Task Variant Allocation in Distributed Robotics

José Cano\textsuperscript{1}, David White\textsuperscript{2}, Alejandro Bordallo\textsuperscript{1}, Ciaran McCreesh\textsuperscript{2}, Patrick Prosser\textsuperscript{2}, Jeremy Singer\textsuperscript{2}, Vijay Nagarajan\textsuperscript{1}

\textsuperscript{1}School of Informatics, University of Edinburgh, UK \textsuperscript{2}School of Computing Science, University of Glasgow, UK

Summary

- We consider the problem of assigning software processes (or tasks) to hardware processors in distributed robotics environments.
- We introduce the notion of a task variant, which supports the adaptation of software to specific hardware configurations.
- We formalise the problem of assigning task variants to processors as a mathematical model.
- We propose three solution methods to the problem: Constraint Programming, a Greedy Heuristic and a Local Search Metaheuristic.
- We demonstrate the use of task variants with a case study, where constraint programming improves the local search metaheuristic and the greedy heuristic by an average of 16\% and 41\% respectively.

Task Variants

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<tr>
<th>Variant</th>
<th>Task</th>
<th>Benefit</th>
<th>Cost</th>
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<tbody>
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<td>Variant 1</td>
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<td>Variant X</td>
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Better exploitation of the available HW resources!!!

Problem and solution methods

Maximise QoS & Minimise CPU

Constraints

- Constraint Programming
- Local Search Metaheuristic
- Greedy Heuristic

Evaluation

Greedy Heuristic
Local Search
Constraint Programming

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