CONTRASTIVE LEARNING: A DEEP LEARNING FRAMEWORK FOR REVIEW-BASED KNOWLEDGE GRAPHS

ABSTRACT

Graph-based learning has gained popularity as a robust solution for modeling entity recommendations and representations through a collection of nodes and edges that links entities together. Nevertheless, traditional models of knowledge graphs can suffer from noisy high-order relationships and ignore the rich contextual information found in user reviews. This research proposes a review enriched graph neural network framework that connects structural knowledge and semantic cues through a contrastive learning framework. A hybrid architecture (Graph Attention Networks and Relational Graph Convolutional Networks) is designed to better capture heterogeneous relations and localized importance of nodes. The review embedding's (obtained from transformer-based models) and structural nodes representations are aligned and enhanced by the contrastive objective to improve the quality of the learned features. We take our embedding's through dimensionality reduction before using a tree-based classifier for downstream prediction. After evaluating for accuracy, this model produced a training accuracy of 95.02% and a test accuracy of 92.08%, achieving much better scores and precision, recall, and F1-Scores than any traditional single model baselines. This work demonstrated that multi-view GNNs with contrastive alignment can be used to create more robust and semantically rich representations in a graph-based learning system.