

Book review:

MEDICAL IMAGE UNDERSTANDING TECHNOLOGY

by

Ryszard Tadeusiewicz and Marek R. Ogiela

The book under review presents a new important paradigm in the field of development of methods for contemporary bio-medical engineering, more exactly - in the domain of processing and analysis of medical images. Particularly now, when doctors can use many images (photographs) for medical diagnosis, obtained by various techniques and requiring different means of interpretation, the preliminary assessment of illness, obtained owing to the computer-aided diagnosis, should be especially helpful. This refers to a wide range of practical tasks, from rare and difficult individual clinical cases, to mundane and routine preventive examinations.

The classical contemporary processing of medical images is, as a rule, dominated by the well-known approach of pattern recognition, whereby introductory phases of image processing and analysis are followed by a decision-making process consisting in classification of an examined object among a finite number of the otherwise defined classes, most often representing the normal state and the different pathologies of the tested organ. The reviewed book proposes a novel methodology, where these classes are created endogenously and coupled with respective elements of medical knowledge, due to automatic recognition of common features. The criteria of classification are also constructed endogenously. This constitutes the beginnings of a new methodology of meritorious interpretation, and even - a concept introduced by the authors - of the automatic understanding of the medical images obtained. The proposed procedure can be grouped with the refined methods of contemporary information technology, based on the advanced artificial intelligence tools.

The book consists of six chapters, which are clearly divided into three parts with different goals. The first two chapters form an introduction and explain the innovative character of the proposed approach, relying on the readers' intuition. The third chapter is a detailed presentation of the syntactic methodology presented in the book, i.e. the linguistic description of the image contents using a specific description language, on which the apparatus for solving the problem formulated is based. The last three chapters provide examples of applications of the proposed procedure, as well as a discussion of its advantages and limitations.

Before indicating whom the book is aimed at, it is worth suggesting it for a general reflection. Thus, it can not be a coincidence that many ideas worked out

by engineers have been successfully adapted later in other fields of science and practice. The task of engineers is most often made significantly easier, because the objects they are interested in are of their own creation, and the functional mechanism of these objects is well-understood. The concepts developed by the engineers have thus often been transposed onto, e.g. econometric problems, and even the most complex and the least known systems - medical objects. The authors of the reviewed book come from such a group of engineers, computer engineering and automatic control specialists, who have been able to generalize and adapt knowledge from their fields to medical objects. However, the ideas themselves come from broadly understood engineering, and remain universal. For these reasons *Medical Image Understanding Technology* by R. Tadeusiewicz and M.R. Ogiela, published by Springer in the series of Studies in Fuzziness and Soft Computing, edited by J. Kacprzyk, in 2004, can be recommended to a wide audience, while also serving as a potentially comprehensive source of inspiration for research of a modern and advanced character.

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R. Tadeusiewicz, M.R. Ogiela *Medical Image Understanding Technology. Artificial Intelligence and Soft-Computing for Image Understanding*. Volume 156 in Studies in Fuzziness and Soft Computing (J. Kacprzyk, Editor-in-Chief). Springer-Verlag, Berlin - Heidelberg, 156 pages, 2004. ISSN 1434-9922. ISBN 3-540-21985-4. Price: USD 129 (hardcover).