Towards Computational Fronesis: Verifying Contextual Appropriateness of Emotions

Michal Ptaszynski, High-Tech Research Center, Hokkai-Gakuen University, Sapporo, Hokkaidō, Japan
Pawel Dybala, Department of Information and Management Science, Otaru University of Commerce, Sapporo, Hokkaidō, Japan
Michal Mazur, Graduate School of Information Science and Technology, Hokkaido University, Sapporo, Hokkaidō, Japan
Rafal Rzepka, Graduate School of Information Science and Technology, Hokkaido University, Sapporo, Hokkaidō, Japan
Kenji Araki, Graduate School of Information Science and Technology, Hokkaido University, Sapporo, Hokkaidō, Japan
Yoshio Momouchi, Department of Electronics and Information Engineering, Faculty of Engineering, Hokkai-Gakuen University, Sapporo, Hokkaidō, Japan

ABSTRACT

This paper presents research in Contextual Affect Analysis (CAA) for the need of future application in intelligent agents, such as conversational agents or artificial tutors. The authors propose a new term, Computational Fronesis (CF), to embrace the tasks included in CAA applied to development of conversational agents such as artificial tutors. In tutor-student discourse it is crucial that the artificial tutor was able not only to detect user/student emotions, but also to verify toward whom they were directed and whether they were appropriate for the context of the conversation. Therefore, as the first task in CF the authors focus on verification of contextual appropriateness of emotions. They performed some of the first experiments in this task for the Japanese language and discuss future directions in development and implications of Computational Fronesis.

Keywords: Affect Analysis, Applied E-Learning, Artificial Intelligence, Computational Fronesis (CF), Computational Linguistics, Contextual Affect Analysis (CAA)

DOI: 10.4018/jdet.2013040102
INTRODUCTION

In recent years there has been a major development in distant education technologies, such as E-learning, Online learning, Computer-based learning (CBL) or Technology-enhanced learning (TEL). In general E-learning aims at supporting or replacing usual classroom education with the use of modern information and communication technology. It is estimated that the E-learning industry has grown to be worth over 27 billion dollars (Ontario Media Development Corporation, 2010) and is estimated to exceed 100 billion in 2015 (Global Industry Analysts, 2010). It has also gained on popularity among students, who prefer E-learning courses to the usual courses in 25% of cases (Allen & Seaman, 2008).

One kind of E-learning is a virtual classroom lead either by a human teacher or, most recently, by an artificial tutor. These can be realized in Virtual Learning Environments (VLE), created on the basis of chat-rooms, either through text-based communication, or with the support of voice and online presentations. There have been also attempts to use virtual worlds, such as Second Life as a base for VLE (Redecker, 2009).

In such virtual classrooms a great role is assigned to knowledge acquisition through social interaction. Contrary to usual classroom scenario, where a teacher stands before students, gives a lecture and asks the students questions, VLE offer a kind of learning that is more interactive and emotionally engaging for students. Learning through conversation (Laurillard, 1993; Laurillard, 1999) with regards to students’ emotional engagement (Baath, 1982) are thus two important issues in E-learning. These two issues have lead us in this research. We focused on supporting conversational artificial tutors with knowledge on user emotions. In particular we developed a method for context aware emotion recognition to be applied in such tutors. The method is responsible to verify whether emotions expressed by human users are appropriate to the context of conversation.

The outline of this paper is as follows. First we present the background for this research. We then describe the fields of Artificial Tutors (AT) development, and Contextual Affect Analysis (CAA). Afterwards, we also propose a novel term “Computational Fronesis” embracing the tasks of supporting AT with CAA. Followed by a section in which we describe previously developed tools applied in the research. Next we describe the method for verifying whether the emotions expressed in conversations are appropriate to the context of the situation. The two sections after contain descriptions of the design of evaluation experiment and its results, respectively. Then we present a discussion on further implication of context aware Affect Analysis. Finally, we conclude the paper and propose some ideas to improve the described method and point out some of the possible future applications.

BACKGROUND

Artificial Tutors

The research on artificial tutors is a relatively new field. Several artificial tutors have been developed in the form of non-task oriented conversational agents for second language acquisition (Jia, 2009); Tatai, Csordas, Kiss, Szalo, & Laufer, 2003; Stewart & File, 2007). In such research the pedagogical conversational agent/tutor assists students and provides a support to their learning efforts. In particular, Fryer et al. recently assessed the usefulness of chatterbots as language learning tools (Fryer & Carpenter, 2006).

There have been several VLE incorporating conversational agents to pedagogical tasks. CSIEC (Computer Simulation in Educational Communication) is an Artificial Intelligence (AI) framework developed at Peking University (Jia, 2009). It provides learners with a chatting partner for educational purposes. However, it deals with some problems regarding the ability to understand and generate natural language
Automatic Digital Content Generation System for Real-Time Distance Lectures


www.igi-global.com/chapter/automatic-digital-content-generation-system/26388?camid=4v1a