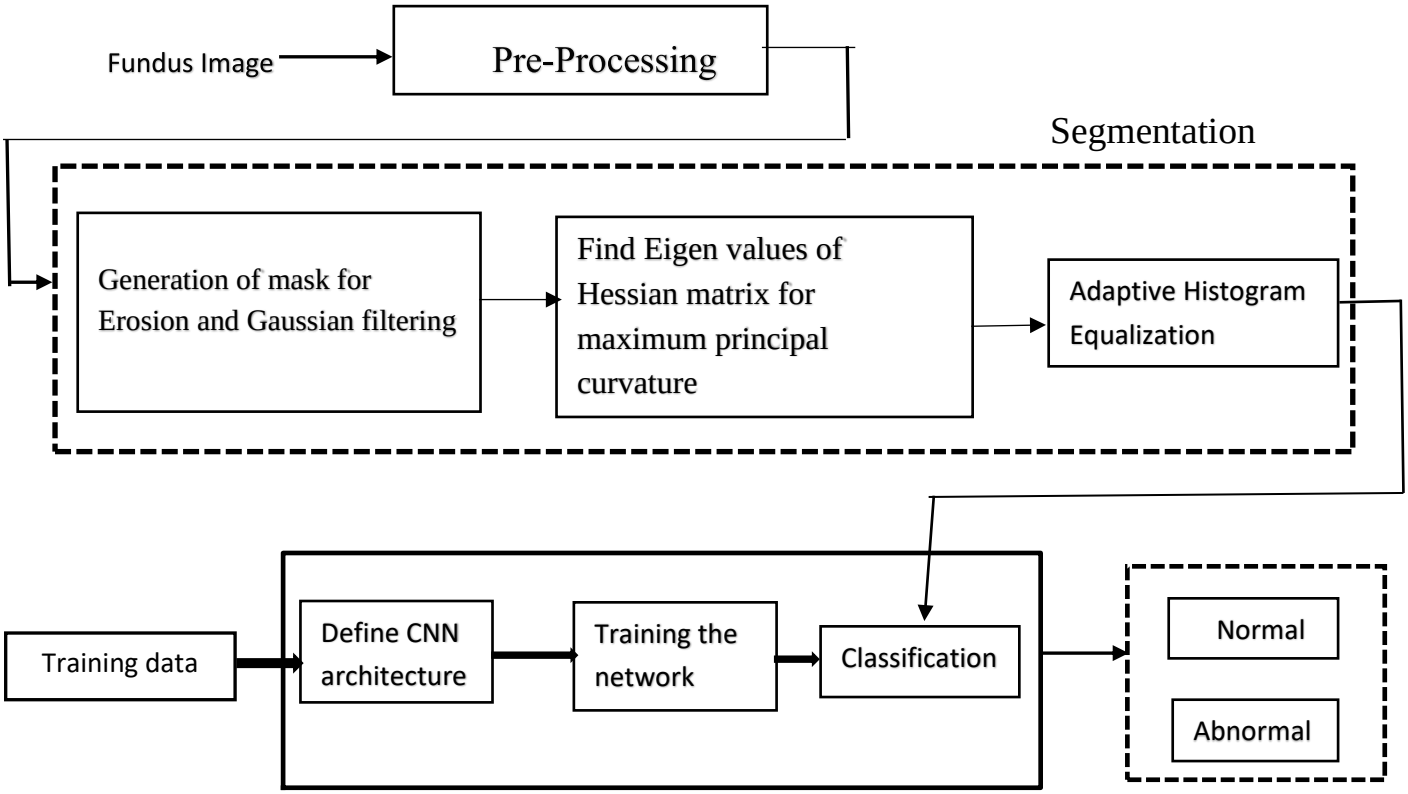
TECHNOLOGY ARCHITECTURE ON DEEP LEARNING FUNDUS IMAGE ANALYSIS FOR EARLY DETECTION OF DIABETIC RETINOPATHY:



FUNDUS IMAGE ON RETINOPATHY

Fundus photography can be used to document retinal disease over time, and may be increasingly helpful in screening of diabetic patients for retinopathy. B-scan ultrasonography can be helpful in patients with media opacity, such as vitreous cataract.

FA is helpful to visualize retinal ischemia, as well as leakage from retinal neovascularization and also in macular. OCT has become a critical tool in the diagnosis and management of diabetic macular.

As these technologies have continued to evolve, their importance in the diagnosis and management of diabetic retinopathy has become increasingly evident.

PRE-PROCESSING OF FUNDUS IMAGE

To detect the presence of diabetic retinopathy, the steps followed are pre-processing, segmentation and feature ranking. Pre-processing is required to ensure that the dataset is consistent and displays only relevant features.

This step is necessary to simplify the workload of the following processes. Next, the images are segmented to differentiate between the normal and abnormal substances.

Green Channel of the three colour channels in the image (Red, Green, and Blue) the contrast between the blood vessels, exudates and is best seen in the green channel and this channels neither under- illuminated nor over-saturated like the other two.

SEGMENTATION ON RETINOPATHY

The segmentation of retinal vasculature from eye fundus images is a fundamental task in retinal image analysis.

Over recent years, increasingly complex approaches based on sophisticated Convolutional Neural Network architectures have been pushing performance on well-established benchmark datasets.

We first compile and review the performance of 20 different techniques on some popular databases, and we demonstrate that a minimalistic version of a standard U-Net with several orders of magnitude less parameters, carefully trained and rigorously evaluated, closely approximates the performance of current best techniques.

We then show that a cascaded extension (W-Net) reaches outstanding performance on several popular datasets, still using orders of magnitude less learnable weights than any previously published work.

Furthermore, we provide the most comprehensive cross-dataset performance analysis to date, involving up to 10 different databases.

Our analysis demonstrates that the retinal vessel segmentation is far from solved when considering test images that differ substantially from the training data, and that this task represents an ideal scenario for the exploration of domain adaptation techniques.