



Information Technology and Quantitative Management (ITQM 2017)

A Fuzzy Inference System to Support Medical Diagnosis in Real Time

Igor Barone de Medeiros^a, Maria Augusta Soares Machado^{a, b*}, Wallace José Damasceno^b, André Machado Caldeira^b, Rodrigo Costa dos Santos^b, Joel Batista da Silva Filho^b

^aIBMEC, Av. Presidente Wilson, 118, 11th floor, 20030-020, Rio de Janeiro, RJ, Brazil

^bFuzzy Consultoria Ltda Av. Nossa Senhora de Copacabana 1376/ 302 Rio de Janeiro, Brazil, <http://www.consultoriafuzzy.com>

Abstract

This paper presents a Fuzzy Inference System created to support medical diagnoses in real time. It minimizes health costs and maximizes health resources based on real data selected by medical groups in the market. This renders support in posting qualified interview decisions through new Customer Risk Mapping. The main objective is to create a foundation of health resources for hospitals administrators based on medical decision procedures thus increasing the capacity for hospitals to absorb new processing techniques and consequently, ensuring higher quality services for their patients. The aim of this system is to delineate patient-risk-factor during a qualifying interview. The automation of this process becomes a benefit by establishing a real-time responses which needs not be applied by a doctor (can be executed by nurses), and, in return, characterizes an opportunity cost for the hospital.

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Peer-review under responsibility of the scientific committee of the 5th International Conference on Information Technology and Quantitative Management, ITQM 2017.

Keywords: fuzzy logic, health care, preventive medicine.

1. Introduction

The supplementary health sector situation needs innovative measures where new ideas of working procedures could be tested and employed; as a result, providing a significant growth rate for people with an entrepreneurial spirit in an industry involving considerable financial transactions.

* Corresponding author. Tel.: +55 21 45034053; fax: +55 21 229417118.

E-mail address: fuzzy-consultoria@hotmail.com.

According to [1], the Brazilian health system is undergoing a profound transitional stage in which several points of management are being questioned; for example, the inclusion of the National Health Agency Administration and the lack of investment in intellectual capacity. This transitional period is crucial for health plan providers - placing them under the threat of closing their doors. In addition, resources for the sector are increasingly scarce due to the rapid growth of medical costs and diagnostics, that being higher than inflation.

The study of this subject has as its objective to stimulate new decision-making within the healthcare sector by creating new strategies of sustainable management for providers, hospitals and all involved in healthcare.

In view of the dissatisfaction within this market - powered by poor administration and personal ownership interest of executives, this paper identifies beneficial measures through a Fuzzy Inference System. This system acts as an artificial medical intelligence, largely due to database manipulation, thus increasing the ability of providers and suppliers to accommodate new beneficiaries and obtain superior costs control.

2. The Public and Private Healthcare Sectors

The data presented in this analysis are 2015 report's data source World Bank [2]. The administration of health organizations, including health plans operators for further assistance, is one of the most complex activities in the world of today's business. The global healthcare market invests 1.7 trillion, according to World Bank [2] this can be seen in table 1.

Table 1 – Global health care

Demographic region	Population (millions)	Global population (%)	Health Costs (billions US\$)	Global Health costs (% US\$)	Health cost per capita (US\$)
Africa	510	10	12	1	24
India	850	16	18	1	21
China	1134	22	13	1	11
Asia	683	13	42	2	61
Latin America	444	8	47	3	105
Middle East	503	10	39	2	77
Former European socialist economies	346	7	49	3	142
Consolidated markets	798	15	1483	87	1860
World	5268	100	1703	100	329

According to [3] and [4], over the past 40 years, life expectancy has increased more than in the total sum in the history of mankind. In 1950, life expectancy in developing countries was forty years; in 1990, it had risen to sixty-three years. In 1950, out of one hundred children, twenty-eight died before their fifth birthday; in 1990, this number had fallen to ten. Smallpox, which killed more than five million people yearly in the early 50s, has been completely eradicated. Vaccines significantly reduced cases of measles and polio. All these achievements, not only reflect significantly the welfare of direct gains, but also reduce the economic burden imposed by workers with poor health and sick or defaulting students. These developments are partly due to rising incomes and improvement of education around the world and, in part, to the expansion of healthcare services by governments, which have also benefited from technological advances.

There are great problems in health care in Brazil:

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