

The Hong Kong Polytechnic University
Department of Logistics and Maritime Studies
Research Seminar

Determining Process Capacity: Intractability and Efficient Special Cases

by

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Venue: R602, Shirley Chan Building
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(Conducted in English)

Abstract:

Most OM textbooks use the following simple approximation to illustrate the computation of the capacity of a process: The capacity of each resource is first calculated by examining that resource in isolation; process capacity is then defined as the smallest among the capacities of the resources, i.e., bottleneck capacity. In a recent paper, Gurvich and Van Mieghem (2015) show that, in the presence of collaboration and multitasking, this “bottleneck formula” can be significantly inaccurate, and obtain a necessary and sufficient condition under which it correctly determines process capacity.

We provide further clarity on determining process capacity by showing that it is hard to compute process capacity exactly and also to approximate it to within a reasonable factor. These results are based on a novel characterization, which we establish, of process capacity that relates it to the fractional chromatic number of the associated “collaboration graph”. An important implication is that it is unlikely that we can replace the bottleneck formula with a simple but close approximation of process capacity. On the positive side, we show that capacity can be efficiently computed for processes for which the collaboration graph is a perfect graph.

Bio:

Yang Bo joined the department of decision sciences and managerial economics at the Chinese University of Hong Kong in 2017. Prior to this employment, he obtained his doctoral degree in Operations Management from Naveen Jindal School of Management at The University of Texas at Dallas. His research interests include dynamic programming, math programming, and game theory, with applications in inventory management, capacity management, and the management of resource-sharing systems. His work has been accepted/published in *Operations Research* and *Manufacturing & Service Operations Management*.

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All are welcome!