humaine

WP 6: Emotion in Interaction

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Plenary meeting, 24-27 May 2005, Newcastle
Partners

- DFKI
- DIST - University of Genova
- EPFL
- France-Telecom
- ICCS
- Limsi CNRS
- OFAI
- T-systems
- Trinity College of Dublin
- University of Augsburg
- University of Geneva
- University of Hertfordshire
- University of Paris 8
- New member: University of Sheffield
WP6 Core research themes

Research theme: role of emotion in interaction.
- Perception: perception from audio and visual information;
  - Agent perception of the users / other agents / world.
  - Agent’s interpretation of signals
  - Human perceptual attention
  - Social attention for speakers and listeners during social interaction
- Interaction: role of emotions in interaction;
  - Balanced perception and generation
  - Model of speaker(s) and listener(s)
  - Create affective awareness
- Generation: design of expressive signs.
  - Produce dynamic expressive visual and auditory behaviours
  - Achieve coordination of signs of emotion in multiple modalities
  - Define representation language to encode information and use it to drive animation of ECAs

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Work done so far

Deliverable 1:
- describe WP6 main domains

Deliverable 2:
- extensive literature review in the domains of
  - perception: bio-signal interpretation, audiovisual speech perception, face perception, bodily expressivity perception
  - interaction: adapt to user’s emotional state, artificial memory and attention, perceptual attention
  - generation: ECAs; nonverbal production, audio and visual speech synthesis, representation languages
  - preliminary ideas about exemplars
  - reshaping of WP6 themes on ECAs

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Exemplar

Deliverable 3: Definition of Affective Interactive Embodied Conversational Agents with several capabilities covering the 3 domains:

- perception
- interaction
- generation

Capabilities required from an ECA corresponds to steps to move research forward

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Current conception

ECAs with more or less sophisticated presentation facilities. ECAs are to a certain extent able:

- to compute what to say based on discourse plans
- to generate synchronized behaviours
- to talk with somehow emotional appropriate intonation
- to show some emotional expressions (the so-called ‘universal’ facial expressions of emotions)
- to perform gesture and body movements
What needs to be done

- Improve the naturalness of ECAs
  - multimodal integration of emotional behaviours
- Improve the believability of ECAs
  - consistency of an ECA’s behaviour in terms of personality, cultural context and situation.
- Improve the interactivity of ECAs
  - take into account the particular user and the particular context
Agents’ capabilities

- Cognitive influences on action
  - Emotion related attention shifts
  - Adapt politeness behaviours to the user’s emotional state

- Creating Affective Awareness
  - Creating Affective Bonds
  - Imitation
  - Adaptation
  - User’s engagement

- Backchanneling
Agents’ capabilities

- Coordination of signs in multiple modalities
  - From multimodal emotional corpora to models of coordination between modalities
  - Multimodal behaviour
  - Gesture repositories

- Expressivity
  - Behaviour expressivity
  - Speech expressivity
  - Context dependent emotional body gesture
  - Blend of emotions: acoustic and facial expressions (fuzzy logic, genetic algorithm)
  - Copy-synthesis of emotional speech and behavior
Methodology overview

- Theoretical Framework: Design of overall architecture for ECA system, that can perceive, interact and generate

- Mock-up development of a sub-system enabling a capability

- Proof-of-concept: instantiation of sub-systems of the theoretical framework
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Representation Language

- A key issue for mock-up implementation
- A means for encoding communicative information
- Use it to drive and control the animation of ECAs
- Function as interface to wrappers for various player technologies
- Interfaces to the annotation schemes
- A first meeting happened on March 9th
- A second meeting will be held here

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One Year Achievement

Perception domain:

- perception model: based on Theory of Mind research
  - attention model: measure of the perceived amount of attention that an other is paying, based on their eye, head, body and locomotion directions
  - level of interest: degree to which potential partners are perceived to intend to interact
One Year Achievement

Interaction domain:

- affective bonds
  - investigate user’s engagement behaviors through empirical study
  - evaluate emotional engagement of users using analysis of movement
  - modulate synchronization/imitation rate in function of the affect link with the other agents

- interaction management:
  - Companion project (U of Sheffield): notice emotional user responses, produce timely emotional responses
  - Basic model: model of actions and expressions in a social context

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One Year Achievement

**Generation domain:**

- **audio:**
  - rule-based emotion simulation for speech synthesizer
  - multicultural / multilingual comparison

- **visual**
  - communicative behavior qualifier: expressivity model for gesture and face
  - perceptual tests to evaluate implementation of single and combined dimensions of expressivity to produce more believable overall impression of the agent
  - modulation of gestures according to the emotional state induced by context-situation
  - idle variations of gesture and posture
  - synthesize intermediate expressions
One Year Achievement

Representation language:

- coding scheme for correlating politeness strategies with communicative behaviors
- multilevel annotation of multimodal emotional behaviors
- annotation scheme for attentive behaviors
TASKS

- **Task 1: Representation Languages and Theoretical Framework**
  - Deliverable: report describing the representation languages and the theoretical Framework of the overall architecture: due Month 23

- **Task 2: Mock-up of each capability**
  - Deliverable: report describing the mock-up of each capability: due Month 35

- **Task 3: Proof-of-concept of each capability**
  - Deliverable: report describing the proof of concept of each capability: due Month 46
Achievements

- Definition of common thematic areas through the elaboration of one exemplar
- Exchange of existing tools
- Collaboration among partners
- Active participation (more than 40 contributions sent to WP6 workshop; around 70 participants at WP6 workshop)
Difficulties

- Maintain coherence across subtasks
  - Strong need of dialog reinforcement between groups working on the different capabilities
  - Common research topics or common practicability questions across working groups

- Maintain coherence across workpackages
Working methodology

- Use the already available tools in the HUMAINE portal
- Several meetings are planned
- Exchange of personnel for short periods among partners