Training child helpline counsellors with a BDI-based conversational agent

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Abstract. Counsellors at the child helpline offer a confidential environment for children to be heard and empowered. However, training counsellors on handling children's conversations in text-based chat can be costly and time-consuming. This paper introduces Lilobot, a conversational agent designed for training counsellors of child helplines. The agent's dialogue is built on the Belief-Desire-Intention (BDI) model, which, in this case, simulates a child victim of school bullying in a text-based interaction. Trainees engage with Lilobot in a role-play format, taking on the counsellor's role. This interactive system helps trainees learn the Five Phase Model, a conversation protocol child's helplines use. The system also has a trainer interface, where a trainer can oversee and control Lilobot's interactions, and see a suggested optimal conversational path. The system was built with three main components - a natural language processing model (using Rasa) and the BDI reasoning model and optimal path generation (using Java Spring).

Keywords: BDI · Chatbot · Conversational Agent · Child Counselling · Training System · Education .

1 Introduction

Child helplines are essential for young people needing emotional and social support. Helpline counsellors require training on various theories and protocols through practice [2], which usually is effective but time-intensive and logistically cumbersome [3, 6]. Interactive agents could offer a solution to these constraints [8] by allowing for interactive and repetitive practice and self-directed learning in applying helpline communication protocols [10]. Such conversational agents have been demonstrated to create a safe learning environment and improve communication skills and trainees' self-efficacy [5, 9].

2 Lilobot's Design

Here, we introduce a Belief-Desire-Intention (BDI) conversational agent to train child helpline counsellors. The case that we worked on is Lilobot, an agent we

built to simulate a bullied child. Lilobot was designed in collaboration with the Dutch Child Helpline "De Kindertelefoon" to display behaviours associated with bullied children, such as social anxiety, depression and loneliness [1, 4]. A trainee counsellor's goal is to converse with Lilobot through the "Five Phase Model", a conversational protocol used by helplines to guide conversations [10]. These sessions aim to collaboratively arrive at a solution, in this case, guiding Lilobot to seek assistance from trusted figures such as parents or teachers.

Lilobot's reasoning is carried out through its BDI model of agency [7]. Upon receiving the trainee's input, i.e., the trainee's intent, the system updates the agent's beliefs based on a predetermined input-to-belief mapping. These beliefs are formulated to impact Lilobot's responses across the phases of the Five Phase Model. Then, the reasoning component checks whether any new desire aligns with the current belief state, subsequently adopting a suitable desire as an intention and planning corresponding actions. If not, the current desire remains active. A relevant response is subsequently fetched from the knowledge base to send to the trainee. The conversation concludes either when the trainee successfully completes the Five Phase Model or if the simulated child deems the counsellor as threatening or unhelpful. When the session concludes, the system provides feedback to the counsellor through a transcript of the conversation and a summary of belief changes. Such feedback could help the trainee understand the child's thinking and how the Five Phase Model affects it.

To complement the guided learning experience, we introduced a trainer interface. Through this interface, a trainer (e.g., a senior counsellor) can monitor and adjust Lilobot's interactions with a trainee. This adjustment can be made either directly on the chat responses or by altering the numerical values of beliefs in the BDI model, thereby dynamically modifying Lilobot's thought processes. Furthermore, we implemented an "optimal path" algorithm that suggests a sequence of trainee inputs, to reach the targeted agent state. This path can be generated during the conversation at run time, starting from the current BDI values. In essence, the algorithm works by simulating different trainee inputs and then creating a graph of possible conversational paths. Next, a Breadth First Search is used to decide on the optimal path, which is then shown as a message sequence. The algorithm was optimised by only considering trainees' inputs that bring Lilobot closer to the subsequent state, i.e., the next desire.

The system has three components: the BDI reasoning and generating the optimal path, done through the Java Spring application, and the Rasa component to recognize trainee inputs. We used PostgreSQL as the database server, storing both the agent's BDI states and the knowledge base.

In conclusion, the agent offers counsellors interactive training through a simulated child to enhance familiarity with the Five Phase Model. Trainers can also use the system to personalise Lilobot's responses with counsellors in training. We plan to extend the system with dynamic feedback and evaluate it.

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