Can Automated Tutors be Socially Intelligent?

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Research Aims and Objectives

This research aims to investigate the detection of social cues (specifically a student's learning style) during tutoring conversations with a conversational agent (CA), and to automatically adapt the tutoring style to suit the student and aid learning.

A CA tutor will be developed for a specific subject domain which automatically estimates and adapts to a student's learning style. Machine learning techniques will be employed to automate the adaptation, producing a set of rules which determine learning styles and their appropriate tutoring style, which will then be tested for a different subject.

Social Behaviour

Social behaviour is learned by people over many years, who can adjust their behaviour according to social signals. CAs would require volumes of scripts to detect and adapt to just a few defined social situations [1].

Learning styles describe the way groups of people learn most effectively and are considered a subset of personality [2]. Tutors adjust their behaviour based on the social context, such as student learning style.

Proposed System Architecture

A modular design is proposed for adaptability, allowing new subject knowledge bases to be plugged in.

Overview of components:

- Controller – central manager, manages communication
- GUI – manages display, events and user communication
- Knowledge base – manages course information (topics, breakdowns, tests, teaching material)
- Learning styles – manages learning style and teaching style information, estimates students learning style
- Student model – manages student information (name, knowledge level, topics visited, test scores, learning style)
- Conversational agent – accept and understand natural language text and formulate a response (considering learning style and topic)
- CBR system – compares student learning style to existing cases and determines the appropriate vocabulary and mode of response (e.g. diagram, explanation)

Conversational Agents

Conversational agents (CAs) are computer programs which allow people to communicate with computers using natural language, and have been used in sales, helpdesks, online assistants [3], guidance and intelligent tutoring systems [4].

CAs are in their infancy, and it is difficult for a computer program to understand the complexities of natural language, or to pick up on social signals in order to adapt their response to the human conversant. CAs rely on manually coded scripts to direct their conversation, which are time consuming and require expertise to create.

Intelligent Tutoring Systems

Intelligent tutoring systems (ITS) attempt to model and mimic the behaviour of human tutors in a computer-assisted learning environment [5]. ITS have recently been extended to create more personalised learning by adapting the content shown to a student’s existing knowledge and learning style (determined by questionnaires and quizzes). AutoTutor is one of the few ITS which use CAs, but it does not adapt to social cues such as learning style [4].

References