

Case Representation and Similarity Assessment in the selfBACK Decision Support System

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Abstract. In this paper³ we will introduce SELFBACK , a decision support system that facilitates, improves and reinforces self-management of non-specific low back pain.

Keywords: Case-Based Reasoning, Case Representations, Data Streams, Similarity Assessment

1 Introduction

Low back pain is one of the most common reasons for activity limitation, sick leave, and disability. It is the fourth most common diagnosis (after upper respiratory infection, hypertension, and coughing) seen in primary care [2].

Self-management in the form of physical activity and strength/stretching exercises constitute the core component in the management of non-specific low back pain; however, adherence to self-management programs is poor because it is difficult to make lifestyle modifications with little or no additional support. In the SELFBACK project we will develop and document an easy-to-use decision support system to be used by the patient him/herself in order to facilitate, improve and reinforce self-management of non-specific low back pain. The decision support system will be conveyed to the patient via a smart-phone app in the form of advice for self-management.

The SELFBACK system will constitute a data-driven, predictive decision support system that uses the Case-Based Reasoning (CBR) methodology to capture and reuse patient cases in order to suggest the most suitable activity goals and plans for an individual patient. This will be based on data from two sources. One is a questionnaire, presented to the patient at suitable intervals, in order to capture general information (e.g. age) and subjective symptoms (e.g. the current degree of pain). Initially, patient information from the patient's clinician or general practitioner will also be added. The other is a stream of activity data

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collected using a wristband. The incoming data will be analyzed to classify the patients current state and recent activities, and matched against past cases in order to derive follow-up advices to the patient. Two main challenges are to detect the activity pattern represented at a suitable level of abstraction, and to match that structure against existing patient descriptions in the case base. Combined with patient profile data from the questionnaire, and the current goal setting, this should enable the system to suggest the best next activity goal and plan for the patient.

Stratified care for patients with low back pain, based on initial pain intensity, disability related to low back pain, and fear-avoidance beliefs have been shown to improve patient outcomes as well as being cost-effective [1]. The SELFBACK system aims at further improving the stratified care approach by including data on the patients health and coping behaviour (i.e., the adherence to basic self-management principles) in order to support and prompt appropriate actions thereby empowering the patient to improve the self-management of their own low back pain. The SELFBACK system targets the self-management of non-specific low back pain by incorporating existing knowledge in the SELFBACK system to recommend advice that is personalised to the information input by the patient.

The overall SELFBACK hypothesis is that CBR can be applied to the general condition and activity pattern streams of patients with non-specific low back pain in order to effectively improve their rehabilitation processes. Based on this hypothesis, we are currently studying two core research issues: The case representation, i.e. what exactly should be in a case and how should this be expressed, and the corresponding similarity assessment method that operate on that structure. The primary focus of this paper is on case representation, with similarity assessment discussed in relation to the representation.

In the presentation we describe the case representation and case content as well as we introduce the applied similarity assessment. For both, case representation and similarity assessment, we conducted experiments using already existing data set from the domain and discuss these in the course of this work as well.

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