A genetic algorithm on single machine family scheduling problem to minimise total weighted completion time

ABSTRACT

In this paper, we address a single machine family scheduling problem where jobs, each characterised by a processing time and an associated positive weight, are partitioned into families and setup time is required between these families. For this problem, we propose a genetic algorithm using an optimised crossover operator designed by an undirected bipartite graph to find an optimal schedule which minimises the total weighted completion time of the jobs in the presence of the sequence independent family setup times. The proposed algorithm finds the best offspring solution among an exponentially large number of potential offspring. Extensive computational experiments are conducted to assess the efficiency of the proposed algorithm compared to other variants of genetic algorithms. The computational results indicate the effectiveness of the proposed algorithm in generating better quality solutions compared to other algorithms.

Keyword: Genetic algorithm; Machine scheduling; Minimise total weighted; Completion time