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Self-Supervised Attributed Graph Clustering with Dual Contrastive Loss Constraints

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Abstract : Attributed graph clustering can utilize the graph topology and node attributes to uncover hidden community structures and patterns in complex networks, aiding in the understanding and analysis of complex systems. Utilizing contrastive learning for attributed graph clustering can effectively exploit meaningful implicit relationships between data. However, existing attributed graph clustering methods based on contrastive learning suffer from the following drawbacks: 1) Complex data augmentation increases computational cost, and inappropriate data augmentation may lead to semantic drift. 2) The selection of positive and negative samples neglects the intrinsic cluster structure learned from graph topology and node attributes. Therefore, this paper proposes a method called self-supervised Attributed Graph Clustering with Dual Contrastive Loss constraints (AGC-DCL). Firstly, Siamese Multilayer Perceptron (MLP) encoders are employed to generate two views separately to avoid complex data augmentation. Secondly, the neighborhood contrastive loss is introduced to constrain node representation using local topological structure while effectively embedding attribute information through attribute reconstruction. Additionally, clustering-oriented contrastive loss is applied to fully utilize clustering information in global semantics for discriminative node representations, regarding the cluster centers from two views as negative samples to fully leverage effective clustering information from different views. Comparative clustering results with existing attributed graph clustering algorithms on six datasets demonstrate the superiority of the proposed method.

Keywords : attributed graph clustering, contrastive learning, clustering-oriented, self-supervised learning
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