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硕士学位论文

社交型智能体的情感建模及基于社会角色的情感  
模型验证

Emotion Model for Sociable Agent and Its  
Verification Based on Social Role

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## 摘要

随着以智能体技术为依托的产品在教育、医疗、娱乐、交通和通信等领域得到越来越广泛的应用，人类对智能体本身的可交互性提出了更高的要求。和谐的人机交互体验对于加速智能体进一步融入到人类的社会生活中具有重要的意义。面向增强人机交互功能这一目标，社交型智能体的概念被提出并迅速成为智能体技术的研究热点，交互体系和情感等社交元素的重要性在这一概念中得到了强化。本文的研究工作便是围绕着提高智能体在社交过程中情感表现的合理性而展开。立足于已有的人工情感理论，本文将基于社会角色和关系的社会认知模型融入到情感的产生过程中，提高了情感与社交行为之间的耦合度。论文的主要研究工作如下：

(1) 吸收PSI理论中关于情感与认知过程不可分割的观点，将社交型智能体情感的产生与其社会认知相关联，并且通过整合以事件评价为基础的OCC情感归类模型，使智能体能够响应社交激励并涌现出与之相符的情感。

(2) 利用情感约束的方法，使智能体能够从自身所具备的社会认知出发，根据其所处的社交场合及内在需求，调节在社交过程中所产生的情感，进而提高智能体情感表现的合理性。

(3) 以OpenCog开源智能系统作为基础框架，设计并实现社交型智能体原型，将社会角色模型的核心概念以超图的表示形式导入到智能体个体之中，作为基本的社会认知。通过推理和学习，智能体可对其社会认知进行更新与扩展。

(4) 利用Unity3D游戏引擎构建出虚拟社交环境，并将社交型智能体原型在该环境中可视化，使用户能够便捷地构造自定义的社交场景并与其中的智能体进行交互，以此观察智能体的情感和其它内在参数的动态变化，从而验证情感模型的合理性。

**关键词：**社交智能体；人工情感；社会认知

## Abstract

As agent-based products have been more and more widely used in the fields of education, health care, entertainment, transportation, communication and so on, human beings place higher demands on better interactive functionality of agents. Experience from human-machine interaction is significant for accelerating integration of agents into our social life. To achieve the goal of enhancing human-machine interaction, the concept of sociable agent has been brought up, and then quickly become a key issue in the research of agent theory. In this concept, the importance of social elements, such as emotion and interactive hierarchy, is emphasized. Based on the theory of artificial emotion, this thesis focuses on the ways to better rationalize the emotion expression of agents in social interaction. By integrating social cognition model, which is based on social roles and social relationships, into the emergence of emotion, we increase the coupling degree between the emotion and social behavior of agents. Our research work involves the following aspects:

- (1) By adopting the viewpoint from PSI theory that emotion and cognition are inseparable, we associate emergence of emotion with agent's social cognition. We incorporated the OCC emotion model which is based on event-driven mechanism, so agents could respond to social stimulus and thus corresponding emotions emerge.
- (2) By employing methods of emotion regulation, agents could also regulate their emotions based on their social cognition, in order to meet the requirement of social situations and their internal demands. Consequently, the rationality of emotion expression in sociable agent is improved.
- (3) We built a prototype of sociable agent within the framework of OpenCog, which is an open source artificial intelligence system. By using the representation of hyper-graphs, we introduced the core concepts of social role-based model and

made it basic social knowledge for sociable agents. Through reasoning and learning, the agent is able to update and expand its knowledge base.

(4) By building a virtual interactive environment using Unity3D game engine, we visualized the sociable agent model in a direct way. Users are allowed to customize the social situations and interact with the agents in the virtual world. It is also convenient for users to observe the internal dynamics of agents including emotion and other parameters instantly, so the emotion model can be verified.

**Keywords:** sociable agent; artificial emotion; social cognition

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