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Notice for the PhD Viva-Voce Examination

Ms Binju Saju (Registration Number: 1981311), PhD scholar at the School of Sciences, CHRIST (Deemed to be University), Bangalore will defend her PhD thesis at the public viva-voce examination on Saturday, 13 January 2024 at 11.00 am in Room No. 044, Ground Floor, R & D Block, CHRIST (Deemed to be University), Bengaluru - 560029.

Title of the Thesis	:	**Risk Factor Based Stage Advancement Prediction of Cataract Using Deep Learning Techniques**
Discipline	:	**Computer Science**
External Examiner (Outside Karnataka)	:	**Dr Sudheep Elayidom M** Professor and Head Department of Computer Science Cochin University of Science and Technology Kalamassery, Kochi Kerala - 682022
External Examiner (Within Karnataka)	:	**Dr Hanumanthappa M** Senior Professor Department of Computer Science Bangalore University Bengaluru Karnataka
Supervisor	:	**Dr Rajesh R** Associate Professor Department of Statistics and Data Science School of Sciences CHRIST (Deemed to be University) Bengaluru — 560029 Karnataka

The members of the Research Advisory Committee of the Scholar, the faculty members of the Department and the School, interested experts and research scholars of all the branches of research are cordially invited to attend this open viva-voce examination.

Registrar

Place: Bengaluru
Date: 08 January 2024

ABSTRACT

In modern world, Cataract is the predominant causative of blindness. Treatment and detection at the early stage can reduce the number of cataract sufferers and prevent surgery. Two types of images are generally used for cataract related studies- Retinal Images an Slit lamp Images. The quality of Retinal images is selected by utilizing the *hybrid NIQE-PIQE* approach and based on the quality score value *DCNN* categorizes the images into low quality, medium quality and high quality images. Then the selected quality images are again pre-processed to remove the noise present in the images. The *Hybrid G-MHE-HF* is utilized for enhanced noise filtering. The Slit lamp image quality selection is combined to select the good quality slit lamp images for further analysis. The image quality of an image is assessed utilizing BRISQUE model. A new algorithm Normalization based CLAHE is used for increasing the medium and low quality images into high quality images. Then these images are pre-processed utilizing the wiener filtering (WF) with CNN-AASO for removing the noise. Further, the denoised image is enhanced by GMCE for contrast enhancement.

The cataract detection and classification is performed using two phases. In phase I, the cataract is detected using Deep OCRN_IAO model. The phase I uses retinal and slit lamp images for cataract detection. In phase II uses slit lamp images and detects the type and grade of cataracts through proposed BE_ResNet101 model. This work also proposes the risk factors for cataracts and classify the cataracts risk using deep learning models. The dataset is pre-processed by missing values and the string values are converted into numeric values. Then, Fuzzy rule-based clinical system is described for the risk prediction.. Then in second phase has classification based stage advancement. The Fuzzified output is given to classifier for classifying the stage advancement.

Keywords: Cataract detection, Grade classification, CRNN, Dense CNN, Aquila optimization, BE-ResNet101, ICNN, RNN

Publications:

1. **Binju Saju** and R. Rajesh.. (2023). An Image Quality Selection and Effective Denoising on Retinal Images Using Hybrid Approaches . International Journal on Recent and Innovation Trends in Computing and Communication, 11(5), 170–180. https://doi.org/10.17762/ijritcc.v11i5.6603
2. **Binju Saju** and R. Rajesh. (2022). Eye-Vision Net: Cataract Detection and Classification in Retinal and Slit Lamp Images using Deep Network. International Journal of Advanced Computer Science and Applications.
3. **Binju Saju** and R. Rajesh. "Denoising and Contrast Enhancement of Normal Eye Images and Slit Lamp Images of Cataract Using Optimized Deep Learning Model." International Journal of Health Sciences, no. V, 10 Jun. 2022, pp. 833-852, doi:10.53730/ijhs.v6nS5.8764.
4. **Binju Saju** and R. Rajesh.. (2022). A Comprehensive Study on Computer-Aided Cataract Detection, Classification, and Management Using Artificial Intelligence. In: Saraswat, M., Sharma, H., Balachandran, K., Kim, J.H., Bansal, J.C. (eds) Congress on Intelligent Systems. Lecture Notes on Data Engineering and Communications Technologies, vol 114. Springer, Singapore. https://doi.org/10.1007/978-981-16-9416-5_25