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Biography

Kishore Balasubramanian, has 23+ years of academic experience in imparting Engineering Education. A doctorate in Information and Communication Engineering from Anna University, India, his research interests include Medical Image Processing and Soft Computing Techniques. He is an active reviewer and editorial board member in many SCI and Scopus indexed scientific journals. He has served as a Technical Committee Member, Sessions Chair and delivered Keynote Address in National and International Conferences. He has authored books in Analog Electronics and AI for medical diagnosis and book chapters. He has published 70+ papers in International and National journals (Springer, Elsevier, Taylor and Francis, Wiley, Sage etc.). He is a member of ISTE, IRED, IEEE (Society Affiliate), ISDS, ICICS and IAENG. He has visited countries like Dubai, Singapore etc for delivering Keynote Speech at International conferences.

Harmonizing Soft Computing and Advanced Image Processing for Precision Ophthalmology

Abstract:

Vision impairment remains a critical global health challenge, making early and accurate diagnosis the absolute cornerstone of preventable blindness. Today, the diagnostic framework of ophthalmology is undergoing a major paradigm shift driven by the fusion of soft computing and advanced image processing techniques. Conventional diagnostic methods often struggle with biological variability and imprecise medical data. While high-resolution imaging modalities such as OCT, fundus imaging, UWF, and adaptive optics—generate unprecedented data volumes, translating them into actionable clinical insights requires more than traditional analysis. This keynote explores how harmonizing soft computing paradigms with advanced image processing redefines precision ophthalmology. Soft computing techniques—including fuzzy logic, neural networks, evolutionary algorithms, and deep learning hybrids—excel at managing the uncertainty and complexity inherent in ocular imaging. Integrated with state-of-the-art image processing methods like multi-scale segmentation, texture biomarkers, and attention-driven feature extraction, they enable robust detection, grading, and prognosis of diabetic retinopathy, glaucoma, AMD, and corneal pathologies. This synergy allows for automated, highly accurate segmentation of critical ocular structures, effectively mapping retinal layers, the optic disc, and microvasculature. Advanced algorithms eliminate noise and enhance contrast in imaging, while soft computing frameworks manage early-stage pathological uncertainties. We will discuss frameworks moving beyond binary classification toward quantifiable disease phenotyping, personalized risk stratification, and early progression prediction. Special emphasis is placed on reducing false positives, enhancing generalizability across diverse populations or devices, and building explainable AI models to earn clinician trust. Unifying soft computing adaptability with modern imaging fidelity creates a precise, predictive, and patient-centric future, bridging engineering innovation and clinical practice to safeguard vision.