Chapter 6.6
Computational Intelligence for Information Technology Project Management

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ABSTRACT

With the growing complexity of information technology (IT) projects, the management of these projects is proving to be a daunting task. The magnitude of this problem is underscored by the assertion that approximately 70% of IT projects fail to meet their objectives (Lewis, 2007). Computational intelligence (CI) is an area of research focused on developing intelligent systems to help with complex problems. Specifically, CI seeks to integrate techniques and methodologies to assist in problem domains in which information, data and perhaps even the problem itself are vague, approximate, and uncertain. It would seem that research aimed at leveraging the power of CI against IT project management problems is critical if IT project success rates are to be improved. This work examines the core CI technologies – fuzzy logic, neural networks, and genetic algorithms – and looks at current and potential future applications of these techniques to assist IT project managers.

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INTRODUCTION

While the concept of project management has been around for centuries, the methodologies

with which we are most familiar are not nearly that old. Tools developed during World War I and II, such as Gantt charts, PERT charts, and network diagrams laid the groundwork for the primary project management techniques we use today (Sisk, 1998). Even with these tools and the powerful information technologies at our disposal, successful performance of the multiple steps in project management is still a difficult task. The fact that approximately 70% of information technology (IT) projects fail to meet their objectives further emphasizes the difficulties throughout the life of a project (Lewis, 2007).

The sheer complexity of managing an IT project is a large part of the problem and has been cited as a primary cause in the failure of such projects (Daniels & LaMarsh, 2007). The IT industry is constantly changing which makes it difficult for users to envision and develop potential tools based on the newest technologies. Additionally, project management is still a relatively new science that is continuously evolving. Throughout the life cycle of an IT project, project leaders and their respective teams encounter many situations where they are faced with making important decisions which could determine the success or failure of the project. Often times many of these decisions are made with insufficient tools or resources. The lack of sophisticated IT tools directed specifically toward helping the project manager may lead to decreased performance in all aspects of project management. Problems are many, but examples include outdated or incomplete information for problem identification, planning and execution; basing decisions on past project experiences which may not apply to the current project; difficulty in monitoring the project due to inaccurate knowledge of the current project status; and perhaps even problems with capturing lessons learned from a project, regardless of whether it is a success or failure.

Computational intelligence (CI) is an area of research focused on developing intelligent systems to help with complex problems. Specifically, CI seeks to integrate techniques and methodologies to assist in problem domains in which information, data and perhaps even the problem itself are vague, approximate, and uncertain. The information technology project management environment is certainly one of these problem domains. With the ever increasing complexity of today's IT projects, the need for intelligent tools, processes, methods, and systems to assist in the management of these projects is also growing. While some work has been done in applying CI to IT project management problems, it appears that efforts in this area are still in their infancy. We submit that research aimed at leveraging the power of CI toward the problems in IT project management will be vital in the quest to improve IT project success rates.

The next section defines computational intelligence with respect to the work presented here. The core CI technologies that we will explore are also introduced and explained. A broad survey of current work related to applying these CI technologies to the field of IT project management is then given. We end with a section that describes potential future applications of CI to IT project management.

BACKGROUND

This section presents the background information related to computational intelligence necessary to understand the discussion regarding current and potential applications of computational intelligence constructs to the project management domain. A discussion of what computational intelligence means is provided first, and then each of its core technologies that are relevant to this work are presented and described. These technologies include fuzzy logic (FL), neural networks (NN), and genetic algorithms (GA). Finally, a summary of the background information is given along with some comments on two other computational intelligence technologies.