

English Summary

Social Agents

Agent-Based Modelling of Integrated Internal and Social Dynamics of Cognitive and Affective Processes

Nowadays, humans are supported by technology in different domains. An example is a smart car that can observe the driver. If the driver is falling asleep or driving outside his traffic lane, then he will be warned. Other examples are a vibrating belt that can lead a fire-fighter towards the exit of a building, when there is little visibility, applications on smart phones that can support humans in improving their lifestyle, smart medicine boxes that can observe when the user forgets to take a pill and warn him/her, smart living environments for the elderly and 'online' health care. Research questions that are still to be answered in this area are about the support of groups or teams.

How can a system be designed that can observe the mood of the social network of a depressed person and prevent that all of these people around the depressed person do not get depressed as well? How can a smart system be designed that can monitor the physical and mental status of the members of a soccer team during a soccer game and give advises to the coach to prevent injuries and increase the chance of winning? How can teams that are solving problems, having a meeting, performing stressful tasks or working in space be supported by technology that can measure their physical and mental states to reason about them and perform supportive actions when necessary?

For this dissertation, agent-based models were developed that can support teams in the areas of emotion contagion, decision making, leadership and information diffusion. Questions that are answered are: how can social interactions be modelled and how can these social interactions be supported by agent-based computer models? How can internal states (e.g. intentions or beliefs) be integrated with social interactions (e.g. decision making, information diffusion) and how can affective processes (e.g. emotion regulation) be integrated with cognitive processes (emotion regulation) in agent-based computer models? How can all these processes together be supported by a smart agent-based system? Do the models simulate reality correctly? Are there other models that model the real world processes more accurate?

The strength of the current research lies in the extension of the knowledge about how to design and analyse innovative computer models that integrate internal and social processes, plus affective and cognitive processes. Other powerful results of this research are: the development and validation of the computer model ASCRIBE, that can simulate and predict how panic spreads in an evacuating human crowd, the development of a system that can detect which emotion is changing in the user by analysing his/her voice, a computer model that can simulate and support the spread of negative mood and emotion regulation in a group of people and a system that can

observe the developmental level and emotion of team members and advise the team leader how to behave to make the team members develop as efficiently as possible and keep the group emotion and atmosphere at a good level.

Follow-up research exists of designing supportive actions based on the model ASCRIBE and to implement and test these on a large group of people, validate the intelligent system that can support informal caregivers, designing an agent-based model for crisis-management scenario's and simulate multiple scenario's with it to compare them with the real world incident in the Schiphol Airport Train Tunnel. New research questions that have emerged from this research are: how can agent-based systems be designed in other domains? How can internal and social processes be integrated in new domains and form the basis for support of team members during their task performance?