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VALERIE

Virtual Agent for Learning Environment Reacting and Interacting Emotionally

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Abstract. In this paper we describe how to design a very simple tutor for Computer Assisted Instruction. In this work we adopted the basic ideas from the Belief Desire Intentions architecture and we implemented a simple model for the affective state of the avatar. The framework comprehends a simple model for personality, for the mood and for emotions and expressions. We set this architecture on the already existing architecture of MAUI (Lisetti [3]). For the graphics we used Haptek technologies. We will describe our approach for the mind and the body of the avatar. We will then discuss some results we found and talk about some possible future works.

Introduction

Almost every school has not enough time or budget to let an instructor sit down and help each single student as they struggle with the subject. This can be frustrating for students who find it hard to understand a certain topic. Providing a virtual personal assistant, Intelligent Tutoring Systems can solve this problem. Each student can have a personal Tutor looking at him to help him when he gets confused.

Emotions are not always considered in ITS, but several researchers (Picard [5], Lisetti [3], [4] et al.) argue emotions are fundamental in communication and in human interactions in general and few studies have applied that possibility, Conati and Zhou [1].

Those systems demonstrated to increase pleasantness and effectiveness of the student learning experience. Monitoring user emotions, an ITS would be able to adapt the teaching style and understand while a student is getting confused reacting, for example, explaining once again the subject using other words, qualitative reasoning or analogies.

We can then conclude ITSs are important resources for learning, as they improve learning performances of the students in a pleasant way but need to better include emotive models in order to understand user affective status and react a natural, believable, human and affective way.

1. VALERIE

VALERIE (Virtual Agent for Learning Environment Reacting and Interacting Emotionally) is a project built within the MAUI framework shown in Figure 1.

MAUI, Multimodal Affective User Interface, by Lisetti et al. [3] is a framework for tools that can take into account affective input as Autonomic Nervous System signals, facial expression and vocal signal, to determine user affective state. The agent can talk and show emotions through an avatar designed with Haptek technologies.

The intent of the project was to work on both agent body and mind modelling.

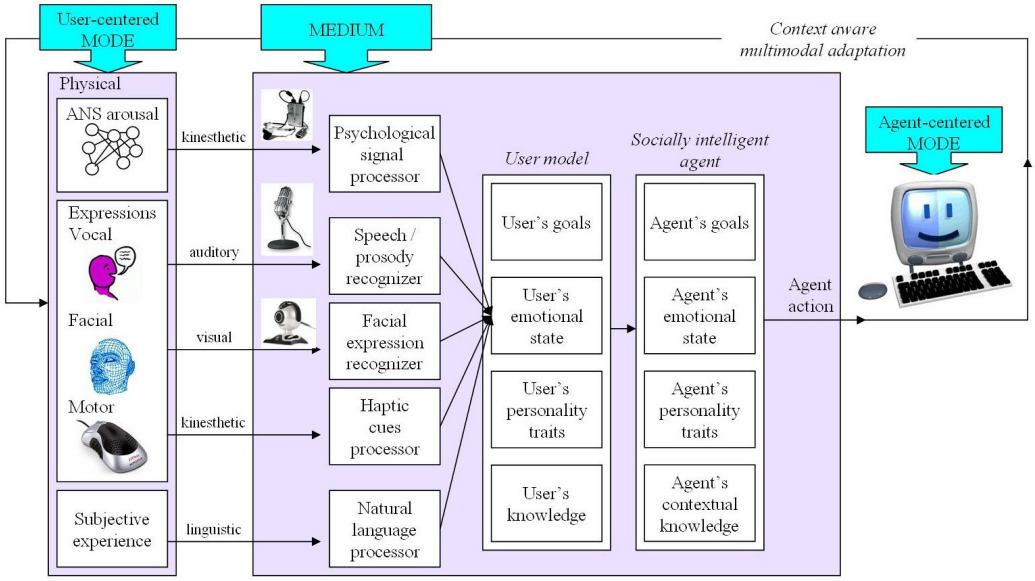

Figure 1: MAUI framework

1.1 The Body

With the Haptek software People-Putty we designed a new character. Expressions were designed in People Putty by moving nine sliders which are mapped to character's happiness, sadness, anger, mellowness, suspicion, curiosity, ego, aggression and energy.

Since we wanted to have more control we bought the additional software Figure Maker. This tool allows the user to generate and modify Haptek switches. Haptek switches are combinations of parameters which are the Haptek equivalent of Ekman Action Units [2].

Switches include information of time so are particularly suitable for expression with relevant information in time. At this purpose we designed VALERIE's surprise.

1.2 The Mind

We tried to model VALERIE's mind in the easiest possible way trying to allow believable and quite complex behaviour. The base for our work was the BDI architecture.

VALERIE has in the resulting model only two desires as a teacher: giving feedback and giving support, plus the implicit but relevant desire of having a good student.

These desires are mapped in term of three possible intentions: give positive feedback if the user is performing well, give positive support if the user is performing badly but it is trying to do well and give annoyed or strict comment while this last assumption is not satisfied. The information about user effort is extrapolated by the information about the times used to answer questions and correct errors. In the future this information would be integrated by the affective information MAUI can extrapolate from Autonomous Nervous System signals.

The expressed emotion of the agent is computed, through some parameters, from the information about the accomplishment of VALERIE's desires. Those parameters are influenced by the agent mood. Agent mood represent, according to Lisetti and Gmytrasiewicz [4], a generic focused and slowly modifiable phenomenon. The agent would automatically adjust its parameters trying to maintain its mood as described and justified by many psychologists (and Picard [5]).

Furthermore, initial values for the parameters can be interpreted as a seed of personality.

The resulting architecture is really simple but it is able to simulate, either in an explicit way either with embedded code, a BDI system with some Beliefs relative to user average, and user effort, three Desires and three Intentions. Superimposed to that architecture we have such a kind of multilayer emotional or affective state, with personality, mood and emotions.

2. Results and Conclusions

2.1 Results

We tested our system running the software and looking for the agent responses and emotive state. For all the tests the idea was to give the same inputs to the system and, changing one internal parameter or characteristics, look at agent responses and behaviour.

We did three tests: the first was designed to show the adaptability of the system to the user average, the second to see how internal state, or rather mood, influences agent decision and the third to show three different kind of personality we designed.

The first test succeeded: the agent adapted to user show its ability to adapt to the user. This kind of adaptation is necessary if we want the system to work properly with users with different capabilities. We don't want VALERIE to give always positive feedback to good students while scoring well in absolute but worse than its own average.

The second test was designed to show how the mood can influence the responses. The idea is that one person who is in a bad mood usually sees things worse than they are and vice versa. The results showed the right behaviour and the interaction between VALERIE and the user changes according to the agent's internal mood.

The last test was designed to show the influence of personality to the decisions of the avatar. To run this test we designed three simple personalities. The results show that the three avatar responses are really different. This test is important as it shows VALERIE can simulate simple different personalities. This possibility is really interesting and suggests the use of more complex model for personality.

2.2 Conclusions

In conclusion we can say VALERIE is not complete but still it works quite well, presenting the behaviour we expected and desired.

Future works would add to the system the already available information about user emotional state. Further more we would investigate the possibility of adding emotive voice (now is Microsoft ® text to speech), and new expressions (now are only seven). A more comprehensive and complex agent model would then be needed if we want to add still more believability to the system. This would need Dynamic Decision Network, more complex appraisal theories and a whole branch of well known artificial intelligence techniques.

References

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