Chapter 23
Intelligent Agent to Identify Rheumatic Diseases

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ABSTRACT

Most of Mexican populations, even medical population, do not have enough information on rheumatic diseases to allow them to understand the importance of the socioeconomic and psychological impact of these disorders. In order to reduce this problem, a didactic tool is provided to general practitioners that enables them to identify medical disorders in the area of rheumatology. Didactic software is based on the application of an intelligent agent based on goals that contains enough information to identify seven of the most common inflammatory rheumatic diseases and fourteen non-inflammatory. The purpose of this tool is that a general practitioner can get an early diagnosis in a rheumatic patient and subsequently send that patient to a rheumatologist in order to prevent damage. The presented prototype can be useful for professors and students of the computation area to solve similar problems.

1. INTRODUCTION

1.1. Review of the Rheumatic Diseases

Rheumatic diseases have been known since antiquity, but not as the way they are known today, because the branch of medicine that studies, Rheumatology, has been developed during the twentieth century. This has created many myths and popular beliefs that most people believe in mostly because of the lack of information on them.

By mentioning some of them; some people say that eating ten black olives may cure the disease for sure, in some regions it is recommended to carry a magnet in their pocket, other always carry a small potato in their pocket which will not rot, but instead it will dry slowly until get harden and then they’ll changed by another, in other regions people is used to carry metal objects either copper or silver. The reality is that rheumatic diseases are not curable, only controllable and these remedies are not scientifically proven. The cause of Rheumatic diseases is unknown; they are autoimmune diseases that can cause chronic inflammation of the joints and other areas of the body, chronic inflammation can cause permanent...
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joint destruction and deformity, the damage in the joints can occur early and does not correlate with the severity of symptoms, it may be genetically inherited (hereditary), it can affect people of all ages and more than 100 diseases are classified as rheumatic diseases, it is not known what triggers the rheumatic diseases. It’s also suspected that certain infections or factors of the environment might trigger the activation of the immune system in susceptible individuals. Then this misdirected immune system attacks the body’s own tissues. This leads to the inflammation of the joints and sometimes also of various organs of the body, such as the lungs or eyes.

A person who suffers from a rheumatic disease that has affected the hip joint is facing a severe pain when attempting to walk. The first three or five steps walks with great difficulty, as it decreases the pain, once that it lessens can walk with less pain and greater agility. When attempting to stand the pain is so acute that it does not balance and when sitting drops the body waiting for that pain to decreases, spending time it dulls, but knowing that when get up again will face that terrible acute pain. When the joints of the hand are concerned, it is very difficult to remove the lid to a jar, as pain does not allow you to force. If the person suffers from a knee, usually the cartilage that covers the joint decreases its thickness, staying in touch with the bone part, decreasing joint mobility and increasing pain to move it. Usually the patient will live with the pain articulates for a lifetime, with the probability that the joint will be merged and significantly decrease their movement, in such degree that it turns into a person with a disability. Most of the people must be in constant motion, as it permits the disease, otherwise it would be in for life in a wheelchair or bed.

1.1.1. Project

This project is a field investigation, applied to the medical area of Rheumatology and related with the Information Technology. It is in itself, an automated medical tool to identify joints disorders, based on an Intelligent Agent from Artificial Intelligence specialty, based on the heuristic compilation of the tacit knowledge of rheumatologists. This study tries to associate the factors than relate the support process on Information Technology on a General Doctor, towards a modern tool as didactic software, which facilitates identification of the most common rheumatic diseases.

1.1.2. Description of the Project

This identification tool has a section of rheumatic inflammatory conditions and a section of rheumatic non-inflammatory conditions. inflammatory conditions referred to joint. In the section of inflammatory conditions, the user will find windows that include the different aspects of the joint disease that must be considered in diagnosis such as kind of onset, number and size of involved joints, topography of the arthropathy and symmetry of involvement. The section of non-inflammatory conditions considers only localized, regional, and generalized involvement. Both sections follow a reasonable and logic algorithm that allows reaching diagnosis of the rheumatics conditions included in the diagnostic tool.

This project started off in the year 2009 with students from the Instituto Tecnológico de Saltillo, at Saltillo’s city, Mexico. When identifying the problems at our region, we invited the three rheumatologists in our city and only one of them agreed. The participants in computational sciences initiated the study of the algorithm that uses the specialist to identify the rheumatic diseases and the bibliography to understand the medical terms, for their part the doctor should have understood the algorithm of a software agents. To depart of here we began to develop the application. At a later time several professors of the Facultad de Sistemas of the Universidad Autónoma de Coahuila were interested in the identified problem, taking part in the theme “The rheumatic patient and his family” focused on the Medical and Social sciences conducting the study at the Instituto Mexicano del Seguro Social.