Research into Emotionally Intelligent Agents

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Research Directions

Emotionally Intelligent Agents The group has strong expertise in the area of agent architectures. The main research vehicle has been the INTERRAP architecture. Recent research has been directed at giving the architecture a formal operational model and combining utilitarian and symbolic reasoning within the architecture. Currently, we are integrating resource monitoring and resource managing constructs into the architecture so that the control flow within the architecture can be adapted optimally to a dynamic environment. We find close parallels between our resource-adapting mechanisms and motivational and emotional models in the life sciences. Indeed, most of the virtues that are cited for "emotional intelligence" in people are precisely the advantages we seek to obtain with the resource-adapting mechanisms in our software. We are developing contacts within psychology and cognitive science to help us pursue these parallels.

Intelligently Emotional Agents The current success of the object-oriented view of software development in part lies in to its intuitiveness in domains such as the programming of graphical user interfaces. It simply seems natural to describe the domain in terms of objects. Increasingly, we find objects with their own thread of control. In such cases, agent-oriented programming is the natural paradigm, with each agent autonomously directing its behaviour in pursuit of its own goals. Lifelike characters are obvious candidates for such a paradigm. However, as we noted above the key component of a lifelike character is ability to produce believable emotion-related behaviour. To this end, our group is developing affective reasoning engines to incorporate into the INTERRAP agent architecture. Our previous work on combining symbolic and utilitarian reasoning is providing the basis for the reasoning mechanism: emotions arise in an agent precisely when events in the environment signal changes in the expected utility of the actions the agent would otherwise carry out. Currently, we separate our work on emotionally intelligent agents, where optimality of agent behaviour is the main issue, from that on intelligently emotional agents, where the use of AI techniques to engender believability is the main issue. Ultimately, we would like to be able to unify the two research threads.

Socially Intelligent Agents The group has always examined aspects of cooperation within multi-agent systems: how do several agents coordinate their goal-directed behaviour. Currently, we developing the notion of holonic agents, entities that can be treated externally as a single agent but which are, in fact, a group of agents. Social behaviour is closely related to emotional behaviour. Much of the content of general models of emotions is concerned with the fulfilment and violation of group norms. Moreover, as the proponents of affective computing point out, social interaction is greatly facilitated by the emotional component of communications. The group is, therefore, interested in the way the two preceding strands of research impinge on social structure within groups of agents and has organised workshops with sociologists to investigate this issue.

Projects

COMMA-COGs A project funded by the German government. The project is investigating resource-adaptive constructs within agents and within groups of agents. The results will be applied to the construction of a toolkit for modelling theories from the social sciences and also applied to agents engaged in electronic commerce. Our work on emotionally intelligent and socially intelligent agents is relevant here.

DFKI - Presentation Agent Other groups within our research centre have developed expertise in the area of intelligent online help systems and virtual reality. This project will use the expertise in the three groups to develop a lifelike character to present personalised information on web pages. The work on intelligently emotional characters is relevant here.