

A Decision Support System for Intelligent Software Project Scheduling and Staffing

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ABSTRACT

Developing effective computer aided techniques for planning complex software projects is an important and challenging research area in software engineering. Software projects are people-intensive activities, and allocation of human resources is considered one of the most important aspects of software project management. Part of human resource allocation involves the scheduling of project tasks and the staffing of teams with suitable developers. Both of these activities are challenging for project managers due to the large number of possible permutations and factors influencing task scheduling and staffing decisions. Incorrectly planning and estimating the execution of tasks frequently causes software projects to be delivered late and/or over budget, whereas not selecting the appropriate developers to carry out tasks may produce lower-quality, defective software products. To address these challenges, this paper presents a decision support system aimed at supporting software project managers to schedule projects and form teams in the best possible way, given a set of tasks and developers. The approach employs a genetic algorithm to optimize various aspects of scheduling and staffing, with respect to project duration and developer skills, and at the same time handling constraints concerning task dependencies and assignment conflicts. The approach was assessed using a set of scenarios of varying project size and complexity that depict possible real-world software project instances. The results obtained show that the proposed approach is capable of providing feasible project schedules and team assignments for software projects with differing sizes and complexities. A unique feature of our approach is its ability to offer a large number of alternative project plans for a given set of project tasks and developers. Software project managers do not always have the same goals and criteria when planning for projects. Therefore, the approach described here can provide significant practical value to project managers in software development organizations.

Keywords

Software Engineering, Software Project Management, Resource Allocation, Genetic Algorithms