KNOWLEDGE REPRESENTATION

IN MEDICINE AND CLINICAL BEHAVIOURAL SCIENCE

by Dr.L.J.KOHOUT and Professor W.Bandler
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The book edited by Ladislav Kohout and Wyllis Bandler—
two well-known scientists in fuzzy set community, forms a
valuable contribution to studies of aspects of knowledge
representation in clinical systems.Contrary to a mass of
technical papers in this area, this volume covers not only
particular issues closely related to expert systems but
gives a broader poerspective into a variety of methods of
processing of clinical,medical and psychological information.
In fact ,information gathered in this area has to be treated
with a high caution due to its incompleteness,inconsistency
and vagueness.Therefore there is no doubt the editors got
down to the crux of the matter of construction of any
knowledge-based system.A success of any edited volume in
this area is achieved only in a situation when the aspects
covered by this topic would be carefully investigated by a
representative group of researchers.Fortunatelly,contributors
of this volume have research experience in more than one
professional field, say medicine and computer science.This
fact as well as a carefully structured contents of the volume
made it possible to produce a book of interest for a broad
audience of readers.

The book is divided into four main parts.Each of them has
its own particular character.Naming them only we have,
I. Conceptual problems and Methodological Foundations
II. Methodology of Modelling
III. Relational Products for Modelling and Analysis
IV. Selected Examples of Concrete Applications
They cover a broad spectrum of topics viewed at different

levels of generality.

Part I is devoted to general methodological requirements imposed on effective schemes of clinical knowledge representation.

General problems posed to medical informatics are considered by J.Anderson.Secondly an aspect of handling incomplete data with different degrees of relevance to individual concepts is covered by a discussion performed by D.Ward.A process of medical reasoning is investigated by L.Johnson.In a paper presented by V.Pinkava, conceptual, methodological and logical foundations of classification are discussed in detail.Finally the part ends with a paper of A.Elliman which is devoted to various aspects of the management of medical data bases.

The part II entitled Methodology of Modelling comprises of two papers.Firstly L.Kohout gives a detailed presentation of conceptual and methodological issues arising with respect to functional structures of behaviour.Despite a fact the entire discussion is concentrated on clinical methodology, its relevance is also visible in other fields,namely in such areas as:

-robotics (functional hierarchies of movement control),
-semiotics of natural language representation(functional
    linguistic hierarchies and methodology of the Prague
    Linguistic Circle).

The second paper presented by M.Nowakowska gives a novel and inspirating look at a theory of time incorporating fuzzy set approach (viz.fuzzy relations) to a problem of subjectivity in time perception.This may enable to study a variety of types of distortions existing in time perception.

In Part III a set of techniques established by both the editors, a so-called relational products, is discussed in detail.This parts starts with a paper of W.Bandler and L.Kohout which gives an overview of relational products.A particular attention is focussed on actual possible medical applications in which some of the ideas of these products (e.g. α-cuts of fuzzy relations, products of a relation

with its converse, hierarchies detected by fuzzy relational products) are of a significant use.Next in a paper authored by Ch.Sherwood, a system which makes, use of fuzzy sets in order to analyze medical and posychological tests is presented. A list of operations on fuzzy sets used and some normalization aspects are also considered.A paper of E.Th.Keravnou gives a detailed description of computer implementation of relational products and provides the reader with their specific utilization to medical information retrieval procedures.In the light of the results contained in the papers prepared by the editors and the above paper one can expect that the ideas of fuzzy relational products will be investigated further on and perhaps they (and fuzzy relational equations) would form a commonly established framework for modelling and processing of vague information.

Part IV covers selected and really interesting applicational examples.E.Sanchez tackles with a variety of aspects of pattern matching appearing to often in medicine. It is clearly pointed out that a linguistic character of patterns (described with expressions such as e.g. *slightly, moderately,* etc.) is in as common fact appearing even in WHO classification schemes (e.g. WHO Fredrikson classification of hyperlipoproteinenias).The paper gives a pertraining analysis of existing matching schemes indicating a role of possibility distributions arising on a ground of processing of medical expressions.The author clearly indicates that a notion of a "limit of normality " in a medical sense is a matter of degree, therefore really a novel approach -fuzzy set techniques has to be worked out.A paper of S.K.Pal leads the reader to another area of utilization of fuzzy sets, namely to image processing.He discusses a problem of X-ray image analysis.Just using image transformations that are based on conventional shapes of membership functions (as S- and Π- functions) and fuzzifiers, especially for solving tasks of contrast enhancement, image segmentation and classification purposes, highly acceptable results have been obtained. In sequel Ch.F.Reynolds gives an overview of a personal

information system for medical staff.The system called CODIL
has been designed in such a way which assures a satisfaction
of a particular need which enable the user to handle poorly
structured medical information.

It is noticeable that a balance between all the parts of
the book has been achieved.This causes the book is
interesting and useful for readers with a scattered (in sense
of generality of their points of view) interests.
Let us come up with a final conclusion: the volume is really
an inspirating for research in fuzzy sets either in provoking
attempts to work out concepts on applying fuzziness in
knowledge representation or in looking for concrete computer
implementations.The book is the must for all interested in
actual trends of knowledge representation in medicine, or,
generally speaking, in "soft" sciences.

Witold Pedrycz