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Abstract

Preference elicitation (PE) is an very important component of interactive decision support systems that aim to make optimal recommendations to users by actively querying their preferences. In this paper, we present three principles important for PE in real-world problems: (1) multiattribute, (2) low cognitive load, and (3) robust to noise. In light of three requirements, we introduce an approximate PE framework based on a variant of TrueSkill for performing efficient closed-form Bayesian updates and query selection for a multiattribute utility belief state – a novel PE approach that naturally facilitates the efficient evaluation of value of information (VOI) for use in query selection strategies. Our VOI query strategy satisfies all three principles and performs on par with the most accurate algorithms on experiments with a synthetic data set.

Keywords preference elicitation - decision-making under uncertainty

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Multiattribute Bayesian Preference Elicitation with Pairwise Comparison Queries

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Abstract. Preference elicitation (PE) is an very important component of interactive decision support systems that aim to make optimal recommendations to users by actively querying their preferences. In this paper, we present three principles important for PE in real-world problems: (1) multiattribute, (2) low cognitive load, and (3) robust to noise. In light of three requirements, we introduce an approximate PE framework based on a variant of TrueSkill for performing e cient closed-form Bayesian updates and query selection for a multiattribute utility belief state — a novel PE approach that naturally facilitates the e cient evaluation of value of information (VOI) for use in query selection strategies. Our VOI query strategy satisfies all three principles and performs on par with the most accurate algorithms on experiments with a synthetic data set.

Keywords: preference elicitation, decision-making under uncertainty.

1 Introduction

Preference elicitation (PE) is an important component of eCommerce and recommender systems that propose items or services from a potentially large set of available choices but due to practical constraints may only query a limited number of preferences. The PE task consists of (a) querying the user about their preferences and (b) recommending an item that maximizes the user's latent utility. Of course, a PE system is limited by real-world performance constraints that require phase (a) to be e cient while ensuring phase (b) can make an optimal recommendation with high certainty. To this end, we outline five principles important for the practical application of PE in real-world settings used to guide our research in this work:

1. Multiattribute: Exploiting the natural attribute structure of services or items in the form of multiattribute utility functions [10] is crucial when the number of recommendable items exceeds the number of queries a PE system can reasonably ask. In this case, learning preferences over attribute dimensions can simultaneously inform preferences over many items.

L. Zhang, J. Kwok, and B.-L. Lu (Eds.): ISNN 2010, Part I, LNCS 6063, pp. 396–403, 2010.