Case Acquisition in a Project Planning Environment

Sasidhar Mukkamalla and Héctor Muñoz-Avila

Department of Computer Science and Engineering
19 Memorial Drive West
Lehigh University
Bethlehem, PA 18015, USA
{sam6,munoz}@cse.lehigh.edu

Abstract: In this paper, we propose an approach to acquire cases in the context of project planning, without any extra effort from the end user. Under our definition, a case has a one to one correspondence with the standard elements of a project plan. We exploit this correspondence to capture cases automatically from project planning episodes. We provide an algorithm for extracting cases from project plans. We implemented this algorithm on top of a commercial project-planning tool and perform experiments evaluating our approach.

Introduction

Knowledge acquisition is a problem frequently faced when using intelligent problem-solving techniques in real-world situations. It is well known that over the years intelligent systems have been developed but failed to be used because it was not feasible to feed such systems with adequate knowledge. Research on this area has typically concentrated on developing interfaces to capture knowledge from users. Although a lot of progress has been made in this direction, it is still difficult to convince users to take advantage of such systems because of the overhead needed to learn how to use those interfaces and then using them to feed the intelligent system with the knowledge needed.

We present an alternative for addressing the knowledge-acquisition problem, namely, to extract knowledge from the same interactive tools that users regularly use in achieving their tasks. By doing so, the knowledge acquisition effort becomes transparent to the user. This alternative derives from our ongoing effort to provide a knowledge-layer to enhance project-planning tools.

Project planning is a business process for successfully delivering one-of-a kind products and services under real-world time and resource constraints. In previous work (Muñoz-Avila et al, 2002), a knowledge-layer for existing tools supporting project planning was proposed; the core idea in this proposal called knowledge-based project planning (KBPP) was to reuse cases containing pieces of project plans when creating new project plans. In this paper, we also report on the first implementation of a KBPP on top of a commercial Project Planning (PP) tool, but our primary focus is on the case acquisition capabilities that we developed.

On the core of our case acquisition effort is the definition of cases. As a result of our definition, a case has a one to one correspondence with the standard elements of a project plan. This notion reflects our believe that by only using standard PP elements
to define cases the intelligent component of the KBPP system will be less intrusive, the cases are more natural from the point of view of the end-user and the case acquisition effort will be simplified.

This paper is organized as follows. In the next section we discuss related work. Then, we summarize the proposal for KBPP presented in (Muñoz-Avila et al, 2002) and discuss the first implementation of these ideas. The following section discusses our case capture approach. Then, we discuss an implementation of our case acquisition ideas in a project-planning tool, Microsoft Project. Next we evaluate our approach and finally we make concluding remarks.

Related Work

Providing tools for knowledge acquisition has been a frequently studied research topic. For example, in the EXPECT project (Blythe et al, 2001), an integrated suit of intelligent interfaces is used to capture knowledge. The EXPECT project shows that by integrating these interfaces it is possible to elicit the context of the users actions, which enhances the knowledge acquisition capabilities. This is somewhat related to our work, since the use of a KBPP tool by the user provides the context for the case capture knowledge. However, the main difference lies in that we are not constructing ad-hoc interfaces to capture, instead we are capturing the cases from the data given by the user during his/her regular interactions with the PP tool.

Authors have long observed that the problem-solving episodes can be captured as cases (e.g., Veloso, 1993). If users develop a project plan using tools such as Microsoft Project, the elements of a project plan could be stored as cases. As we will discuss, our method traverses different elements within a project plan in a process that is similar to the foot-printing process, which is used to identify relevant features of a plan generated (Veloso, 1993).

In the system CaMeL (Elgami et al, 2002), a process is shown that allows automatic elicitation compiled knowledge forms from cases. These compiled knowledge forms are called methods and indicate how to decompose tasks following the hierarchical task network representation (HTN) that we use in this work. A similar process developed by Carrick and Cunningham (Carrick and Cunningham, 1993) can elicit rules from cases. In our work, we study the acquisition of cases, which is a complementary problem to these two approaches. We envision a two-step process in which cases are learned using the process described in this paper. In the rest of this paper we will concentrate only on the case acquisition process.

Another related research direction is to capture user intent and use this as conditions for case retrieval. For example, by analyzing the input of a user in an interactive system, intent about the rational for user actions can be inferred (El Fattah, 2001).

Knowledge-Based Project Planning

Several software packages for project management are commercially available. These include Microsoft Project™ (Microsoft) and SureTrak™ (Primavera Systems Inc).