A Context-Aware Adaptive Feedback System for Activity Monitoring

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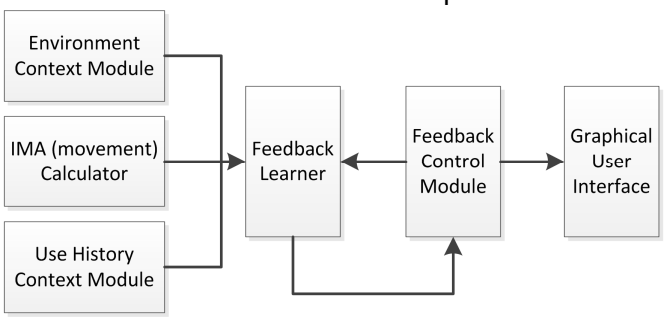
INTRODUCTION

An active lifestyle is an important factor in the prevention of deconditioning and many negative secondary effects in chronic diseases (e.g. COPD). A number of studies have been conducted with the aim of gaining insight into the daily activity patterns of these patients [1]. Current research is focussing on motivating patients to stay physically active and balancing their activity patterns by using an activity sensor combined with remote monitoring and smart, personalised feedback.

METHODS

The feedback system consists of a wireless 3D-accelerometer for measuring activity and a PDA to provide feedback to the patient. Research has demonstrated the effectiveness of feedback in terms of improving activity balance and overall activity levels in different patient populations, but the feedback mechanisms are still quite rudimentary. In the past, feedback was given at fixed times using a randomly chosen text message (e.g. "Please go for a walk."). However we are now able to predict better timing for the messages based on the context of the patient's environment and usage of the system [2]. We are developing a system which incorporates a self-learning, adaptive feedback component that provides the right feedback at relevant timings for the individual patient. The aim is to improve patients' compliance to treatment and reduce obtrusiveness. The figure shows the design of the system that is currently being implemented. The Feedback Control Module polls the Feedback Learner regularly, receiving input from the IMA Calculator node and two modules providing the patient's contextual data. It then uses a rule-based machine learning scheme described in [2] to return the best feedback message and an indication of likely compliance by the patient.



RESULTS

Using the old system, patient compliance to individual feedback messages is low (57%). Analysing the data off-line, we are able to predict the compliance to individual feedback messages on average 64% better than using a baseline method. Currently the system is undergoing testing and patient evaluations are planned [3].

DISCUSSION AND CONCLUSION

The patient evaluations are expected to determine the effectiveness of the proposed adaptive feedback system. The theoretical work done on predicting patient compliance supports our view that a self-learning system can cater to individual patient preferences and improve treatment compliance.

REFERENCES

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