

BOOK REVIEW: FUZZY LOGIC AND MEDICINE APPLICATIONS by *Novruz Allahverdi*

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Abstract. The basis of the popularization of fuzzy logic is based on the possibility of creating models based on expert knowledge, which classical mathematics has remained away from. In this respect, it is seen that the book “Fuzzy Logic and Its Applications in Medicine” written by Professor Novruz Allahverdi makes a significant contribution to the field of fuzzy logic. In the book, in addition to providing the necessary information about the theoretical foundations of fuzzy logic, the design and application results of various applied models in the field of medicine are given. The book has been written specifically for computer engineering and electrical-electronic engineering students. However, it seems that the book will be useful for all undergraduate and graduate students of the Faculties of Science and Engineering, as well as all readers interested in Artificial Intelligence.

Keywords: Fuzzy logic, artificial intelligence, fuzzy inference system, expert systems, medical applications.

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1 Introduction

Since the first article published by L.A.Zade in 1965, many studies on fuzzy logic have been developed. On the one hand, while the mathematical foundations of fuzzy logic were developed with deep theoretical research, on the other hand, fuzzy logic became widespread with applied studies. Based on the popularization of fuzzy logic, it provided the opportunity to create models based on expert knowledge, which classical mathematics was far away from. When the book titled “Fuzzy Logic and Medicine Applications” prepared by professor Novruz Allahverdi is evaluated from this point of view, it is seen that it makes a very important contribution to the field of fuzzy logic. As the name suggests, this book reflects the author’s significant experience in developing various fuzzy logic-based applications and expert systems in the medical field.

In the book, the necessary theoretical information on the fuzzy logic is given before moving to applied models. In this respect, the book contains self-sufficient content that does not require the reader’s deep fuzzy prior knowledge of logic.

It should also be noted that fuzzy logic has various applications at different stages (classification, diagnosis, treatment, etc.) of many medical research in the field of medicine.

Although there are sufficient number of published articles and books in this field, it is seen that the examples to be used by the designers of fuzzy control systems and students in the field of medicine are few and short.

The book appeals to students in general. Having many detailed examples in the book makes it easier for readers to understand. In addition, the book can be used by faculty members for classroom purposes. Each chapter in the book ends with questions and exercises that will be useful for students to test themselves. It is also clear that these questions and exercises will help students to test their knowledge.

When establishing a fuzzy medical system, two important points should be considered: (1) reliable medical data and (2) expert knowledge. It is often difficult to obtain the required medical data. On the other hand, fuzzy rules should be created by specialist physicians and/or a group of physicians. There are many examples in the book that will have practical benefits in developing such systems.

The content of the book is briefly as follows: Chapter 1 presents general issues of fuzzy logic; Chapter 2 describes fuzzy sets, operations on them, and logic laws. In addition, concepts such as S-Norms, T-Norms, Einstein product were introduced. Next, L-R based operations on fuzzy numbers and fuzzy numbers themselves are given; Linguistic variables, the Extension principle and fuzzy rules are explained in Chapter 3; In Chapter 4, fuzzy systems, fuzzy inference mechanism, fuzzy rules and fuzzification-defuzzification process are explained in detail. Chapter 5 describes step by step the various applications of designing fuzzy expert systems into the medical field. In this section, the design and working principles of fuzzy expert and/or control systems such as determining cancer risks, determining the health status of the patient during heart surgery, anemia diagnosis, determination of dental diseases, determination of the amount of medication, determination of the risk of type-2 diabetes in the operating room are explained.

This book has been written specifically for computer engineering students and electrical and electronics engineering students. However, I believe the book will be useful for all undergraduate and graduate students of the Faculties of Science and Engineering. At the same time, I think this book will be useful for Medical Faculty students and researchers who are interested in the mathematical creation principles of medical decision systems. In short, it is possible for all readers interested in Artificial Intelligence to benefit from this book.

References

Allahverdi, N. (2020). *Fuzzy Logic and Medicine Applications*. KTO Karatay University, 240 s.