Map Reading with an Empathic Robot Tutor

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***Abstract*—In this video submission, we describe a scenario developed in the EMOTE project. The overall goal of the EMOTE project is to develop an empathic robot tutor for 11-13 year old school students in an educational setting. The pedagogical domain here is to assist students in learning and testing their map-reading skills typically learned as part of the geography curriculum in schools. We show this scenario with a NAO robot interacting with the students whilst performing map-reading tasks on a touch-screen device in this video.**

Keywords—robot-child interaction; empathy; robotic tutor

I. Introduction

The work shown in this video is part of the EU project EMOTE (www.emote-project.eu) (EMbOdied-perceptive Tutors for Empathy-based learning). EMOTE has the overall goal of developing artificial tutors that have the perceptive and expressive capabilities to engage in empathic interactions with learners in school environments. It is grounded in psychological theories of emotion in social interaction and pedagogical models for learning facilitation. Here, we show a one to one tutoring scenario, in a map task scenario, where the robotic tutor, a Nao torso robot, supports the learner to complete an art trail on a map application installed on a large touch-screen device. The art trail tasks have been designed to support the learner in developing map-reading skills, concentrating on directions, distance and map symbols. The objective is to obtain clues that help the student to place a new exhibit at the end of the existing art trail. In each task, the learner is asked to find a feature based on its symbol, distance from current location and direction.

The robot tutor's behaviour is grounded in empathic and pedagogical strategies, building on previous work [2]. The robot assists the learner using pedagogical actions such as prompts, pumps and splices based on task performance, historical skill levels, and time in task. The robot tutor monitors learner's affective states, levels of valence and arousal that are then used to adapt the use of pedagogical actions. For example, if the learner is in a state of low valence and arousal, which indicates a state of tiredness or boredom the behaviour of the robot will be to entertain and engage the learner. If the learner has positive valence identifying states where the learner is happy or relaxed, then the amount of pedagogical actions are reduced. When the learner is frustrated, more pedagogical help is provided.

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II. Architecture

Figure 1 explains the architecture components and the data flow between the modules in the system.

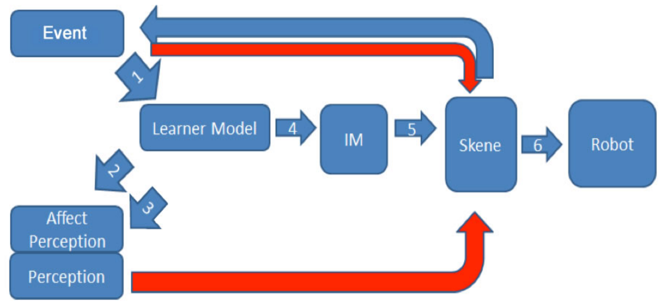

Fig. 1. Architecture diagram

1. An event happens in the Map Application; this event is assessed and a message sent to the learner model.
2. The learner model passes this information to the affect perception module providing context that may be relevant to the affective state of the learner.
3. The Affect Perception module uses this activity context to update the affective states. The Affect Perception module sends the affective state message to the learner model.
4. The learner model combines the information on the current state of the learner and provides this to the Interaction Manager (IM).
5. The IM uses the activity context, skill levels and the affective states to select an appropriate next high-level system action or pedagogical tactic.
6. The Skene [3] module transforms the high-level action specification into a concrete set of words and behaviours for the robot to perform.

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