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An expert system for supporting Traditional Chinese Medicine diagnosis and treatment

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Abstract

Portugal has recently become one the few European countries to fully acknowledge Traditional Chinese Medicine (TCM); this substantial paradigm shift calls for novel tools for TCM practitioners, students and patients alike. This paper describes an Expert System for supporting the TCM consultation process – both in terms of gathering and managing the patients' personal and symptomatic data, and of obtaining accurate diagnoses and treatments under regulated and reviewed protocols. The proposed tool was designed and is being developed with the support of two TCM therapists, which act as experts and provide aid to the processes of building the knowledge base and the automatic diagnosis system. In terms of architecture, the current version of the framework includes a mobile client application for the Android platform, integrated with an online spreadsheet. A survey was conducted in order to assess some of the needs of the community of TCM practitioners, and allowed gathering information on their needs.

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1. Introduction

Traditional Chinese Medicine (TCM) is the name commonly given to the set of practices of traditional medicine in use in China. Those practices were developed over thousands of years and are considered one of the oldest forms of Oriental medicine. TCM encompasses seven main methods of treatment: Tui-na; Acupuncture; Moxibustion; Cupping; Phytotherapy; Chinese food therapy; Physical practices.

The main goal of this research is the creation of an expert system capable of helping therapists reach a diagnosis and establish a treatment plan. In order do to so, the expert system must guide the therapist in the data entry process by presenting the most relevant questions in an adequate sequence. Moreover, the expert system must use that data to find the most adequate diagnosis hypothesis and present them to the therapist. In addition, we are using a Google Spreadsheets to store all relevant information, including the knowledge necessary to reach a diagnosis and suggest a treatment plan. This option eases the creation of both desktop and mobile applications while also simplifying the fine tuning of the system. All TCM diagnosis and acupuncture treatments included in the expert system were collected from experts and are supported by B. Auteroche e P. Navailh book [1].

This paper focuses on presenting the TCM-SIS (Traditional Chinese Medicine – Support Information System) framework, while providing the background underlying this research and proving the pertinence of this study; also, we intend to introduce the technical and architectural approaches proposed for implementing the framework.

1.1. Traditional Chinese Medicine

Traditional Chinese Medicine cannot be understood without a basic understanding of holistic medicine. Holistic medicine views the body as a whole, and tends to believe that "imbalances" in the body manifest as symptoms. Holistic medicine believes that, in the long term, it is not efficient to suppress symptoms (e.g., by means of aspirin for headaches), as these symptoms will keep returning until the body is restored into balance. Traditional Chinese medicine is based on the theory of holistic medicine, and this can be seen through remedies such as herbal medicine, acupuncture, massage (Tui na), exercise (qigong), and dietary therapy. TCM diagnosis aims to trace symptoms to patterns of an underlying disharmony, by measuring the pulse, inspecting the tongue, skin, and eyes, and examining the eating and sleeping habits of the patient among many other things [1].

The theoretical framework of TCM has a number of key components. The Yin-yang theory is the concept of two opposing – yet complementary – forces that shape the world and all life, and is central to TCM. In the TCM view, a vital energy or life force called *qi* circulates in the body through a system of pathways called meridians. Health is an ongoing process of maintaining balance and harmony in the circulation of *qi*.

The TCM approach uses eight principles to analyse symptoms and categorize conditions: cold/heat, interior/exterior, excess/deficiency, and yin/yang (the chief principles). TCM also uses the theory of five elements – fire, earth, metal, water, and wood – to explain how the body works; these elements correspond to particular organs and tissues in the body [2,3].

1.2. The Portuguese Reality

The law bill n. º 71/2013 published on September 2013 [13] is a milestone of tbe Portuguese TCM history, as Portugal will be one of the few European countries to fully acknowledge TCM and its practitioners. This paradigm shift increases the relevance of software solutions as the one presented in this paper.

With the purpose of getting to know some of the TCM therapists' needs as related to the information technologies in their professional settings we conducted a survey during a 3-day TCM post-graduation session that had 220 therapists in attendance. The participation in the survey was completely voluntary and of those 220 therapists we had 55 answering the survey.

The first question asked in the survey was "What would you value the most in a computer application tool developed with the purpose of assisting you in your professional TCM practice?". The answers are detailed in Table 1. The second question asked in the survey was "Do you presently use any kind of information system to support your therapeutic practice"; we have obtained 34 negative answers and 21 positive answers.

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