Chapter 15
Evolutionary Intelligence and Quality-Of-Information
A Specific Case Modelling

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ABSTRACT

The strategy of making predictions for a specific case or problem, in particular regarding scenarios with incomplete information, should follow a dynamic and formal model. This chapter presents a specific case concerning the employment of professionals for a health institution, as technicians and physicians, to demonstrate a model that requires the Quality-of-Information and the Degree-of-Confidence of the extensions of the predicates that model the universe of discourse. It is also mentioned a virtual intellect, or computational model, in order to maximize the Degree-of-Confidence that is associated with each term in the extensions of the predicates, according to the approximate representation of the universe of discourse. This model is prepared to be adopted by a Business Intelligence platform in order to increase the Quality-of-Information and the Degree-of-Confidence of the extensions in healthcare.

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INTRODUCTION

Decision-support systems appeared in the early 1970s in contrast to transaction-processing or operational applications, such as order entry, inventory control and payroll systems. Over the years, the decision-support domain has widely expanded until the concept of Business Intelligence (BI) appears, in the early 1990s (Watson & Wixom, 2007).

A business collects and acquires an enormous amount of data every day and recent surveys confirm that over 93% of this data is not usable in the business decision-making process today (Reinschmidt & Francoise, 2000).

Nowadays, BI is extensively used to describe analytic applications as a strategic initiative in driving business effectiveness and innovation (Watson & Wixom, 2007).

Data organization can lead to a competitive advantage and learning how to uncover and leverage this advantage is what BI is all about (Reinschmidt & Francoise, 2000).

Knowledge Representation is the area of Artificial Intelligence (AI) concerned with how knowledge can be represented symbolically and manipulated in an automated way by reasoning programs. There are many different ways to approach and study the area of Knowledge Representation. One might think in terms of a representation language like that of symbolic logic, and concentrate on how logic can be applied to problems in AI (Brachman & Levesque, 2003).

Many approaches for Knowledge Representation and Reasoning have been proposed using the Logic Programming (LP) paradigm (Kakas, Kowalski, & Toni, 1998) (Gelfond & Lifschitz, 1988) (Pereira L. a., 2009). Here, the authors follow the proof theoretical approach and an extension to the logic programming language, to Knowledge Representation and Reasoning as represented in the article "Evolutionary intelligence in asphalt pavement modeling and Quality-of-Information" (Neves, et al., 2012).

In practical terms, at the end of this process the authors expect to get a set of theories (or scenarios) that correspond to the best models of the universe of discourse. It will be possible to apply the program in various scenarios of the case that is being studied and, in each of these scenarios, obtain a set of predicates and each attribute of these predicates will be represented in the form of slices of a pie chart.

This model of Knowledge Representation can be generalized and applied to any problem in any knowledge domain in which the concepts of Quality-of-Information (QoI) and Degree-of-Confidence (DoC) must be considered for the decision-making process to get a good diagnosis.