
A Comparison of Random Task Graph Generation Methods for Scheduling Problems

Louis-Claude Canon*¹, Mohamad El Sayah , and Pierre-Cyrille Heam²

¹Département d'Informatique des Systèmes Complexes (FEMTO-ST/DISC) – Université de Technologie de Belfort-Montbéliard, Ecole Nationale Supérieure de Mécanique et des Microtechniques, Université de Franche-Comté, CNRS : UMR6174 – France

²Département d'Informatique des Systèmes Complexes (FEMTO-ST/DISC) – Université de Technologie de Belfort-Montbéliard, Ecole Nationale Supérieure de Mécanique et des Microtechniques, Université de Franche-Comté, CNRS : UMR6174 – 24, rue Alain Savary 25000 - BESANCON, France

Abstract

How to generate instances with relevant properties and without bias remains an open problem of critical importance for a fair comparison of heuristics. In the context of scheduling with precedence constraints, the instance consists of a task graph that determines a partial order on task executions. To avoid selecting instances among a set populated mainly with trivial ones, we rely on properties that quantify the characteristics specific to difficult instances. Among numerous identified such properties, the mass measures how much a task graph can be decomposed into smaller ones. This property, together with an in-depth analysis of existing random task graph generation methods, establishes the sub-exponential generic time complexity of the studied problem. Empirical observations on the impact of existing generation methods on scheduling heuristics concludes our study.

Keywords: instance generator

*Speaker