Dynamic Planning For Agents in Games using Social Norms and Emotions

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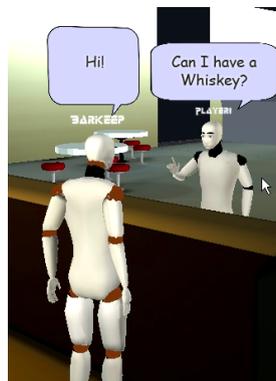
Abstract. In realistic social game environments, agents need to exhibit a certain level of social awareness to maintain the illusion of life and to provide important interaction cues. Previously we have reported on an engine that imbues game agents with socially reactive behavior based on a continuous steering framework and a model of human territoriality. However, some social action requires deliberation and planning. In this paper we describe an addition to our engine that provides dynamic social planning on top of the reactive layer. We propose a novel approach that considers both the emotional and social impact of events and actions on the agent. An implementation demonstrates the approach.

This work fits within a larger research effort to make game characters more visually convincing in social game environments. A significant piece of the puzzle was to make the agents aware of their social surroundings and have them continuously react according to fundamental rules of human territoriality. This is something we have built into a social engine middleware for games [1]. However, a purely reactive framework is not capable of producing complex social action sequences that realize higher level social goals. Even seemingly simple goals such as ordering a drink would require the planning of a sequence of social steps such as establishing contact with a bartender and politely thanking for the drink at the end (Fig. 1). Not only is planning required, but it also needs to be dynamic because the social environment is constantly changing. What would happen if a friend greeted you in the middle of your drink order? To address this, we have added a BDI system, called JADEX [2] that has been augmented with a dynamic planner[3], to the social engine.

Social planning occurs in the context of a particular social environment where certain behavior is expected, which we call social norms. But the agent performing the planning also brings to it a personal emotional context, which may affect some of its choices. In fact, emotion can take quite a central role in social planning, as in FearNot! [4] and the Mission Rehearsal Exercise (MRE) [5]. MRE uses the Emotion and Adaptation (EMA) [6] computational model based on Appraisal Theory by Lazarus [7]. EMA continuously appraises how the dynamic environment affects the agent resulting in emotional and coping responses.

Inspired in particular by the EMA model, but wanting to increase the influence of social norms on action selection, we coupled the planner with a more general appraisal module that appraises events and possible responses both in terms of emotional and social impact on the agent. These are treated as two separate dimensions, along which action choices are ordered. The social impact essentially represents adherence to social norms. A final choice may be influcened by a personality trait that for example favours social order over emotionality. If an emotion becomes strong enough, a negative social consequence may get overlooked. This approach creates a cycle where events come from the environment, the appraisal module suggests and rates responses and the planner decides what actions should be taken using the provided appraisal.

Fig. 1. Drink being ordered only after social contact is initiated.

As a concrete example, consider agent A, with the goal of ordering a drink. It comes up with a socially accepted plan and starts executing it. On the way to the bar, agent B greets it. A may choose to alter its plans to meet a social obligation to greet B back, while still pursuing the drink. But A may appraise the situation differently if it doesn't like B, in which case A's emotions may cause it to ignore B. That might come at a high social cost though.

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