

Preference Learning

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Editors

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Preface

The topic of preferences has attracted considerable attention in Artificial Intelligence (AI) research in previous years. Recent special issues of the *AI Magazine* (December 2008) and the *Artificial Intelligence Journal* (announced for 2010), both devoted to preferences, highlight the increasing importance of this area for AI. Representing and processing knowledge in terms of preferences is appealing as it allows one to specify desires in a declarative way, to combine qualitative and quantitative modes of reasoning, and to deal with inconsistencies and exceptions in a quite flexible manner.

Like in other subfields of AI, including autonomous agents, nonmonotonic reasoning, constraint satisfaction, planning and qualitative decision theory, researchers in machine learning have started to pay increasing attention to the topic of preferences. In fact, as witnessed by a number of dedicated events, notably several workshops on preferences, ranking, and related topics (held, e.g., at NIPS 2004 and 2005, ECML/PKDD 2008 and 2009, SIGIR 2008 and 2009), we currently observe the formation of “preference learning” as a new branch of machine learning and data mining. For the time being, there is still no stipulated demarcation of this emerging subfield, neither in terms of a list of relevant topics nor in terms of an intentional “definition”. Roughly, *preference learning* refers to the problem of learning from observations which reveal, either explicitly or implicitly, information about the preferences of an individual (e.g., a user of a computer system) or a class of individuals; the acquisition of this kind of information can be supported by methods for *preference mining*. Generalizing beyond the training data given, the models learnt are typically used for preference prediction, i.e., to predict the preferences of a new individual or the same individual in a new situation. The problem of “learning to rank” is a good example and an important special case; here, the goal is to predict preferences in the form of total orders of a set of alternatives (e.g., a personalized ranking of documents retrieved by a search engine).

This book, which is the first volume specifically dedicated to the topic of preference learning, distinguishes itself through the following features:

- It gives a comprehensive overview of the state-of-the-art in the field of preference learning.

- By including a number of survey chapters, it offers an introduction to the most important subfields of preference learning.
- By proposing a systematic categorization according to learning task and learning technique, along with a unified notation, it helps structuring the field; thereby, it is supposed to have a positive impact on future research.
- Through the selection of contributions, it emphasizes the interdisciplinary character of preference learning and establishes connections to related research fields, such as multicriteria decision-making and operations research.
- Last but not least, it highlights important applications of preference learning in different areas, such as information retrieval and recommender systems, thereby demonstrating its practical relevance.

Some chapters of the book are based on contributions selected from two successful workshops on preference learning that we organized as part of the ECML/PKDD conferences in 2008 and 2009. Besides, however, the material is complemented by a number of chapters that have been solicited explicitly for this book. Overall, we are quite confident that the book provides both a broad coverage and comprehensive survey of the field of preference learning as well as a useful guideline and good introduction to the most important directions in current research.

The origination of this book is largely due to our close collaboration in recent years, which in turn has greatly benefited from a joint research project funded by the German Science Foundation (DFG). This support is gratefully acknowledged. Moreover, we would like to thank Ronan Nugent and the Springer for providing excellent assistance and ready advice during the final stages of preparation.

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