FinTech Industrial Project Progress Check Form (Final)

Student Name & ID: DU Jiaxing, 1155204280

Project title: Graph Neural Network Implementation

Sponsoring Organisation: CEFAR

Industrial Supervisor: Cobi XU, A.I. Phoenix Technology Co

Instructions: This form is to report the student’s progress up to the final. Please complete the form using Microsoft Word and add rows if necessary. Completion percentage refers to the percentage of the original plan completed. If the percentage is less than 100%, explanation must be provided. Please report your progress accurately and evidence should be provided to the supervisors for them to verify.

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| Task | Actual achievements | Completion  Percentage | Explanation |
| Federated recommendation system rating prediction | 1. Perform FL on Ciao and MovieLens datasets to predict user ratings on GCN, GAT, Sage (two scenarios: FL between item categories, FL between users) 2. Compare with centralized and local training performance. FL performs better than local training, a little worse than centralized training | 100% |  |
| Federated Anti-money laundering (AML) detection | 1. Preprocess the IBM Transactions data downloaded from Kaggle, e.g. one-hot encoding, outliers filtration; Form graph-structured data (nodes: bank accounts, edges: transactions) 2. Perform centralized training on the dataset to select proper GNN models. Due to the highly imbalance of two classes (valid and fraud), most models suffer a high false negative rate. 3. Model adjustment. Consider more complex models like GIN and PNA. Add the direction of edges in the graph and adopt reverse message passing for training. Test F1 rate of centralized reaches 50%. 4. Perform FL using the model selected above. Randomly divide the datasets into five parts, imitating that some regulatory organizations hold part of transaction data for training. Though the FL result is worse than the centralized training, it is much better than model adjustment, also outperforming local training. | 100% |  |