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Automobile Organization with multi-agent approach

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ABSTRACT

Under the power emergency and global warming, mass moving becomes more significant than before. The drawback of mass transportation, bonus the high elasticity and efficiency of taxi and with the rebellion of technology, electric-taxi is the better transportation option for city. On the other hand, among the many taxi service types, dial-a-ride (DAR) service scheme is the better way for traveler and taxi. Though the electrical energy restock of electric-taxi is the main scarcity and restraint for DAR operation scheme. In order to more efficiently supervise the electric-taxi DAR operation method and the lots of disadvantages of corporal scheme and survey the behaviors and interactions of reproduction scheme, multi-agent simulation technique is the most appropriate simulation method. Lastly, we use practical data as the input of imitation scheme and examine the simulation result. In this paper productively obtain two presentation measures: regular waiting time and service rate. Result shows the standard waiting time is only 3.93 seconds and the service rate is 37.073%. So these two presentation measures can support us to create organization decisions. The multi-agent oriented model put forward in this editorial is the subject of an application planned in the long term to manage the user information scheme of an urban transport system.

Keywords: *multi-agent, transmit, dial-a-ride problem*

1.1 INTRODUCTION

To oppose global warming, mass transportation plays a significant position in metropolis. Public can travel by taking mass transportation quite than heavy a car. In this way, public can decrease the CO2 creation and air contamination. In order to decrease the process cost of mass transportation, Transportation Company has to abandon the elasticity and competence. However taxi just recompenses the disadvantages of mass transportation, since it has the features of high elasticity and competence. So far, the majority of passengers stands near road and wait for a taxi.

In this provision, there are three disadvantages. First, passenger doesn't know how long he/she has to wait waiting a taxi pass by. Secondly, traveler is not sure the coming taxi is free or not. Thirdly, taxi needs to go approximately and look for traveler. Therefore the process efficacy is too low so that cause the power waste. Different, dial-a-ride (DAR) system is a good solution to solve this problem. In DAR system, passengers use wireless communiqué tool (mobile phone) to call for a pick-up and release service-to service center (control center).

Then, repair center allocate an idle taxi to execute the task. Using this kind of service scheme, traveler doesn't need to wait longer than before. And taxi driver can save the taxi energy. Therefore, Dial-a-ride system is very significant in taxi operation system. On the other hand, with the technical upheaval of power, electric-taxi comes with the tide of fashion. Electric taxi means a taxi is ambitious by electricity. It has two advantages. First, for the earth, electric taxi can decrease the air contamination and Global warming, since it can't emit CO2. Secondly,

for taxi driver, electric-taxi can decrease the fuel cost, particularly for oil, due to the cost of restock electrical energy is lower than gas.

Therefore electric taxi is a significant transportation for metropolises. Different, electric-taxi also has disadvantage. The worst disadvantage in electric taxi is the electrical energy that's also the biggest restraint. Throughout the electric-taxi traveling period, the electricity of taxi is lessening. When the electricity of electric-taxi is not sufficient to do the next service, electric-taxi has to replenish its' electricity in the electric station. During the restock period, electric-taxi can't do any task and traveler still waits for service. Under this situation, that will cause the diminution of Taxi Company's revenue and traveler approval.

Though, profits and traveler satisfaction are the most significant presentation measures for Taxi Company. So Electric-taxi Company has to suggest some organization policies to deal with the exciting restock difficulty. Therefore how to direct the electric-taxi DAR process scheme becomes a very significant problem with organization policies. In order to supervise the electric-taxi DAR process system, we have to build an electric-taxi DAR operation simulation system. There is a lack in multi-agent transportation simulation, such as allowing cars move based on straight path and transmit operations. In fact, the traffic jams organization is significant for electric-taxi DAR operation system. So this paper takes into account the shortage of existing methods to strengthen our multi-agent simulation.

On the other hand, due to the unfeasible and costly weaknesses of physical system, multi-agent simulation method is the most suitable simulation method for our research. The main purpose of this study is as follows: First purpose is to provide a series of organization policies to manage the electric-taxi DAR process system and examine the occurrence of reproduction. Second purpose is to recompense the shortages of existing methods to reinforce our multi-agent imitation. The main payment of this paper is that we successfully obtain the presentation measures to sustain the decision making for manager.

2.1 ELECTRIC-TAXI DAR OPERATION ORGANIZATION

This describes electric-taxi DAR operation system (Figure 1). The electric-taxi DAR operation system divided into three divisions. First division is the agent container. In agent jug, we have six types of agents: electric-taxis, manage center, traveler, electric stations, road and stops. Agents are divided into two types (Figure 2). First type is active agents those have their own structures and behaviors. Second type is passive agents persons only contain their arrangement.

The requirement of each type of agent is as follows:

1. Passive Agents (PA): This category of agents represents entities (agents) that have a structure, without a behavior. Typically, a large part of the elements restricted in the imitation atmosphere belongs to this group. For example, road is a passive agent, its x and y coordinates belong to spatial organization. And, its id and color belong to non-spatial organization.

2. Active agents (AA): This category of agents represents entity (agents), which have structures and behaviors: These entities vigorously contribute in the imitation. For this category, we must stipulate the data structures of the entities as well as their behaviors. For example, electric taxi is an active agent. Its x and y coordinates belong to spatial organization. Its id and color belong to non-spatial organization. Its moving behavior belongs to spatial behavior. Its information transmitting belongs to non spatial behavior.

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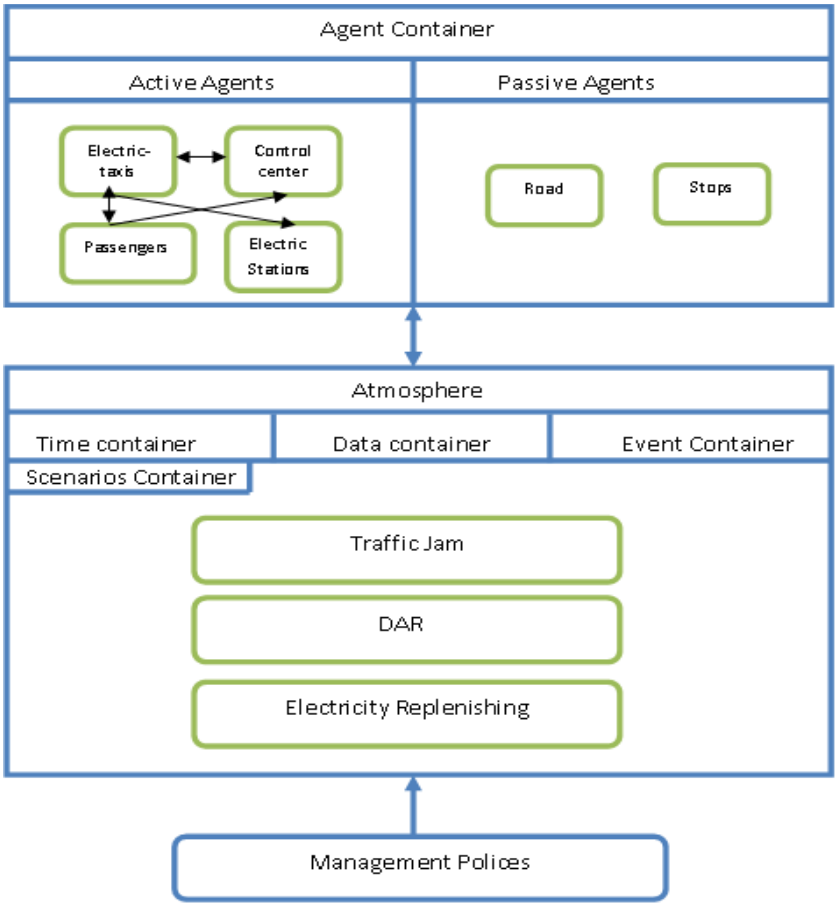

Fig.1. the structure of electric-taxi DAR operation scheme

The second part is atmosphere. Atmosphere is composed of time container, data container, event container and scenario container. Time container includes all of the related information and variables. Data container contains all of the related information and variables to support data analysis. Event jug has many events to be the activate of every possible act of each agent. We also design three kinds of scenarios in the scenario container (Figure 1): traffic jam, dial-a-ride management and electrical energy restock management. These three kinds of scenarios constitute the underlying scenario of electric taxi DAR operation scheme.

Third part, the management policies to manage the electric taxi DAR operation simulation system. The structure of active agents which belong to agent container and the scenario communication processes of circumstances container in the atmosphere.

2.2 THE FRAMEWORK OF ACTIVE AGENTS

The framework of active agent and define each purpose within the structure of active agent and each kind of active agent clearly. Though we can't clearly appreciate the precise actions, quality and duties what the agents will have through this framework instantaneously. Though it can change the abstract structure of each active agent the active agent into a existing framework. And in this way, we can remove the actions, quality and duties what the agents will have during this framework further.

The functions within the framework of active agent:

1. K: Knowledge base of agent. The information base of agent can help agent make choice more precisely. Some agents have their own information base. Information base consists of a lot of information. Information comes from dissimilar kinds of agents. For example, the information of control center comes from traveler and electric taxi. This information makes up the knowledge base of control center. The dissimilarity of knowledge base comes from roles (electric taxi, passenger or control center) not types (passive agent or active agent). Different role may have different information base.
2. IS: Information source. Information source means where the information comes from.
3. R: Reply. Reply means the object of action.
4. A: Assessment rules. Decision means the alternatives, mechanisms or algorithm to help agent make suitable actions or decisions. It describes the six kinds of agents: **CCA** Control Center agent; **PA**: Passenger agents; **TA**: Electric Taxi agents; **EA:** Electric station agents; **RA:** Road agents; and **SA**: Stop agents.

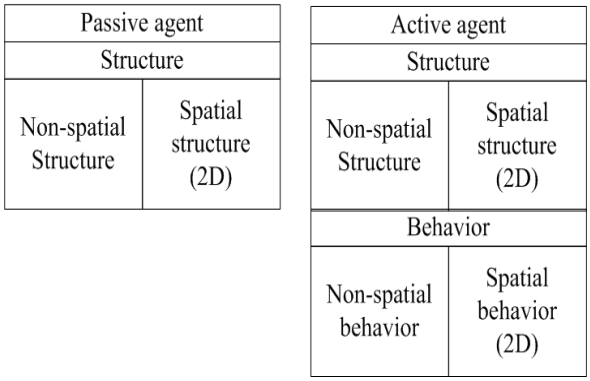

Fig.2. Passive Agents and Active agents

3. PROPOSED SYSTEM

3.1 Dial-a-ride scenario

The dial-a-ride scenario traveler calls for a service to control center. After control center receiving a necessity, control center allocate a free electric taxi to pick the exact traveler up and deliver him/her to the purpose. The main roles are traveler, control center and electric-taxi. In dial-a-ride communication process diagram, there are three agents: Control Center, Electric-taxis and Passengers.

3.2 Traffic jam

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An Electric-taxi encounter a road which is crowded, the Electric-taxi finds out another direct path that excludes the road which is packed to avoid the traffic jam. Any Electric-taxi which is receiving in the traffic jam will send the traffic jam in order to each Electric-taxi. The main role is Electric-taxis. In this occurrence (traffic jam) communication process, there is one type of agents: Electric-taxis.

3.3 Electricity replenishing scenario

The electricity replenishing scenario An Electric-taxi driver checks the electrical energy of taxi, and find out the electrical energy is too low to support any longer travel. So the Electric-taxi moves to electric station to replenish electrical energy.

Manage Center and Electric-taxis those are in the Electric stations will give the electric station in order to the electric-taxi which wants to refill electricity. The major roles are: Electric-stations, manage Center and Electric-taxis. In this electricity replenishing interaction process, there are three agents: Electricity stations, Control Center and Electric-taxis.

3.4 PERFORMANCE ANALYSIS

In this sub-section, we list the atmosphere requirement and replication settings in the table 1 and table 2. The figure 3 is the simulation of electric-taxi DAR operation system. In computer atmosphere, we use Microsoft Windows XP Professional version 2002 Service pack 3 as our operation system. The CPU computer is Intel(R) Core(TM) 2 6320 @ 1.86GHz and the RAM computer is 1.87 GHz, 0.99GB. The AnyLogic version is anylogic 5.1 and the java version is JDK6.0. In imitation settings, the number of taxi is 10. The number of stop and road is 8 and 18, respectively. And stop generation belongs to random generation. Other detail information is listed in table 2.

Fig.3. the simulation of electric-taxi DAR operation scheme.

Operation system	CPU	Ram	Any logic version	Java version

Microsoft windows XP Professional version 2002 Service pack 3	Intel(R) Core(TM)2 6320 @ 1.86GHz	1.87Ghz, 0.99GB	Anylogic 5.1	JDK 6.0

Table 1. Atmosphere requirement

Operation system	CPU	Ram	Any logic version	Java version
Microsoft windows XP Professional version 2002 Service pack 3	Intel(R) Core(TM)2 6320 @ 1.86GHz	1.87Ghz, 0.99GB	Anylogic 5.1	JDK 6.0

Table 2. Simulation settings in Anylogic 5.1 version

4. CONCLUSION

In this article an electric-taxi DAR operation scheme that develops the lacks of existing methods. And from the study result, successfully obtain the performance measures to support the decision making with DAR operation system. In the future works, first, we will intend dissimilar organization rule merge different scenarios to scrutinize the result of simulation and evaluate the occurrence. Second, we will construct graphic user interface (GUI) to connect with on-line. In this way, we can adapt our electric taxi DAR operation system to approach actuality. For electric-taxi DAR managers, they can use our reproduction system as the maintain of making resolution.

REFERENCES

[1] Ali, W. (2006). *Developping 2D and 3D multi-agent geosimulation, a method and and its' application: the case of shopping behavior geosimulation in square one mall.* Retrieved 2006, from www.theses.ulaval.ca/2006/23343

[2] BigSolar (2005). *General report*. Retrieved 2005, from http://www.bigsolar.url.tw/F6DM.htm.

[3] Cantone, D., & Faro, S. (2004). Two-Levels-Greedy: a generalization of Dijkstra's shortest path algorithm. *Electronic Notes in Discrete Mathematics*, 17, 81-86.

[4] Cubillos, C., Polanco, F. G., & Demartini, C. (2008a). Passengers Trips Planning using Contract-Net with Filters. Paper presented at the 8th International IEEE Conference on Intelligent Transportation Systems Vienna, Austria.

[5] Ezzedine, H., Kolski, C., & Peninou, A. (2005). Agent-oriented design of humancomputer interface: application to supervision of an urban transport network. *Engineering Applications of Artificial Intelligence*, 18, 255–270.

[6] Galus, M. et al. (2009). *A Framework for Investigating the Impact of PHEVS*. Retrieved April 7th, 2009, from http://www.eeh.ee.ethz.ch/en/eeh/about-us.html

[7] Government of Honk Kong (2005) *General report*. Retrieved 2005 from http://www.epd.gov.hk/epd/partnership/chi/tran.htm

[8] Green Partty Taiwan (2007). *General report*, Retrieved 2007 from http://www.greenparty.org.tw/division.php?itemid=831

[9] iCo2l (2008). *General report*. Retrieved 2008 from.http://icool.saveoursky.org.tw/co2news/index.php?load=read&id=399

[10] Kok, I. D., & Lucassen, T. (2007). *Using Sectors in a Multi Agent Approach to a Taxi Planning Problem*. Retrieved 2009 from http://www.teunlucassen.nl/index.php

[11] Lansdowne, A. (2006). *Traffic Simulation using Agent Based Modeling*. Retrieved 2009, from http://www.myhomezone.co.uk/project/