Applying Topic Model in Context-Aware TV Programs Recommendation

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Abstract. In IPTV systems, users' watching behavior is influenced by contextual factors like time of day, day of week, Live/VOD condition etc., yet how to incorporate such factors into recommender depends on the choice of basic recommending model. In this paper, we apply a topic model in Information Retrieval (IR)–Latent Dirichlet Allocation (LDA) as the basic model in TV program recommender. What makes employing such approach meaningful is the resemblance between user watching frequency as the entry in user-program matrix and term frequency in term-document matrix. In addition, we propose an extension to this user-oriented LDA by adding a probabilistic selection node in this probabilistic graphical model to learn contextual influence and user's individual inclination on different contextual factors.

The experiment using the proposed approach is conducted on the data from a web-based TV content delivery system "Vision", which serves the campus users in Lancaster University. The experimental results show that both user-oriented LDA and context-aware LDA converge smoothly on perplexity regarding both iteration epoch and topic numbers under inference framework Gibbs Sampling. In addition, context-aware LDA can perform better than user-based LDA and baseline approach on both precision metrics and diversity metrics when the number of topic is over 50. Aside from that, programs with highest probability distribution within top 10 topics represent the natural clustering effect of applying this topic model in TV recommender.

Keywords: TV recommender, context-awarenes, Latent Dirichlet Allocation.