The use of agents in modeling human behavior

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The concept of agents is quite frequently used in computer science. Agents can be employed in a variety of applications and can be used to solve complex problems. This seemingly universal usability has brought the field of agents to a rapid growth. The most promising area of research that arrised in the last few years is human behavior modeling. The ultimate objective that researchers are trying to achieve is to make agents as capable and intuitive as humans are.

Before we start to address this problem, we have to define what an agent or an intelligent agent is. Unfortunately, there is no universally accepted definition of the term agent. However, most researchers would agree with the definition that was provided by Russell and Norvig [1]. An intelligent agent can be perceived as a computational entity that is able to sense and autonomously act upon its environment. There can be only one agent in the environment trying to solve some problem. Using only one agent may be suitable for some limited domains where there is no need for collaboration; however, such domains are rare in real life problems. Usually entities interact and collaborate with each other in order to attain certain objectives. In order to better collaborate with other agents in the environment, we need to know something about the other agents.

Learning about other entities in the environment is very helpful. In this way we can make good guesses of their expected behavior and act accordingly. A simple example could involve a computer program that is able to model the behavior, preferences and habits of the user and would be able to adjust itself in order to facilitate its use. Another example of the usefulness of behavior modeling is computer guided characters (bots) in video games that is able to learn from other players and imitate their behavior [2]. In time it would provide a much greater challenge to the human player, since it would be able to adapt and exploit the player`s shortcomings.

Modeling a single agent or human is very useful in some domains, but a much greater challenge represents modeling a group of agents where complex interactions between entities have to be considered. Behavior modeling of crowds would allow the development of highly realistic and reusable models of human behavior that can be used for various tasks. For example, police officers would be able to simulate in a virtual environment various tactics that could be employed during riots or demonstrations and would result in a peaceful resolution of conflict.

The Multi-agent strategy discovering algorithm (MASDA) [3, 4] is able discover common agent strategy by tracking low-level behavior of a group of agents and using only basic domain knowledge. MASDA could be improved to generate behavior models for a larger group of interacting agents, where also the cognitive aspects of human decisions would have to be considered.

References:

[1] S. Russell and P. Norvig. Artificial Intelligence: A Modern Approach (2nd ed.), Upper Saddle River, New Jersey: Prentice Hall, ISBN 0-13-790395-2

[2] C. Thurau, G. Sagerer and C. Bauckhage. Imitation learning at all levels of Game-AI. In Proceedings of the International Conference on Computer Games, Artificial Intelligence,2004

[3] A. Bežek and M. Gams. From Basic Behavior to Strategic Patterns in Robotic Soccer Domain. Informatica, 2:461-468, 2005

[4] A. Bežek, M. Gams and I. Bratko. Multi-Agent Strategic Modeling in a Robotic Soccer Domain. In AAMAS:457-464, 2006