PHILIPS

Subject: Positions for MSc students in computer science and applied mathematics at Philips Research, Eindhoven, The Netherlands

Date: March 17, 2017

Topic area: Computational intelligence for automated health counseling

One of the big challenges in healthcare is prevention and management of lifestyle diseases such as obesity, high blood pressure, and diabetes. Lifestyle factors are known to be central and changes require a clear decision and commitment from the subject. Health counseling is effective but it is expensive and does not scale for large populations at risk. Automation of health counseling would provide savings in costs but also convenience for the user because the service would be then available when the user has time for it, for example, while driving a car work. The proposed MSc project(s) address key technological challenges in automated health coaching. The focus may be in the algorithms or the development and testing of a concrete demonstrator. The internship typically leads to an MSc thesis and publications on the topic area but other forms of internships are also possible. Some potential topics are listed below.

Position 1: Negotiation control

Automated counseling system is essentially a cognitive dialogue system which follows certain negotiation strategies and learning techniques. Human expertizes from therapeutic sciences should be combined with data-driven adaptation and learning. The proposed MSc project would focus on design and implementation of adaptive negotiation strategies and management of targeted text or spoken dialogue. Typical methods are learning algorithms based on game theory.

Position 2: State detection and understanding

The progress in a negotiation relies on sensing of the progression of the decision making on the subject, i.e., that the subject acknowledges a problem, or is ready for a change. The project would focus on data-driven detection of different phases of health decision making such as recognition of a problem, change talk, and commitment to a change from text or speech responses and reactions to questions. Typical methods contain LSTM neural networks and graphical models applied to text content or speech data.

Position 3: Automated generation of reflective listening utterances in a machine counseling dialogue

Reflective listening is a communication strategy in counseling dialogues which involves two key steps: seeking to understand a speaker's idea, then offering the idea back to the speaker, to confirm the idea has been understood correctly. It attempts to "reconstruct what the client is thinking and feeling and to relay this understanding back to the client". In this project, the focus is to apply computational linguistic techniques to automatically generate utterance that conveys the impression that the machine is reflectively listening to the user. Examples of such techniques are automated generation of paraphrases and summaries.

Position 4: Engaging the user and building a relation with them in a conversational dialogue

In counseling dialogues, building trusting relationships and developing a rapport with clients is key to motivate them to move toward successful and desirable change. In this project, the goal is to investigate computational techniques for building such relationship in conversational systems and how the counseling service can be woven into the lifestyle of the user.

Application documents should contain a free-form cover letter and the CV and they should be sent to Rim Helaoui (rim.helaoui@philips.com) at Philips Research, by May 31, 2017. The start time of the internship can be anywhere in 2017-2018 and work will be done at Philips Research in collaboration with the research staff.

Philips Research