*I**-Prefer: A Tool for Preference Model-Driven Decision Making

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Abstract. Multi-criteria decision making problems exist everywhere. In a complex system, for all involved players, it is inevitable to face task/service selection situations where multiple qualities of tasks/services criteria need to be taken into account. In addition, complex interrelationships between different impact factors and actors need to be understood and traded off. In this paper, we present a tool called *I**-Prefer which is represented with annotated NFR/*i** framework. This framework uses goal and agent-based preference models to drive these decision making activities. Particularly, we describe the purpose and main features of the tool, and give a brief introduction of the extended *i** framework which supports *I**-Prefer analysis.

Keywords: Preference, *i** framework, Optimal strategy

1 Introduction

An increasing number of researchers have been working on multi-motive decision models and methods. In order to model and analyze multi-criteria decisions in a systematic way, we have already done some work on how to make decisions based on an annotated NFR/*i** framework [1, 2]. In this paper, we present a tool named *I**-Prefer. Within this tool, we adopt graphical notations of the NFR modeling methods to model the interrelations among different criterion. Then we decide preferences of decision makers by appending numerical annotations to the nodes in the model. Strategy dependency models in *i** can be used to represent and evaluate alternative services networking decisions. Algorithms for identifying optimal solutions of the given decision problem are also integrated into the tool.

The structure of this paper is organized as follows: Section 2 presents the original purpose of the tool. Section 3 lists the main features of the tool and its availability and status. Section 4 discusses both the limitations and the future plans.

2 Main Purpose of the Tool

The main purpose of the tool is to model the interrelations among different criterions. Then we can decide preferences of decision makers by appending numerical notations to the nodes in the model. *I** framework is a widely used strategic intentional modeling method. Actors' goals and tasks could be modeled intuitively. Services selection always involves at least two types of actors, with mutual dependencies between them. As a result, *i** model is a natural fit for modeling services selection. In order to fulfill the needs to make decision by the preference, which is the input from domain experts and end users, the tool intends to makes some extensions to *i**: (1) Actors' preferences are concerned in the modeling process. Actors' preferences are represented as their demands of system's performance, such as system's soft-goals and weights of soft-goals. (2) The analysis of state of soft-goals is introduced based on the effect of system's design on soft-goals' satisfaction degree. The execution of a system task may increase or decrease soft-goals' satisfaction degrees, and the extent of effect is decided by task to soft-goal impact value. (3) A method of analyzing system's state is introduced, which supports the optimal system's strategy selection. Utility value is adopted to express the quantified value of system's state, which actually specifies the performance of the system [2].

3 Main features and current status of *I**-Prefer

*I**-Prefer is based on JavaScript, and can be applied in IE5.0 (or higher version). The tool is developed in 2009 which is the version 1.0, the next version is under development.

People can download both its source code and user manual (in Chinese) in the URL[3]: https://sourceforge.net/projects/i-prefer and can also try the tool on line.

The tool can support the methods raised in [2], specifically the main features of the current version are as follows.

(1) The tool is web-based, while most *i** tools are not. It can support graphical modeling within web page, and running without downloading any packages. The annotation of the model is the same as NFR/*i** framework. And some additional marks like utility values can also be added to the model. Some of the properties can also be changed by the user, like the name, utility value, and which actor the object belongs to.

(2) The built preference model can be saved and loaded with XML file. The user can save or load a model whenever it is needed.

(3) Automatically calculate the optimal strategies. The computing is based on the established algorithms presented in [1]. In the algorithm, each soft-goal is related to two weights, one is to specify the degree of the completion of the soft-goal, and the other is to provide user's emphasis on that soft-goal. Besides, each Task-Soft-goal has a parameter to describe the impact on the soft-goal after fulfilling the task. The user can use the calculated results to do the most reasonable choice about the tasks/services. The final decision would be presented in highlight in the result.

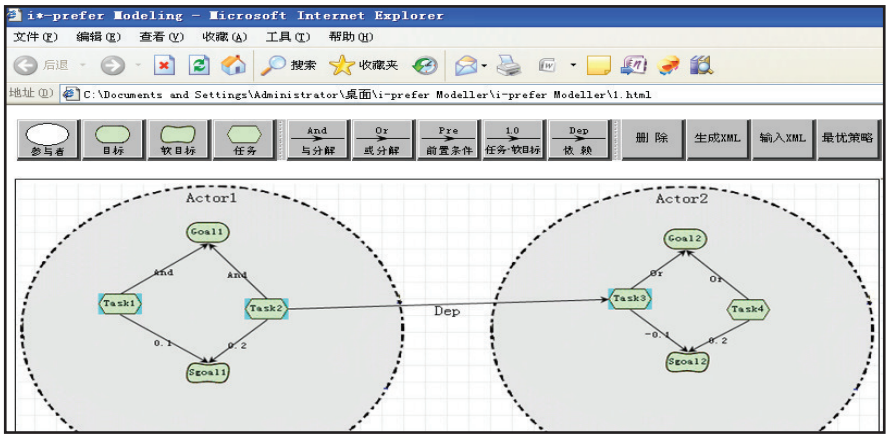

Fig. 1. A screenshot of the tool

With all these features, the tool *I**-Prefer could model the problem scenario, and further conduct the decision making and optimal strategy computing. Fig.1 has shown the screenshot of the tool, which contains 17 buttons about the creation or delete of objects, lines, as well as the buttons to generate and open XML files. Besides, there is also an Optimal Strategy button, which applies background algorithm and finally gives the optimal choice of about the tasks/services in the system.

4 Limitation and Future work

The tool *I**-Prefer supports the quantitative reasoning of actor's preferences on soft-goals, and the evaluation of alternative ways to achieve system goals. It can be used to facilitate automated preference tasks/services selection process and can help optimize decision making. However, there are also some limitations in the tool: (1) The tool is not mature in its algorithms, which can only calculate the optimal strategy for some simple cases; (2) Some parameters of the tool are not customized, so the user cannot change the properties like the color and size of the Actors.

In future, we would extend the algorithms to deal with more complex cases, and try to apply the tool into an industrial case. Besides, we would also make the tool more customized and user friendly.

References

1. Haihua Xie, Lin Liu, Jingwei Yang, i*-Prefer Optimizing Requirements Elicitation Process Based on Actor Preferences, 24th ACM Symposium on Applied Computing in Hawaii in March 2009.
2. Wenting Ma, Lin Liu, Haihua Xie, Hongyu Zhang, Preference Model Driven Services Decision Making, 21st Conference on Advanced Information Systems Engineering (CAiSE 2009) in Amsterdam.
3. SourceForge download page of *I**-Prefer, https://sourceforge.net/projects/i-prefer