Alexandria University
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Robust Project Scheduling

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ABSTRACT

Most of research efforts in project scheduling aim to develop methods for generating workable baseline schedule that minimizes the project makespan in a deterministic environment. In real-life creating an accurate schedule is challenging due to the disruptions caused by unpredictable events during project execution.

Two main approaches are used to account for uncertainties: a) ***Proactive Scheduling*** and, b) ***Reactive Scheduling***. ***Proactive Scheduling*** aims to construct a *robust baseline schedule* that utilizes statistical knowledge of uncertainties and anticipated disruptions. One way to do that is by inserting ***time-buffers*** in the baseline schedule. In contrast, ***Reactive Scheduling*** adjust the project schedule after the realization of a disruptive event, and does not make use of any prior knowledge of the stochastic nature of such, (in most cases, predictable) event.

In this work ***Proactive Scheduling*** is chosen to produce a ***robust baseline schedule***. Two new methods, that utilizes priori information of activity duration probability distribution, for ***time-buffers*** insertion are presented. The first method uses crude approximation to speed up the schedule generation, while the second method uses a more intensive (time consuming) algorithm for the schedule generation.

The performance of both methods are assessed by computing the generated schedule robustness to disruptions. Where solution robustness is the difference between the baseline schedule and a realized schedule. Both methods performance are compared to the Virtual Activity Duration Extension, VADE, presented in the pioneer work of Vonder, S. The experimental results showed that VADE in terms of solution robustness outperformed the first method, while the second method in most tested instances outperformed VADE. The first method though outperformed by VADE and the second method requires much less computational time. As such it is better suited for cases where either a crude approximation is acceptable or where the problem complexity would render the use of VADE or the second method inadequate due to their computational footprint.