

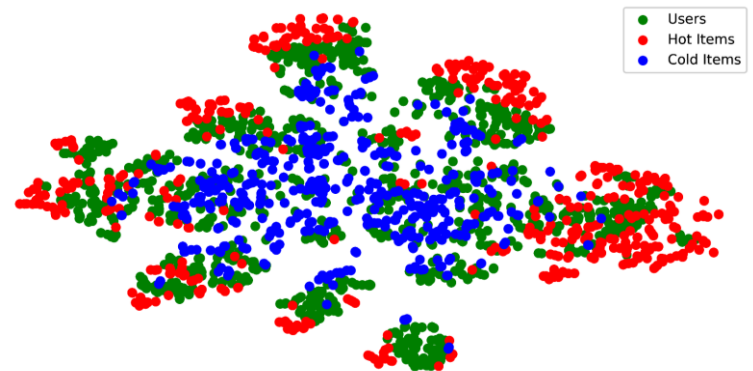
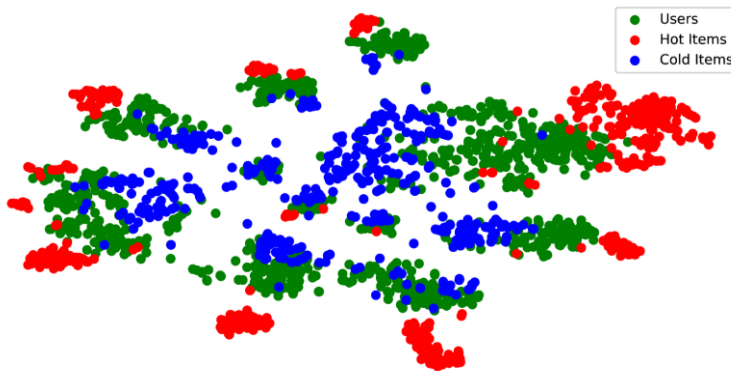
Graph Contrastive Learning View Construction Methods in Recommender Systems: A Survey

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Problems & Ideas

- Problems of conventional recommendation systems:
 - Data Sparsity and Cold Start: heavily rely on labeled data, leading to challenges in scenarios with sparse user-item interactions and new users/items with limited historical data.
 - Noise Sensitivity: Recommendation systems are susceptible to noise in user feedback, which can lead to suboptimal recommendations.
- Ideas: By constructing enhanced views of the user-item interaction graph and using contrastive learning to maximize mutual information under different views, the model is able to learn the latent invariant representation of node features.



Feature distribution map of the impact of contrastive learning on embeddings. Left: LightGCN; Right: SGL.

1,000 users were randomly selected from the Yelp dataset, and then the top 500 most popular items and the bottom 500 least popular items were selected based on the number of item interactions.

Main Contributions

- Contributions:
 - A comprehensive taxonomy that categorizes view construction methods into three types—structure generation, feature generation, and modality generation;
 - A detailed analysis report that provides a comprehensive review of existing work, thoroughly analyzing the performance, complexity, and mechanisms of different methods;
 - A roadmap for future research directions in GCL-based recommendation methods, outlining the challenges faced and potential solutions.

Method	Type	Data Format	Yelp		iFashion		Tiktok	
			NDCG@20	Recall@20	NDCG@20	Recall@20	NDCG@20	Recall@20
SGL	Structure	CF	0.0683	0.1071	0.0240	0.0344	0.0248	0.0641
NCL	Structure	CF	0.0732	0.1143	0.0246	0.0411	0.0255	0.0653
XSimGCL	Feature	CF	0.0752	0.1201	0.0265	0.0437	0.0288	0.0694
KGCL	Structure	CF+KG	0.0796	0.1268	0.0246	0.0403	-	-
KGRec	Structure	CF+KG	0.0829	0.1336	0.0272	0.0453	-	-
MMGCL	Structure	CF+MM	0.0721	0.1162	0.0275	0.0458	0.0256	0.0678
SLMRec	Modality	CF+MM	0.0854	0.1357	0.0305	0.0492	0.0353	0.0745
MMSSL	Modality	CF+MM	0.0908	0.1436	0.0333	0.0536	0.0371	0.0823

Performance comparison of GCL-based recommendation methods. Ignoring generational differences, using knowledge graphs or multimodal information to construct contrastive views for enhancement can effectively improve the performance of recommendation systems. This is particularly evident in scenarios with sparse data.