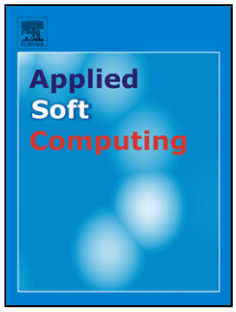

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Priority-Based and Conflict-Avoidance Heuristics for Multi-Satellite Scheduling

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Abstract

In this paper we address the problem of multi-satellite scheduling with limited observing ability. As with other computationally hard combinatorial optimization problems, a two-stage heuristic method is developed to obtain high quality solutions in a reasonable amount of computation time. The first stage involves the determination of an observing sequence and the generation of a feasible scheduling scheme. We propose several priority-based and conflict-avoidance heuristic strategies and develop the time-based greedy approaches, the weight-based greedy approaches, and an improved differential evolution (DE) algorithm. The second stage consists of further improvement strategies under different resource contentions, thus improving the scheduling results further. Finally, we design different classes of instances to test the efficiency and applicability of the methods. Computational results reveal that the new proposed methods routinely delivered very close to optimal solutions.

Keywords: Earth Observing Satellites, Scheduling, Heuristic, Differential Evolution, Optimization

2010 MSC: 00-01, 99-00

1. Introduction

Earth-observing-satellite (EOS) plays a significant role in rapid response to observation requests on Earth's surface (such as environment surveillance, or resource investigation) [1, 2]. The resource (i.e. sensor, camera, or antenna) equipped on satellite has a visual field, which is used to accomplish the observation activity. A resource can only carry out the observation if the target is

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