A psychotherapy training environment with virtual patients implemented using the Furhat robot platform

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Abstract. We present a demonstration system for psychotherapy training that uses the Furhat social robot platform to implement virtual patients. The system runs an educational program with various modules, starting with training of basic psychotherapeutic skills and then moves on to tasks where these skills need to be integrated. Such training relies heavily on observing and dealing with both verbal and non-verbal in-session patient behavior. Hence, the Furhat robot is an ideal platform for implementing this. This paper describes the rationale for this system and its implementation.

Keywords: Psychotherapy, Virtual patients, Social robots.

1. Introduction

For over a decade it has been possible for surgeons and other medical specialists to practice in a simulated environment, for example with the help of virtual reality. This has enabled both students and experienced clinicians to practice complicated procedures systematically. A problem for clinical psychologists and psychologists in training is that there are no available simulators adapted for psychotherapy training. This demo paper introduces such a training environment that has been implemented with the help of the social robot platform Furhat.

2. The Furhat Platform

Furhat is a three dimensional back-projected robot head built for the purpose of multimodal multiparty human-machine interaction systems [1]. It utilizes a computer-animated face with a very high capacity for non-verbal communication and face movement, leading to a very realistic end result. The Furhat platform comes with IrisTK [2], a software framework for building event-based, modular interactive systems. IrisTK has a flexible design and uses a statechart-based XML formalism for designing the dialog flow.

3. Psychotherapy training program

The system is based on a theory of psychotherapy called Intensive short-term dynamic psychotherapy (ISTDP) [3, 4]. This is an emotion-focused form of psychotherapy that explicitly focuses on in-session patient expression of emotion and other clinically relevant behaviors. Furthermore, ISTDP provides a large corpus of knowledge on how verbal and non-verbal behavior are related to therapeutic interventions (see below for examples). Hence, we use the theory of ISTDP to create realistic patient behavior. We aim to create a training environment that is suited for training in any form of psychotherapy. For this, we have been inspired by the general model of psychotherapy training as developed by psychotherapist Jon Frederickson [5].

A core module of the training program is related to the assessment phase of the treatment where a focus for therapy needs to be established. This is typically part of the very beginning of therapy, in where patient and therapist agree on a problem to work on. The process continues with the therapist investigating situations where the problem arises for the patient and exploring whether there are emotional factors contributing to the problem. Importantly, the occurrence of barriers to the process is a rule rather than an exception. Such barriers can broadly be said to be either *anxiety* or *defenses*. If a patient experiences excessive anxiety for example in the form of blurry vision or stomach pain, manifested for example with disorganized talking, then the process cannot continue in a benefical way without regulating the anxiety. A *defense* can be said to be any in-session patient behavior that becomes a blocker for the process. Very briefly, this can be anything from vagueness and overgeneralization to taking a highly passive stance in therapy. Let's say for example that the therapist asks an initial question *"What problem do you want my help with?"*. A patient response such as *"Lots of things"* won't help the process further since it is too general to work with. This calls for the therapist to deal with this blocker for example by saying *"That is quite vague. Can you please be a bit more specific what problem you would like me to help you with?"*. Throughout the whole treatment, i.e. beyond the initial assessment phase, the same principles apply: If there are barriers to engagement in the process, these needs to be dealt with. In the training environment described in this paper, these principles are taught repeatedly with the help of the Furhat robot platform.

4. Implementation

An initial implementation of the training program has been created uing the Furhat robot. The training program starts by teaching the trainee how to identify various expressions of anxiety and defenses. Importantly, these are both verbal and non-verbal. For example, a barrier in the form of slowing down, looking away, and taking an unengaged position, is mostly non-verbal. Such non-verbal behavior is an example of what is possible to model using the Furhat robot. After initial training on how to spot these patterns, the trainee learns how to deal with these barriers, i.e. dealing with in-session behavior that has become a blocker to the process. This is modeled as part of

the dialog flow in the Furhat robot. Using this approach, the trainee gets a direct experience of what it feels like to deal with blockers in therapy and to observe the effects that follow. Later on in the training program, the trainee can practice the assessment phase with several virtual patents. The aim for the trainee in this step is to work with virtual patients with different characteristics and to work through the complete assessment phase with identifying the problem, investigating specific examples and exploring emotional factors driving the problem. As described above, the trainee needs to deal with barriers in therapy in the form of anxiety and defenses throughout the entire process.

Below is an example dialogue between a therapist and a virtual patient in the system. With this, we aim to illustrate how the dialogue progresses when the therapist deals with in-session barriers to engagement:

T: What is the problem you would like me to help you with?

P: I don't recognize myself lately [Defense: vagueness]

T: Could you please be more specific? What specific problem would you like my help with? [Block the defense. As long as we don't have a specific problem to work on, we can't help the patient]

*P: *sigh* Maybe you could say that there are some problems at work.* [Defense: vague and general]

T: How do you mean? What happens at work that becomes a problem for you? [Asking to be more specific]

*P: *sigh** [looking away] *I get into a lot of conflicts.* [Still a bit vague, but in the right direction. Move on to asking for a specific example]

T: Do you have a specific example?

P: I would say it's more a general problem. [Defense: vague and general]

T: That description is vague. As long as this remains vague for us, we won't have a clear picture of your problem, and then we won't be able to help you with it. Could we look at a specific example of this? [Explicitly clarify the defense and invite a more specific response]

*P: *sigh* There have been a lot of situations lately.* [Defense: General]

T: That's still vague and general. What can we do about this vagueness? [Challenge the defense of vagueness]

*P: *sigh* OK, I shouted at my boss last week. Then I slammed the door and drove home. I have stayed home since then and I feel really bad.* [The patient has come up with a specific example that seems related to his/her problems. Move on to exploring the situation further.]

T: Could you please tell me more about that situation?

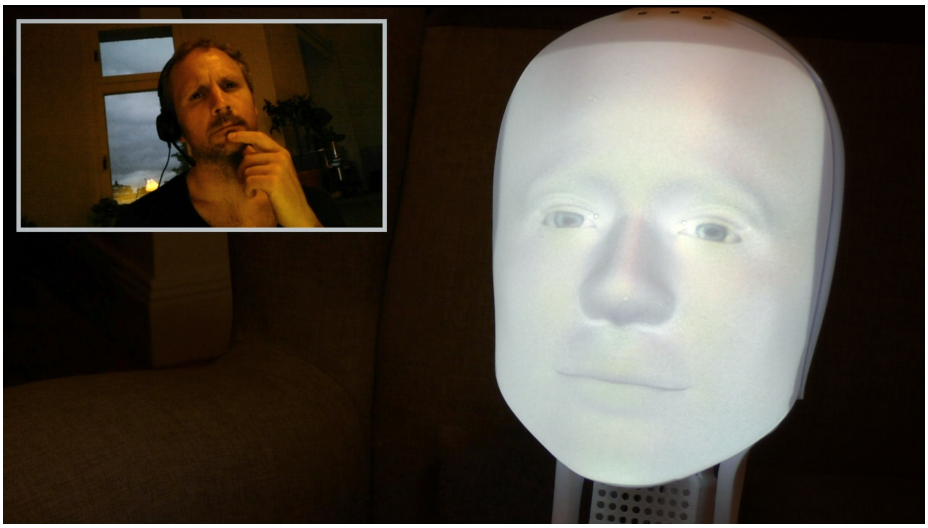

Fig. 1. An example interaction with the training environment

5. Outline of the demonstration

Figure 1 depicts the simulation environment and shows a typical interaction. The presentation conducted at the conference will demonstrate the core features of the application and the implementation in the Furhat robot platform. Focus of the presentation will be on demonstrating our implementation of various virtual patients, with different presenting problems.

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