Social Agents for Serious Games

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Abstract

In this paper we propose the use of a shared social context to facilitate agent perception of social dynamics within a virtual environment. We argue that through a shared context it can be more feasible to equip agents with social behaviors and reasoning rules for social intelligence, better suited for real-time constrained serious games with multiple agents.

1 Introduction

Social reasoning for agents in a real-time (virtual) environment often depends on a rich social context including a good understanding of the environment and social activities of other agents. Composing a social context fully autonomously involves computationally expensive inference procedures concerning environment perception, action recognition and intent recognition. In this paper we propose to employ a partly shared social context to facilitate agents in performing such procedures in order to keep their behavior both socially realistic and also efficient. Since actions and intents are already assumed to be available within an actor agent, we make use of this information by allowing other agents to use it directly in their perception process. The shared social context is managed by a middleware coupling multiagent systems (MASs) and game engines.

Figure 1 illustrates the architectural design of a middleware approach for managing a shared social context for virtual agents whose design is distributed among a MAS and a game engine. The middleware introduces a social layer (bottom part of the figure) that offers an information source for agents to directly read aspects of the social context, hereby eliminating the need for individual agents to construct a similar context fully autonomously. Communication with the social layer is regulated through publish/subscribe mechanisms. Ontologies are used for specifying concepts employed in the shared social context. Employed models within the social layer are described next.

2 Shared Social Context

Social Environment Model This model represents the virtual environment defined at an abstraction level at which agents can reason efficiently based on meaningful concepts. It is built on ontologically-grounded concepts representing environment objects, properties and events. Semantic translations are required to convert data from the game engine’s game state to semantic concepts (e.g. a collection of fire particles translates to a fire concept). The benefits of managing this model globally is that semantic processing can be optimized by sharing translations between multiple agents.

1 The full paper has been published in Proceedings of the 2013 International Conference on Autonomous Agents and Multiagent Systems, pages 1127–1128, 2013
Physical Activity Model This model comprises all currently active physical actions of all embodied agents. Here an action represents some bodily movement of a virtual character like locomotion, grabbing an object, performing a gesture or speech action. In this model, agents can be facilitated in performing action recognition where they can be notified about the physical actions of others. Without such explicit information, agents would individually need to infer these actions themselves, which would involve inspecting their perceivable part of the game state over time while searching for patterns that may represent some physical action.

Social Activity Model Similar to its physical counterpart though now at the cognitive level, this model contains a collective overview of all agents’ current intents. Here, intents can represent both task-related intents (e.g. an intent to pick up an object) or communicative intents (e.g. a dialogue move for requesting information). With this model, agents can be facilitated in performing intent recognition where they can be notified about active intents of other agents. Without this facility, agents would have to infer intents autonomously which would involve associating the type and timing of one or more physical actions to some possible underlying intent of the actor agent.

3 Conclusion

In this paper we proposed the use of a shared social context managed by a middleware to facilitate agents in perceiving their environment and physical and social activities of other agents in this environment. Still, providing this shared context does not preclude agents to keep an individual context in which they might keep subjective information about the social situation and other agents. It is up to a designer of a specific application to decide what model(s) to employ. So, the shared social context should be seen as an easy obtainable, but general basis for creating a personal social context rather than an all-comprising and restrictive model. A more extensive description of our approach can be found in [1].

References