Chapter 12
Clinical Business Intelligence to Prevent Stroke Accidents

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ABSTRACT

Stroke is considered the third main cause of death among all population, without distinguishing genders, led by heart diseases in first place. In other hand, despite representing a significant number of mortality, these diseases are the causes for a long-term disability in all countries with a vast recovery time going parallel with its costs. However, leaving aside this facts, stokes and heath diseases can also be easily prevented considering the outcome. This paper presents a new methodology to prevent these events to happen by using segmentation methods, which allows distinguishing and aggregating clusters of historical records, classification methods, such as Artificial Neural Networks, capable of classifying a new record according to its distribution among the clusters. A Multi-Agent Case Based Reasoning system is also proposed to evaluate solutions based in a similar case.

1. INTRODUCTION

Stroke is a blood supply interruption that occurs in the brain. This interruption happens when an artery, which is a blood vessel responsible for carrying the blood, is blocked, causing an ischaemic stroke, or bursts, causing an haemorrhagic stroke. Being a major factor related with mortality this disease is also closely followed with the main purpose of preventing it from happen since, when diagnosed, it becomes less dangerous and more treatable comparing with other similar diseases. There are several risk factors associated with stroke, however there are those who represent a major influence relating this event. Some risk factors can be treated or controlled like high blood pressure, as being a leading cause of stroke and the most controllable risk factor, cigarette smoking, the nicotine and carbon monoxide can damage the cardiovascular system therefore can augment the probability of stroke, diabetes mellitus, having this kind of diabetes also increases the risk of stroke since can cause blood vessels diseases, high blood cholesterol, being the main cause of ischaemic strokes, and physical inactivity. Despite this risk factors there are those who can't be controlled such as age, older people have more tendency to stroke, gender, stroke is more common in men then in women though more women die from strokes than men, and the mere fact of having suffered a previous stroke represents an increased risk factor not controlled by any means. Knowing this risk factors is already is an advantage if well considered and treat when so. Consequently this document emphasis the cluster prediction of a giving record, according with an historical dataset with different cases of stroke, which is used to retrieve a similar case from a Case Based Reasoning Multi-Agent System. Yet, the objective is not to predict if an input, composed of several symptoms, will suffers from a stroke or not but in case it does retrieve a better treatment according with similarity among other records. Supporting this decision process is a logic programing based approach to knowledge and reasoning with a special focus on the Degree of Confidence defined by a mathematical expression with a normalization background.

2. METHODOLOGY

Previously mentioned throughout this analysis there are three kinds of concepts that are worth to understand and explain. The concept behind this system is to identify clusters in a multi-agent system. Each agent has its own data knowledge, making them different from each other, which affects the decision support during case processing. The first method applied to every agent's dataset it's a cluster method. This method involves the identification e segmentation of identical records given, or not, an attribute to relate in a distance function. Hence, a cluster is a group of

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