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Adaptive Load Balancing: A Study in Multi-Agent Learning

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We study the process of multi-agent reinforcement learning in the context of load balancing in a distributed system, without use of either central coordination or explicit communication. We first define a precise framework in which to study adaptive load balancing, important features of which are its stochastic nature and the purely local information available to individual agents. Given this framework, we show illuminating results on the interplay between basic adaptive behavior parameters and their effect on system efficiency. We then investigate the properties of adaptive load balancing in heterogeneous populations, and address the issue of exploration vs. exploitation in that context. Finally, we show that naive use of communication may not improve, and might even harm system efficiency.

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