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(57) Abstract :

The present invention relates to a hybrid hardware-accelerated system (100) for predicting missing links in complex networks. The system includes a network data acquisition module (101) and a preprocessing unit (102) for normalizing adjacency matrix data. A maximum-entropy computation engine (103), supported by hardware accelerators (104), computes node-specific probability coefficients using Configuration Model principles. In parallel, a gradient boosting decision tree processor (105) with feature extraction circuits (106) analyzes node attributes. A hybrid score fusion module (107) combines outputs using adaptive weighting (108), and a link ranking processor (109) generates ordered predictions stored in memory (110). The system improves prediction accuracy by integrating statistical mechanics with machine learning, achieving better True Positive Rate, Jaccard Index, and Area Under ROC Curve performance for economic and financial network applications.

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