A Proposal for Research on the Application of AI/ML in ITPM:
Intelligent Project Management

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ABSTRACT

According to the market research firm Tractica, the global artificial intelligence software market is forecast to grow to 126 billion by 2025. Additionally, the Gartner group predicts that during the same time as much as 80% of the routine work, which represents the bulk of human hours spent in today's project management (PM) activities, can be eliminated because of collaboration between humans and smart machines. Today's PM practices rely heavily on human input. However, that is not the optimum use of the human project manager's intuitive, innovative, and creative abilities. Many aspects of a project manager's work could be managed by machines that utilize AI/ML approaches to address nonroutine and predictive tasks. This paper describes IT project management (ITPM) processes and associated tasks and identifies the AI/ML approaches that can support them.

KEYWORDS

Artificial Intelligence, Complex Tasks, Machine Learning, Project Management, Project Manager, Tasks

INTRODUCTION

Project management (PM) practices are necessary to ensure the success of an organization's strategic and performance goals in the context of a changing information technology (IT) landscape. Organizations need to be flexible and adaptable to change while practicing a disciplined approach to managing project success. Various PM standards and capabilities have been proposed to address the turbulent dynamics caused by changing technology (Kanakaris et al., 2019; Pospieszny et al., 2018). The advent of commoditized artificial intelligence (AI) services has created much buzz among industry professionals and academic practitioners. While the basis of machine learning (ML) is to use machines with algorithms to learn and adapt through "experience," AI refers to a broader idea where machines can execute tasks "smartly" which otherwise require "human intelligence." AI applies computer vision, ML, deep learning, and other techniques to solve concrete problems.

DOI: 10.4018/IJITPM.315290 *Corresponding Author

Today's PM practices and processes rely heavily on human input. All data about projects are collated, organized, and consumed by human beings. However, this is not an "optimum" use of the project manager's intuitive, innovative, and creative abilities. Schoen (2017) predicted that, by 2030, as much as 80% of the routine work, representing the bulk of human hours spent in today's PM processes, might be eliminated because of the collaboration between humans and smart machines. The goal here is to allow project managers to work on complex problem solving and sensemaking while routine PM work gets managed by smart automation (Frensch & Sternberg,1991).

The notion of *intelligent project management* captures these ideas wherein routine tasks/processes would be automated using AI/ML to reduce human intervention, while the human project manager professional spends more time on innovative, intuitive, and creative tasks. Additionally, the human project manager would utilize AI/ML tools and techniques to augment their decision-making capabilities. Thus, AI/ML can be utilized to automate tasks which require learning as well as tasks which are relatively straightforward and which have a clear and predefined sequence of steps (i.e., routine tasks). Routine PM tasks are currently executed by a human, but these could conceivably be transitioned to a machine. This type of automation has been happening in businesses for decades, particularly in manufacturing with robotics, just-in-time inventory management with electronic data interchange, and, recently, in the service sector using robotic process automation (RPA). However, despite the enormous advancements in AI/ML, very little progress has been made in the PM discipline to leverage AI/ML capabilities in the practice of the profession (Khazanchi, 2018; Winter et al., 2006). Over the years, PM researchers have concluded that project success (and failure) is directly affected by the nature of the task associated with PM processes (Rolstadås et al., 2014). Therefore, in this paper the authors investigate the overall PM processes and their inherent tasks and illustrate how they are amenable to the application of AI/ML approaches.

PROJECT MANAGEMENT

PM processes are used to achieve project goals in a certain amount of time and budget by following guidelines that allow the use of knowledge and skills to be incorporated efficiently (Varajão et al., 2017). In this context, for example, the PM body of knowledge (*PMBOK® Guide*) prescribes a global standard for PM professionals (Project Management Institute, 2017). In this paper, the authors use the *PMBOK® Guide* five process groups (i.e., initiation, planning, execution, monitoring, control, and closing) to determine tasks that, in these groups, are conducive to AI/ML approaches (Varajão et al., 2017). Below, Table 1 provides a summary description of these processes (Project Management Institute, 2017).

All the processes in Table 1 incorporate specific tasks that must be completed effectively to assure the success of a project. In the next section, the authors expand on the different types of tasks within PM processes.

Classifying Project Management Tasks

Researchers have used a broad classification of task types, specifying simple tasks and complex tasks (Ackoff, 1972; Rittel & Webber, 1973). A simple (routine) task has clear objectives which can easily be mapped to solutions. For example, "verify stakeholder identification" is a simple and routine task where the goal is well-known. A complex (nonroutine) task requires responses that deviate from common solutions or from previously learned ones (Maier, 1970). In a complex task, the objective is known but the goal is either unknown or there may be multiple goals. Complex tasks differ from simple tasks in the availability of information about the task, the precision of goal definition, the number of variables, the correlation among variables, and time dependencies over the course of achieving the goal to solve a problem (Frensch & Sternberg, 1991). For example, "assure the development of contingency plans to cope with staffing problems" is a complex task. The task is clear if the project team has a clear understanding of the "staffing problems and development of contingency plan,"