Information and Management Sciences
Volume 14, Number 1, pp.37-55, 2003

Identification of a Rank Minimal Optimal Sequence for Open Shop Scheduling Problems

R. Murugesan
Thiruvalluvar College, India

S. Thamarai Selvi
Tirunelveli Engineering College, India

P. Alphonse Rajendran
Aditanar College, India

V. S. Sampath Kumar
Manonmaniam Sundaranar University, India

Abstract

This paper introduces a new concept of rank minimal sequence for classical job scheduling problems. Also it proposes a new heuristic algorithm, which helps to identify a rank minimal optimal sequence for n jobs, m machines open shop scheduling problems, using job shop scheduling approach. The algorithm is developed based on the concepts such as cyclic machine orders and cyclic associates of a machine order matrix. It tests only a very few job shop scheduling problems in the best case and $m!$ problems in the worst case for n jobs, m machines open shop scheduling problem and provides the sequences. At least one of these generated sequences is found to be a rank minimal optimal sequence. The proposed algorithm has been tested for the standard benchmark problems of various smaller sizes and the results are tabulated. It is interesting to observe that out of 60 benchmark problems tested, our proposed algorithm yields rank minimal optimal sequences for most of the problems compared to the Brucker's Branch-and-Bound Algorithm for Open Shop Problem. Also, it is observed that there can be more than one rank minimal optimal sequence for a problem. The purpose of arriving a rank minimal optimal sequence is that algorithms, which work only on the set of rank minimal sequences instead of the set of all sequences, perform potentially much better than conventional algorithms.

Keywords: Scheduling Theory-Open Shop Problems, Job Shop Problems, Branch-and-Bound, Sequence-Latin Rectangles.