Master's Thesis Topic
Back-End Development of a Virtual Tutoring Agent for Interactive Learning Scenarios

Keywords
Chatbot, Natural Language Understanding (NLU), Natural Language Processing (NLP), Dialogue Manager

Introduction

Virtual tutoring system aims to support students in developing their competence and motivating them toward self-regulated learning. Tutoring agents also known as 'virtual agents' are frequently integrated into virtual tutoring systems since 2005. The purpose is to provide cognitive, psychosocial and motivational support to the tutee. It is a human-like assistance (e.g., by answering questions), and reduce learner anxiety and frustration (e.g., by appearing welcoming and friendly). The tutoring agents could be a conversational agent or an instructional agent: Conversational agents are able to hold conversations with students, and instructional agents are characters that teach the students to complete various activities (e.g., solve puzzles). These agents belong to a category of Intelligent software that is capable of understanding user queries and giving necessary responses.

Research Area

The back-end of such a system is comparable to so-called spoken dialog systems or social chatbots. In this Scenario, the agent will be represented as a TCP-Client and the back-end is providing the TCP Server. The basis of the system is a text-based input, which will be sent as a TCP message to the back-end. The text message has to be processed and interpreted by a dialog manager. On this basis, two types of reaction have to be derived. On the one hand, the emotional reaction of the agent has to be defined, on the other hand, the statement of the agent has to be defined and sent to the agent per TCP.

Problem Statement

The main challenge is to make the system flexible and adaptable so that even non- programmers can define and design the processing of the data and the necessary reaction without having to change the source code of the system. For this purpose, good interfaces have to be found, defined, and implemented.

Task Description

The first step of the master thesis will be a state-of-the-art analysis for the realization of dialog management systems and social chatbot implementations. On this basis, a concept has to be derived fulfilling the described requirements. The concept has to be evaluated by a prototypical implementation.

Expected Results

The background for this master's thesis is to provide automated tutoring support to the students in a particular seminar. Therefore, the tutoring agent will be able to hold the conversation in a context-appropriate tutoring manner.
In this context, the expected results are-
• The backend of the tutoring Agent has to be realized as a TCP Client which can be connected to a TCP Server as Front-End.
• Input to the Client will be different types of text-based responses with sentiment analysis. On the one hand, there will be the emotional reaction, and on the other hand the response utterance. Both reactions have to be connected and displayed according to the described scientific basis.

Earliest Starting Time

The master thesis can be started at the beginning of the winter semester 2023/2024.

Supervisors

1.Ummay Ubaida Shegupta
2. René Schmidt

Literature/Links

1. Emilio Ferrara, et al, "The rise of social bots" Communications of the ACM 59.7,pp.96-104, 2016.
2. Christian, Grimme, et al, "Social bots: Human like by means of human control?." Big data 5.4,pp. 279-293, 2017
3. https://www.tu-chemnitz.de/informatik/ce/publications/index.php?controller=detail&id=791
4. https://library.iated.org/view/SHEGUPTA2023MEN