Optimization of signalized traffic network using swarm intelligence

ABSTRACT

Traffic lights are the signaling devices located at a road intersection for granting right-of-way movement to road users. Thus, optimization of traffic signalization is essential to improve road service as it is the cost-effective way. Commonly, the signal optimization aims to minimize the average travel delay by manipulating the green signal timing. Besides to optimize the signal timing, the local intersection controller needs to collaborate with neighboring intersection controllers for minimizing the average delay for whole network as the congestion will be propagated to the downstream intersection. However, the current fixed-time signal controller is inadequate to manage the high growing demands of traffic as it is tuned offline using the nominal traffic flow data. Thus, this work aims to explore the potential of using Particle Swarm Optimization (PSO) to optimize the traffic signal timing for the traffic network. The proposed algorithm is texted using a benchmarked 1x2 traffic model and its performances are compared with the classical Genetic Algorithm (GA). The simulated results show the proposed PSO has improved the performances in minimizing average travel delay by 3.94 %.