Available online at www.sciencedirect.com

ScienceDirect

Procedia Computer Science 113 (2017) 210–216

Procedia Computer Science

www.elsevier.com/locate/procedia

The 8th International Conference on Emerging Ubiquitous Systems and Pervasive Networks (EUSPN 2017)

Demand for Agent-Based Transportation Models & Social Behavioral Challenges

Samar El-Amine[a]*, Stéphane Galland[a], Ansar-Ul-Haque Yasar[b], Abderraffiaa Koukam[a]

[a]*LE21, Univ. Bourgogne Franche-Comté, UTBM, 90010 Belfort Cedex, France*
[b]*Hasselt University, Transportation Research Institute (IMOB), Agoralaan, 3590 Diepenbeek, Belgium*

Abstract

Agent-Based modelling has been around us for quite some time now and has thus become a crucial factor for executing prediction-based planning, such as the transportation models for metropolitan cities. This paper undertakes the fundamental understanding of the agent-based modeling and simulation and its application to the transportation models while discussing the scope of its applications and advantages too. The paper then presents the concepts attributed to the social behaviors in conjunction with the agent-based modelling techniques applied so far. The literature review conducted in lieu of this work has resulted in agreement with the fact that the potential of agent-based modelling is by far greater than ever due to the ever-improving computing speeds and capabilities, while the understanding of complex human behavior will continue to be a challenge for simulations and automation techniques developed so far.

Peer-review under responsibility of the Conference Program Chairs.

Keywords: Agent-Based Modeling (ABM); ABM Transportation Model; Social Behaviors

1. Introduction

Agent Based Modelling and Simulation (ABMS) has been broadly connected over a range of controls by both specialists and experts. Cases of these orders incorporate nature, science, business, financial science, computer

* Corresponding author.
E-mail address: samar@sanda.be

1877-0509
Peer-review under responsibility of the Conference Program Chairs.
10.1016/j.procs.2017.08.351

simulation, sociologies, political science, strategy, and military studies. Knowledge and uses of ABMS proceed to grow and collect through fast and insightful, innovative work. ABMS has been connected to an expansive scope of spaces in transportation. These applications essentially fall into two methodological ideal models: individual-based models that review individual transportation-related exercises and behaviour, and computational strategies that review a community oriented and responsive transportation framework that displays insight by demonstrating an accumulation of independent basic decision-making of subsystem substances called agents. The former is firmly identified with the models for travellers' exercises while the latter is normally perused as a computational strategy in a distributed artificial intelligence (DAI) framework, or a complex adaptive system (CAS), which is a capable procedure for mimicking dynamic complex frameworks to watch new behaviour. In former researches, it is basic to see transportation studies intersecting the limit of the two classes yet perused with the same (or comparative) term, agent based, hence prompting theoretical disarray. The objective of this groundwork is to audit the chronicled angles and the continuous advancements of ABMS in the interdisciplinary transportation territories, condensing and clearing up the extension and key qualities of past agent based reviews and to reveal insight into future potential research. Another logical concentration of this groundwork is to report an examination exertion that endeavours to set up the connection between the traditional and ABMS-based course decision models. This exertion plans to answer a logical request: Because both established econometric models and ABMS are conceivable in displaying people's route choice decision behaviours, there as far as anyone knows exist certain conditions and settings at which both demonstrating ideal models show practically identical outcomes. This request, as an essential stride toward a superior comprehension of the traditional econometric technique and ABMS-based methodologies, reveals insight into the way ahead for the advancement of an all-encompassing modelling framework.

2. Background

ABMS advanced from AI and software engineering yet is currently being created freely in research domains all through the world. The historical backdrop of ABMS can be followed back to John Von Neumann, who considered and built up a gadget later known as cell automata[1]. In the 1970s, John Conway built up the Game of Life, a two-dimensional (2D) cell automata[2]. A cell has two states, alive and dead; the condition of a cell relies on upon the condition of the neighbours of the past time step. Conways' diversion induced extraordinary enthusiasm for the development of many-sided quality from basic guidelines. Intrigue kept on developing in the 1990s with the presence of different instruments, especially Swarm and NetLogo in the mid-1990s and Recursive Porous Agent Simulation Toolkit (Repast) and AnyLogic in 2000. In the mid-1990s, Joshua Epstein and Robert Axtell[3] created Sugarscape, a misleadingly clever ABSS, which catches basic ideas of sociologies. At every framework point on a plane, sugar developed at a consistent rate. An arrangement of agents, with a settled, arbitrarily decided level of vision and digestion, find and eat sugar on the sugarscape. On the off chance that sugar at one place was depleted, the agent at that point moved to another area where it had the most abundant sugar inside its vision. This straightforward arrangement of agents prompted relocation wonder. More guidelines made extra intriguing outcomes. These efforts and the use of CAS lay the foundations of the ABMS as it is known today. ABM has since its commencement been connected to an assortment of utilizations.