Intelligent model for optimizing Gantt chart in the planning stage

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Abstract

Scheduling plays a critical role in project management as it is a key determinant of project success. This thesis focuses on addressing the challenge of scheduling tasks under resource constraints. Synthetic data is generated to represent a set of tasks with random start times, durations, and resource requirements. The objective is to schedule these tasks efficiently, with a focus on minimizing the minimum completion time while ensuring resource constraints are met.

To tackle this problem, two optimization algorithms are employed: Linear Programming (LP) and Particle Swarm Optimization (PSO).This thesis aims to utilize (PSO) and (LP) in the realm of software project management scheduling with the goal of optimizing time. The resulting schedules are visualized using Gantt charts, providing a clear representation of the optimized task arrangements.

The results show how the (PSO) method is better than the (LP) algorithm in terms of time. Implementation of PSO significantly reduces the start and end times of tasks, leading to an overall reduction in project duration. In contrast, the (LP) algorithm does not yield improvements and produces unsatisfactory outcomes.

These results emphasize the importance of selecting appropriate optimization techniques for complex scheduling scenarios. The (PSO) algorithm demonstrates its effectiveness in optimizing task schedules and achieving significant reductions in project duration. This thesis provides valuable insights for project managers and decision-makers, emphasizing the significance of utilizing suitable algorithms to maximize project efficiency and success.

Keywords: Gantt Chart, Linear Programming, Particle Swarm Optimization, Scheduling, Software Projects Management