

DISCRETE EVENT SIMULATION OF SMART PARKING CONFLICT MANAGEMENT

Antoine Dominici
Laurent Capocchi
Emmanuelle De Gentili
Jean-François Santucci

University of Corsica
SPE UMR CNRS 6134, Campus Grimaldi
20250 Corte (France)

Abstract

Smart parking is a framework aimed to optimize the occupancy of parking spots based on specifications that include the behavior of drivers. One of the challenges in this area concerns the determination of a reliable model able to resolve cumulative parking conflicts that appear when many drivers look for parking in a dynamic environment system where user behavior is paramount. This abstract presents a discrete-event modeling and simulation approach dedicated to propose conflict management strategies based on the estimated travel time to reach desired places around a specific area.

1 Introduction

More and more cities are choosing to use Smart Parking software tools to solve their parking problems. Indeed, because of the inflation of land prices in city centers, adding new parking lots addresses a lot of problems and offers cities very few solutions. This is why the solution of providing information to users has become so important because it allows, with much less financial means, to ensure that the various car parks already in place can be used to their full potential (Lin, Rivano, and Le Mouël 2017). The smart parking approach presented in this paper is a complex discrete-event system whose components can be described by finite state automata reacting to internal or external events. The DEVS (Discrete-Event system Specification) formalism (Zeigler et al. 2018) makes it possible to model this system and to simulate it both in real time and in simulated time.

2 Proposed Approach

During our previous research (Dominici et al. 2020), a system combining discrete-event simulation and artificial intelligence to determine the time at which a place will be released from its user has been developed. To do this we have classified the different classes according to the estimated time before their release. In this paper, based on our previous work, we want to create a system to direct a driver looking for a place according to the release times of the different places available to him. We must also take into account the competition between drivers wanting to park so that they do not interfere with each other and therefore do not increase the time to find a space due to conflicts.

To prove that such an approach is possible and interesting to achieve with a discrete-event system, we propose to simulate the evolution of class-based sensors previously constructed in our previous research (Dominici et al. 2020). Then we add a system allowing users to simulate finding a place while being in conflict with other users, all this while applying different conflict management policies in order to determine which would be the most suitable for a real situation.

