Helping on diabetes management: showing patterns on records and providing advices on a smartphone app

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Introduction

Modern smartphones strive on our society to the point where people depend on these devices for most tasks. MyDiabetes is a mobile application that helps type I diabetics with their daily records (glycaemia, carbohydrates, insulin, exercise, etc.) and by providing advices adapted to the registers entered.

Materials and Methods

Advices are based on medical protocols and guidelines, and serve as a recall to the guidance given by the medical doctor, encompassing the medical expertise. We use general advices to suit the broad diabetic population. Avoiding crisis can be accomplished by warning the user of misleading actions ("you exercised, perhaps you should reduce insulin intake for this meal"), and by explaining the crisis' possible causes ("is your hypoglycaemia related with extra activity?").
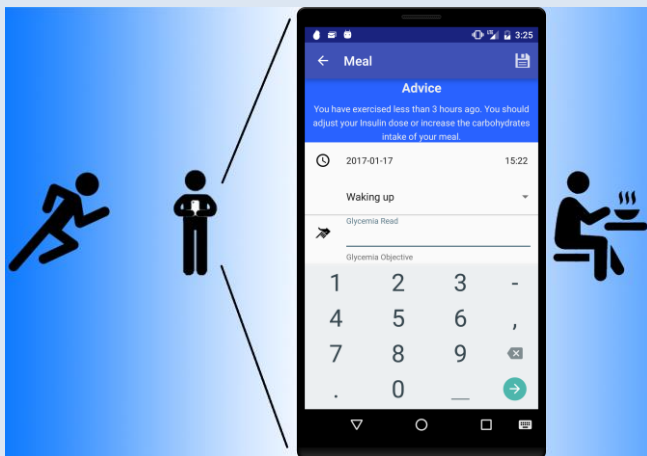

This allows introspective analysis, enabling behaviour adaptations or consulting a doctor with added information.
Registers can also be mined to unveil user patterns ("you have low glycaemia values on Tuesdays") and create specific advices that combine the medical protocols with the data mined.

Results

We are incorporating the advice system in the existent MyDiabetes Android application. We used it to collect registers from 5 diabetic patients (from 15 volunteers) for initial data mining. Currently, it was possible to derive general patterns as "on Sundays' mornings with heavy breakfast, hyperglycaemia is common".
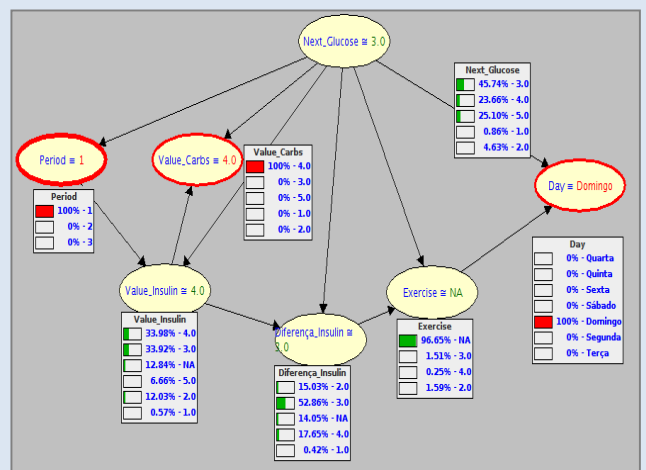
The next step will be to enrich the advice database in order to achieve a broader response capability to aid in situations of crisis. By offering a clear benefit, we hope to obtain a deeper insight on the main difficulties and user's misbehaviours. This will allow us to uncover not only individual usage patterns, but also common bad habits within the diabetic population.

Conclusions

One current problem is the lack of data; the addition of feedback based on patterns and the inclusion of the advice system aims to encourage and benefit patients driving their usage of the platform.

References

- Han, J.; Pei, J.; Kamber, M. (2011). Data mining: concepts and techniques. MA, United States of America: Elsevier.
- Longfei Han, Senlin Luo, Jianmin Yu, Limin Pan, and Songjing Chen. Rule Extraction From Support Vector Machines Using Ensemble Learning Approach: An Application for Diagnosis of Diabetes. IEEE journal of biomedical and health informatics

https://mydiabetes.dcc.fc.up.pt/