

Abstract

Urban traffic congestion is a pandemic illness affecting many cities around the world. We have developed and tested a new model for traffic signal optimization based on the combination of three key techniques: 1) genetic algorithms (GAs) for the optimization task; 2) cellular-automata-based microsimulators for evaluating every possible solution for traffic-light programming times; and 3) a Beowulf Cluster, which is a multiple-instruction-multiple-data (MIMD) multicomputer of excellent price/performance ratio. This paper presents the results of applying this architecture to a large-scale real-world test case in a congestion situation, using four different variables as fitness function of the GA. We have simulated a set of congested scenarios for “La Almozara” in Saragossa, Spain. Our results in this extreme case are encouraging: As we increase the incoming volume of vehicles entering the traffic network - from 36 up to 3600 vehicles per hour - we get better performance from our architecture. Finally, we present new research directions in this area.