

Iterated-greedy-based algorithms with beam search initialization for the permutation flowshop to minimise total tardiness

Victor Fernandez-Viagas^{1*}, Jorge M. S. Valente², Jose M. Framinan¹

¹ Industrial Management, School of Engineering, University of Seville,

Camino de los Descubrimientos s/n, 41092 Seville, Spain, {vfernandezviagas,framinan}@us.es

² LIAAD - INESC TEC, Faculdade de Economia, Universidade do Porto, Porto, Portugal, jvalente@fep.up.pt

October 24, 2017

Abstract

The permutation flow shop scheduling problem is one of the most studied operations research related problems. Literally, hundreds of exact and approximate algorithms have been proposed to optimise several objective functions. In this paper we address the total tardiness criterion, which is aimed towards the satisfaction of customers in a make-to-order scenario. Although several approximate algorithms have been proposed for this problem in the literature, recent contributions for related problems suggest that there is room for improving the current available algorithms. Thus, our contribution is twofold: First, we propose a fast beam-search-based constructive heuristic that estimates the quality of partial sequences without a complete evaluation of their objective function. Second, using this constructive heuristic as initial solution, eight variations of an iterated-greedy-based algorithm are proposed. A comprehensive computational evaluation is performed to establish the efficiency of our proposals against the existing heuristics and metaheuristics for the problem.

Keywords: Scheduling, Flowshop, Heuristics, PFSP, tardiness, beam search, iterated greedy algorithm, iterated local search

*Corresponding author. Email: vfernandezviagas@us.es