

Proposal for a Tutorial on “Affective Computing for Game Development”

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Affective gaming has received much attention lately, as the gaming community recognizes the importance of affect in the development of more engaging games. Affect plays a key role in the user experience, both in games developed purely for entertainment purposes, and in ‘serious’ games developed for education, training, assessment, therapy or rehabilitation. The emerging discipline of *affective computing* has much to contribute to affective gaming. The three core areas of affective computing provide methods and techniques directly relevant to game development: (1) Emotion sensing and recognition by machines; (2) Computational models of emotion; and (3) Emotion expression by synthetic agents and robots.

The proposed tutorial will provide an introduction to these three core areas of affective computing, and highlight their relevance to the development of engaging and effective games. A state-of-the-art review of existing methods and techniques will be provided, along with an overview of the key challenges and issues to address in affective gaming.

Current focus in affective gaming is primarily on the sensing and recognition of the players’ emotions, and on tailoring the game responses to these emotions. A significant effort is also being devoted to generating ‘affective behaviors’ in the game characters, to enhance their realism and believability. These topics will be discussed, both from the theoretical and the applied perspectives. Relevant findings from psychology and neuroscience regarding emotion recognition and expression will be reviewed. Methods and techniques in emotion sensing, emotion recognition and emotion expression will be introduced, and discussed in terms of their relevance for game development.

While emotion recognition and expression are certainly critical components of engaging games, a factor that has been neglected in affective gaming is the actual modeling of emotion within the *game characters*, to enhance their realism and believability, and the modeling the *players’ emotions*, to enable dynamic adaptation to the player’s changing mental states. Both of these can significantly enhance game effectiveness and player engagement. They are particularly critical to the success of ‘serious’ games developed for educational, training and therapeutic purposes. The proposed tutorial will therefore highlight this aspect of affective computing, and will provide the necessary theoretical background from psychology and neuroscience research relevant to developing computational models of emotions in affective gaming.

The tutorial will consist of lectures and short demonstrations to illustrate key techniques and the state-of-the-art in affective computing, and existing applications in affective gaming. The list below summarizes the topics that will be covered. The relevance of each topic to game development will be highlighted throughout.

Tutorial Content

- Overview of the roles of emotions in human-human and human-computer interaction, and their relevance to game development (both the game structure and the characters).
- Overview of the broad area of affective computing.
- Overview of emotion theories and data from psychology and neuroscience, relevant for emotion sensing, recognition, modeling and expression.
- Introduction to established techniques and tools for emotion sensing and recognition, and state-of-the-art in this area.
- Overview of techniques and tools for the development of expressive synthetic agents, and state-of-the-art in the development of believable synthetic agents (life-like characters and virtual humans).
- Descriptions of specific techniques and approaches to modeling emotion; both the generation of emotion via cognitive appraisal and the effects of emotion on perception, cognition and behavior.
- Development of user models that include emotions and other affective factors (traits, attitudes), and their application to the development of adaptive games.
- State-of-the-art in affective gaming, and practical considerations and challenges in integrating emotions in games.

Relevance for GAMEON Conference Participants

Emotion has recently received much attention in the gaming community, and in the disciplines relevant for game development: AI, HCI and cognitive science. This tutorial should enable the participants to make informed decisions about the appropriateness of incorporating emotion in specific game development contexts, and provide the necessary background for an informed choice regarding available experimental data, theories, and techniques and methods for sensing, recognition, modeling and expression of emotions.

The material will be appropriate both for newcomers, and for researchers and practitioners, and for participants from a variety of backgrounds, including computer science, cognitive science, human factors, industrial engineering and psychology. The complexity of the material will be comparable to graduate-level courses and seminars.

Sources

The material for the tutorial will be drawn, in part, from materials developed for a 6-week graduate seminar taught at San Jose State University (Summer, 2005), a ½ day tutorial presented at the Cognitive Science conference (Summer 2006), and a week-long course presented at the Cognitive Science Summer School in Sofia, Bulgaria (Summer 2007). Material will also be drawn from a forthcoming book by Dr. Hudlicka: "Affective Computing: Theory, Methods and Applications", to be published by Taylor and Francis in 2009.