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Tuning of a Stigmergy-based Traffic Light Controller as a Dynamic Optimization Problem

In this paper, we present results on the automatic tuning of an adaptive traffic light controller. The traffic light controller is inspired by some swarm intelligence techniques and uses numerical values that are adapted by the principles of stigmergy to estimate queue lengths. These estimates are used in a probabilistic mechanism that switches between traffic light control strategies and determines phase lengths. This traffic light controller adapts through this specific mechanism to the current traffic situation but to define its behaviour more than 100 parameters are used. To determine appropriate parameter settings, we therefore explored the automatic configuration of this traffic light controller. The main focus in this article is to examine whether the controller parameters require adaptation to major time-varying changes to reach best possible performance. We propose a strategy to deal with such changes and experimentally evaluate the impact limited re-tunings have on the controller performance.