A Bayesian Matrix Factorization Model for Dynamic User Embedding in Recommender System

Kaihan ZHANG, Zhiqiang WANG, Jiye LIANG, Xingwang ZHAO

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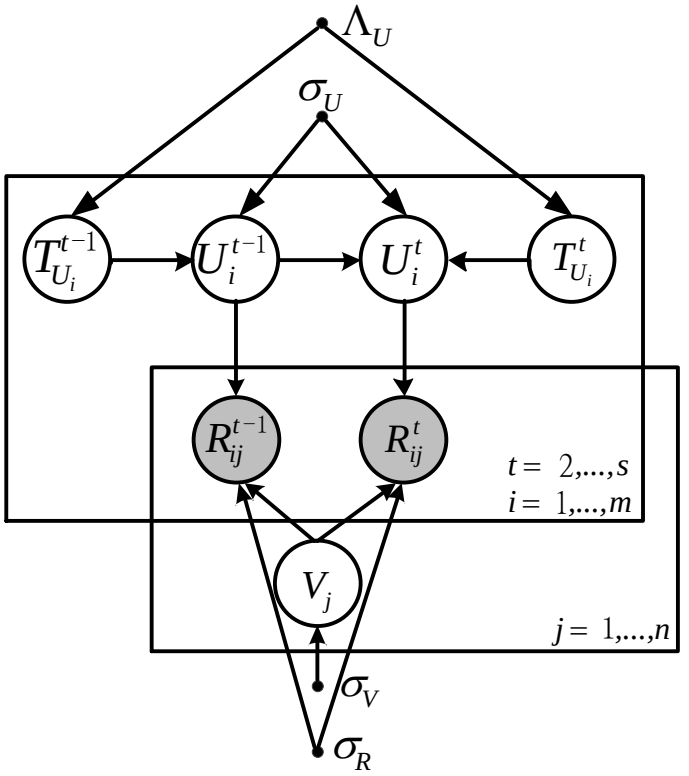
Problems & Ideas

- Problems of time-aware recommendation algorithms
  - Most existing methods are hard to model the evolutionary differences between the dimensions of users' embeddings.

- Ideas
  - Extending the probabilistic matrix factorization model to capture the drifting regularities of users' embedings over time by introducing the dynamic covariance prior for each user.
  - Designing a variational expectation maximization algorithm for inferring all unknown parameters.



Graphical model. Shaded nodes represent observed variables.

Main Contributions

- Compare with matrix factorization-based models

	100k		10m		dianping	
	MAE	RMSE	MAE	RMSE	MAE	RMSE
PMF	0.7414	0.9500	0.6125	0.7991	0.6531	0.8777
timeSVD++	0.7318	0.9516	0.6163	0.8147	0.5999	0.7901
TMF	0.7676	0.9852	0.6118	0.8000	0.5599	0.7608
PCCF	0.7361	0.9351	0.6116	0.7970	0.5892	0.7740
BMFDE	**0.7182**	**0.9177**	**0.6055**	**0.7904**	**0.5427**	**0.7225**

- Compare with neural network-based model

	100k		10m		dianping	
	MAE	RMSE	MAE	RMSE	MAE	RMSE
LightGCN	0.7234	0.9270	**0.5993**	**0.7890**	**0.5312**	**0.7039**
BMFDE	**0.7182**	**0.9177**	0.6055	0.7904	0.5427	0.7225

- Training time (seconds) of all comparison models