Computer-Aided Breast Cancer Diagnosis

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image processing techniques in computer-aided cancer diagnosis systems, evolutionary algorithms, artificial neural networks and max-plus algebra in fault diagnosis

Abstract

Breast cancer, beside skin cancer, is one of the most prevalent malignant tumours among women in Europe, the United States and Australia. Statistically, it is the most common cause of death among women below age 65. First of all, an efficient treatment of breast cancer depends on its advancement at the time of the diagnosis. An early and precise diagnosis is very important. The presentation is focused on the analysis of the microscopic images of the Fine Needle Biopsy (FNB) material taken from breast cancer. The possibility of fully-automated diagnosis system construction is considered. Sample solutions for image filtering, preprocessing, segmentation, morphometric characteristics extraction, and classification are presented. Most of them are based on standard image processing methods, but, due to the complex nature of biological images, they are not effective enough. Therefore, some modified versions of the mentioned standard methods as well as quite new proposals are presented and illustrated on a real data base of microscopic cytological images.

Biography

Andrzej Obuchowicz, Ph.D, D.Sc, was born in 1963 in Zielona Góra. He received the M.Sc. and Ph.D. degrees in physics from the Institute of Physics of the Technical University of Wrocław in 1987 and 1992, respectively, and the D.Sc (habilitation) degree in automation and robotics from the Faculty of Electronics of the Technical University of Wrocław in 2004. Since 1992, he has worked at the Institute of Control and Computation Engineering, University of Zielona Góra. Presently, he is the dean of the Faculty of Electrical Engineering, Computer Science and Telecommunications, University of Zielona Góra. Professor Obuchowicz is an author or co-author of over than a hundred scientific publications. Currently, his research is focused on applications of image processing techniques to computer-aided diagnosis systems dedicated for cancer diagnosis based on cytological and histopathological microscopic images. His general interest include also evolutionary algorithms, artificial neural networs, and max-plus algebra, and their application to fault diagnosis.