Modeling Preferences with Availability Constraints

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User preferences are commonly learned from historical data whereby users express preferences for items, e.g., through consumption of products or services. Most work assumes that a user is not constrained in their selection of items. This assumption does not take into account the availability constraint, whereby users could only access some items, but not others. For example, in subscription-based systems, we can observe only those historical preferences on subscribed (available) items. However, the objective is to predict preferences on unsubscribed (unavailable) items, which do not appear in the historical observations due to their (lack of) availability. To model preferences in a probabilistic manner and address the issue of availability constraint, we develop a graphical model, called Latent Transition Model (LTM) to discover users’ latent interests. LTM is novel in incorporating transitions in interests when certain items are not available to the user. Experiments on a real-life implicit feedback dataset demonstrate that LTM is effective in discovering customers’ latent interests, and it achieves significant improvements in prediction accuracy over baselines that do not model transitions.