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Learning Dispatching Rules for a Large-Scale Scheduling Problem of a Maintenance Provider

Nowadays, companies desire to offer customised products and services to their customers. At the same time, they want to address customers'requests as fast as possible. In addition, operations are often subject to high uncertainty and frequent disruptions, such as urgent order arrivals, resource unavailability, and product defects. Under these conditions, companies need to schedule tasks quickly, often in real-time, and therefore use dispatching rules. However, the performance of those rules depends on the objectives, settings, and conditions for which they were designed. Generating rules by hand for the several possibilities is burdensome. Consequently, using artificial intelligence to find new dispatching rules became common. This work uses genetic programming to find new rules in a large-scale scheduling problem of a real-world maintenance provider. This problem was modelled as a Dynamic Resource-Constrained Multi-Project Scheduling Problem. It includes several sources of uncertainty, such as unexpected arrivals, uncertain processing times and unplanned work. Genetic programming rendered dispatching rules around 10% better tardiness-wise than existing ones from the literature while maintaining a compact size.

Author: AZEVEDO MARQUES, Nuno André (INESC TEC, Faculty of Engineering, University of Porto)

Co-authors: FIGUEIRA, Gonçalo (INESC TEC, FEUP); GUARDÃO, Luís (INESC TEC); GUIMARÃES, Luís

Presenter: AZEVEDO MARQUES, Nuno André (INESC TEC, Faculty of Engineering, University of Porto)

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