Chapter XIII
Modeling Knowledge and Reasoning in Conversational Recommendation Agents

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ABSTRACT

This chapter introduces conversational recommender agents that facilitate user navigation through a product space, alternatively making concrete product suggestions and eliciting the user’s feedback. Critiquing is a common form of user feedback, where users provide limited feedback at the feature-level by constraining a feature’s value-space. For example, a user may request a cheaper product, thus critiquing the price feature. One of the most important objectives in a recommender agent is to discover, with minimal user feedback, which are the user’s product preferences. For this purpose, the chapter includes recent research on critiquing-based recommendation and a comparison between standard and recent proposals of recommendation based on critiquing.
INTRODUCTION

Recommender systems help users to navigate through complex product spaces as they search for their preferred products. They do this by drawing on ideas and technologies from areas such as information retrieval, artificial intelligence, and user modeling, among others, to provide users with more proactive and personalized information services. Conversational, case-based recommender systems (Aha, Breslow, & Muñoz-Avila, 2000), in particular, are set to play an increasingly important role in many e-commerce applications. This type of recommender system helps user navigation as part of an extended recommendation process. During each recommendation cycle, the recommender agent suggests a new product (or products) to the user and solicits feedback in order to refine its search during subsequent cycles. In this way, conversational recommender systems seek to incrementally learn about a user’s product preferences. Subsequent cycles prioritize products among the available options that best satisfy these evolving preferences. Ideally, each recommendation cycle relocates the user to a part of the product space that is closer to their target product. The conversational approach provides users with greater control over the navigation process and has the potential to deliver more efficient recommendation dialogs that involve minimal interaction with the user (Burke, Hammond, & Young, 1997; McGinty & Smyth, 2002; Shimazu, 2002).

Survey of Related Work

Considerable research effort has been invested in developing and evaluating different forms of feedback for conversational recommender agents, and a variety of feedback alternatives have become commonplace. For example, value elicitation approaches ask the user to provide details relating to specific features (e.g., “what is your target price?”) while preference-based feedback and ratings-based methods simply ask the user to indicate which product they prefer when presented with a small set of alternatives (McGinty & Smyth, 2002; McGinty & Smyth, 2003a; Smyth & McGinty, 2003b) or to provide ratings for these alternatives (Smyth & Cotter, 2000). It is well known that different forms of feedback introduce different types of trade-offs when it comes to recommendation efficiency and user-effort. For instance, value elicitation is a very informative form of feedback, but it requires the user to provide very specific feature-level information. In contrast, preference-based feedback is a far more ambiguous form of feedback but it requires only minimal user effort. One form of feedback that strikes a useful balance, in this regard, is critiquing (Burke, Hammond, & Young, 1996; Burke et al., 1997). The user expresses a directional preference over the value-space for a particular product feature. For example, in a travel vacation recommender, a user might indicate that they are interested in a vacation that is longer than the currently recommended option; in this instance, longer is an example of a critique over the duration feature.

Within the recommender systems literature, the basic idea of critiquing can be traced back to the seminal work of Burke et al. (1995, 1997). For example, Entrée is the quintessential recommender system that employs critiquing (also sometimes referred to as tweaking) in the restaurant domain, allowing users to critique restaurant features such as price, style, atmosphere, and so forth. The advantage of critiquing is that it is a fairly lightweight form of feedback, in the sense that the user does not need to provide a specific feature value in order to refine their search towards relevant recommendations (McGinty & Smyth, 2003). In recent years, researchers have highlighted the importance of investigating techniques for reasoning of implicit preference knowledge while requiring minimal information input from the user (McSherry & Stretch, 2005). As recommender systems have become