



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI  
SHORT ABSTRACT OF THESIS

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Programme of Study : Ph.D.

Thesis Title : Automated Diagnosis of Retinal Diseases using Optical Coherence Tomography Images and Volumes using Deep Learning

Name of Thesis Supervisor(s) : Prof. Samarendra Dandapat and Prof. Prabin K Bora

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**SHORT ABSTRACT**

This dissertation focuses on developing efficient and reliable classification methods for the automated diagnosis of retinal diseases using optical coherence tomography (OCT) images and volumes. The proposed methods take into consideration the pathological evidence of the retinal diseases and handle the imaging bottlenecks (speckle noise and poor resolution) of OCT to develop robust deep learning (DL) based classifiers. Specifically, the thesis discusses the usefulness of the multi-scale feature learning strategy to efficiently encode the diverse pathological characteristics of the retinal lesions for accurate classification. An unsupervised simultaneous denoising and super-resolution method is designed to improve the visualization of the minute clinical manifestations that occur at early stages of the retinal diseases for their efficient detection. In the end, an OCT volume classification method is proposed that automatically identifies the salient pathological images of the volume and provides them more importance during the diagnosis process. The developed methods have been evaluated on large-scale publicly available databases. The proposed approaches outperform the existing methods in terms of diagnostic accuracy and computational complexity making them suitable for reliable and fast diagnosis in eye clinics and hospitals.