IEEE *Access*

Multidisciplinary : Rapid Review : Open Access Journal

EDITORIAL

IEEE ACCESS SPECIAL SECTION EDITORIAL: SOFT COMPUTING TECHNIQUES FOR IMAGE ANALYSIS IN THE MEDICAL INDUSTRY – CURRENT TRENDS, CHALLENGES AND SOLUTIONS

The necessity of soft computing techniques for medical image analysis is increasing every day. With new types of diseases affecting human beings, the diagnosis process becomes extremely important for efficient treatment planning. Soft computing techniques play a significant role in diagnosis and its allied techniques. Medical practitioners/researchers are always on the search for soft computing approaches with high performance measures. This is the scope for in-depth research in the area of these approaches in the context of medical applications. This Special Section in IEEE ACCESS is an ideal platform for showcasing the state-of-the-art methods in these areas. Four high-quality articles have been accepted for this Special Section.

Deep learning is one of the recent methodologies which has found wide applications in the medical field. In the article by Ker, *et al*. (Deep learning applications in medical image analysis), the researchers have paid attention to one of the deep learning approaches, namely Convolutional Neural Networks (CNN). These neural networks are used for image segmentation, registration and localization applications. Abnormal Magnetic Resonance brain tumor images are used in this work.

Medical signal processing is another significant area of research in the medical field. Some abnormalities are diagnosed with images and many other abnormalities are diagnosed with signals. In the article by Venkatesan *et al*. (ECG signal preprocessing and SVM classifier-based abnormality detection in remote healthcare applications), the authors proposed an efficient Support Vector Machine (SVM) based abnormality detection method for the human heart using ECG signals. Cardiac arrhythmia detection is the focus of this research work. A combination of mathematical transforms and machine learning algorithms are used in this work.

Cybercrimes have directed researchers to focus on security methodologies for medical images which may have

sensitive information within it. This is one of the innovative research areas in the medical field. Efficient frameworks need to be developed to secure the images which is always a challenging task. In the article by Shehab *et al*. (Secure and robust fragile watermarking scheme for medical images), the researchers have developed techniques for efficiently securing the images. Watermarking methodology based on Singular Value Decomposition (SVD) is used in this work. The proposed methodology is tested against a series of artificially simulated attacks. Different types of medical images are used for the experiments. The test analysis shows promising results for the proposed framework.

Ultrasound Contrast Imaging (UCI) has become increasingly important for abnormality detection in the gastrointestinal part of the human body. In the article by Konstantinos *et al*. (Super-resolved ultrasound echo spectra with simultaneous localization using parametric statistical estimation), the authors have developed a Bayesian network-based methodology for detecting the abnormal blood flow in tissues. An extensive quantitative analysis is presented in this article which validates the efficiency of the proposed work.

We hope this Special Section will be beneficial to many researchers who are working in these soft computing and medical image analysis fields. In spite of all the topics not being covered in this special section, this will serve the needs of budding researchers/practitioners in these areas. We sincerely thank all the authors, reviewers, Editor-in-Chief and all the staff members of IEEE ACCESS for their continuous support.

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