

Speeding Up IA Mechanically-Steered Multistatic Radar Scheduling with GPGPUs

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Abstract

In this paper, we investigate speeding up the execution time of Interval Algebra (IA) mechanically-steered multistatic and multisite radar scheduling using a general-purpose graphical processing unit (GP-GPU). Multistatic/multisite radar scheduling forms part of JDL fusion level 4, Process Refinement, and specifically draws from the multisensor management domain of knowledge. Pseudo code for an Open Compute Language (OpenCL) IA total-path consistency algorithm is provided based on the original work of Ladkin and Maddux. Monte-Carlo executions are run to solve randomly generated Interval Algebra networks on a GP-GPU and a single core of a multicore central processing unit. The results indicate that the OpenCL IA total-path consistency algorithm, executed on a GP-GPU in parallel, should be preferred for temporal constraint satisfaction problems where the network is more likely to be consistent. Then for consistent networks this parallel algorithm can provide execution time speed-up between two and three times, within the tested limits, that of the serial algorithm. We present suggestions as to constraints to the OpenCL IA total-path consistency algorithm.

Keywords: process refinement, resource management, multisensor scheduling, multistatic radar, multisite radar, interval algebra, GP-GPU.