Title: *Multimodal Personal Health Assistant*

Enquadramento/Guidelines

Patient Report Outcomes (PROs) are assessment instruments that can measure the impact a disease and/or a treatment have in several domains of a patient's life. They may be inserted in clinical settings, through therapeutic monitoring and evaluation (e.g. cancer diseases) or in the clinical research field, through studies or clinical trials.

PRO data may be collected on paper through self-administered questionnaires completed by the patients themselves or via interviewer-administered questionnaires. However, with the emergence of communication and information technologies, electronic PROs (ePROs) are gaining relevance. Examples of ePROs are the ones completed using a personal computer, a laptop or a Personal Digital Assistant (PDA).

ePROs possess some advantages as opposed to the use of PROs on paper, namely at the level of data entry (allowing for the patient to register data at any time), the usability of the PRO itself (patient's literacy level), data processing, the flexibility of the model of items that we want to assess, the data integration (using the Electronic Healthcare Record) or at the level of data accessibility (real-time). Nonetheless, to ensure that the ePROs are truly an asset it becomes necessary to consider the development of interfaces that guarantee a high degree of usability on the devices and ease the correct interpretation by the end patients, regardless of their literacy level.

It is hoped that with the existence of tools for the development of multimodal interfaces - including recognition and synthesis of voice/speech - means of collecting information that are more efficient and function for longer periods of time can be developed, thus allowing for much more information related to the patient's feedback to be gathered. In the field of new medicine developments, these tools may also play a relevant part in obtaining further information regarding patient's reactions, especially when combined with information from various physiological signs.

It is believed that the existence of interfaces that ensure a simple use and are based on the principles of universal access, will help to increase the amount of registered information - by allowing, for example, to collect information during an extended period of drugs use after a stay at an health institution - and will allow it to be available at fewer costs in terms of time and resources.

The proposed work is also directly related to several current and past projects the supervisor is involved, namely the Living Usability Lab (LUL) QREN project where a key part of the project is the development of a toolkit enabling for the development of Multimodal User Interfaces with a strong emphasis in Spoken Natural Language and the use of Portuguese, and the FCT CARL project where work has been done on interaction with a mobile intelligent robot using a spoken language interface, thus allowing for dialog between a human and a robot.

Objectives:

1) Obtaining and recording information during the administration of a drug or during a treatment sequence:
   a) Obtaining information on the basis of continued monitoring
   b) Collection should include not only the usual information obtained from sensors (eg. heart rate or temperature) but also information provided by the patient and, as far as possible, about his condition, his mood, and perspective regarding the treatment and its effects;
   c) In addition to passive methods for obtaining data (such as sensors) use dialogue to obtaining information in a partial and incremental manner and confirm the information provided;
   d) Development of a platform capable of collecting this data, with special attention to context and patient, with the capacity to adapt to these variables during its functioning.
2) The system shall be provided with multimodal capabilities, using various modalities such as speech, text and touch:
   a) The system must allow for information to be collected whether by the patient's initiative or by the system's initiative (mixed-initiative);
   b) The system must allow for information to be collected anywhere and anytime (but without discarding ethical and privacy issues);
   c) The system should analyse recently inserted information and make decisions on future data collection according to context (location, time, activity ...), that is, decide what do to do next;
   d) Information storage and collection must make use of standards / norms within the area of clinical records and related.
3) Perform a first evaluation of the created system within a scenario to be defined.

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