SEAL learning from Subgraphs, Embeddings and Attributes for Link prediction. 2
SemiGNN Semisupervised attentive Graph Neural Network. 2, 3
SFM State Frequency Memory. 1
SGCN Signed Graph Convolutional Network. 3
SIDE SIgned Directed network Embedding. 3
S-LSTM Sentence-state LSTM. 1
SNE attributed Social Network Embedding. 2
SP500 Standard and Poor's 500. 1
STAR Spatio-Temporal Attentive Recurrent neural network. 2
ST-GNN Spatial-Temporal aware Graph Neural Network. 2
SVM Support Vector Machine. 2, 3

TPX Tokyo Stock Price Index. 1
TRACER TempoRal Attention Contagion chain Enhanced Rating model. 2
TRAN Time-aware graph Relational Attention Network. 1
TSLDA Topic Sentiment Latent Dirichlet Allocation. 1

VolTAGE Volatility forecasting via Text-Audio fusion with Graph convolution networks for Earnings calls. 1

Xgboost eXtreme gradient boosting. 2, 3