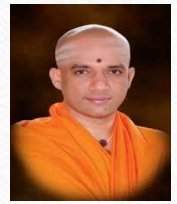
| | Jai Sri Gurudev | |

Sri Adichunchanagiri Shikshana Trust ®

SJB INSTITUTE OF TECHNOLOGY

BGS Health & Education City, Kengeri, Bengaluru-560060

Department of Computer Science and Engineering



Project Phase-II Review-1 on

"INTEGRATED IMAGE FRAMEWORK FOR DIAGNOISING DIABETIC RETINOPATHY"

BY

Simran Dua **Sneha C M**

Sonali Singh **Srushti G**

Under the Guidance of

Prakruthi M K

Assistant Professor, Dept. of CSE, SJBIT

Project Coordinator

Mrs. Chaitra M

Assistant Professor, Dept. of CSE, SJBIT

OUTLINE

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Introduction

- **Diabetic retinopathy:** complication of diabetes and a prime cause of vision loss in patients.
- **Causes:** damage to the blood vessels of the light-sensitive tissue at the back of the eye.
- **Effects:** a prime cause of vision loss in middle-aged people.
- **Prevention:** Detection of diabetes at a early stage and taking a proper treatment can reduce vision loss.
- Once DR symptoms are recognized, the severity of the disease must be assessed in order to prescribe the correct medication.

METHODOLOGY

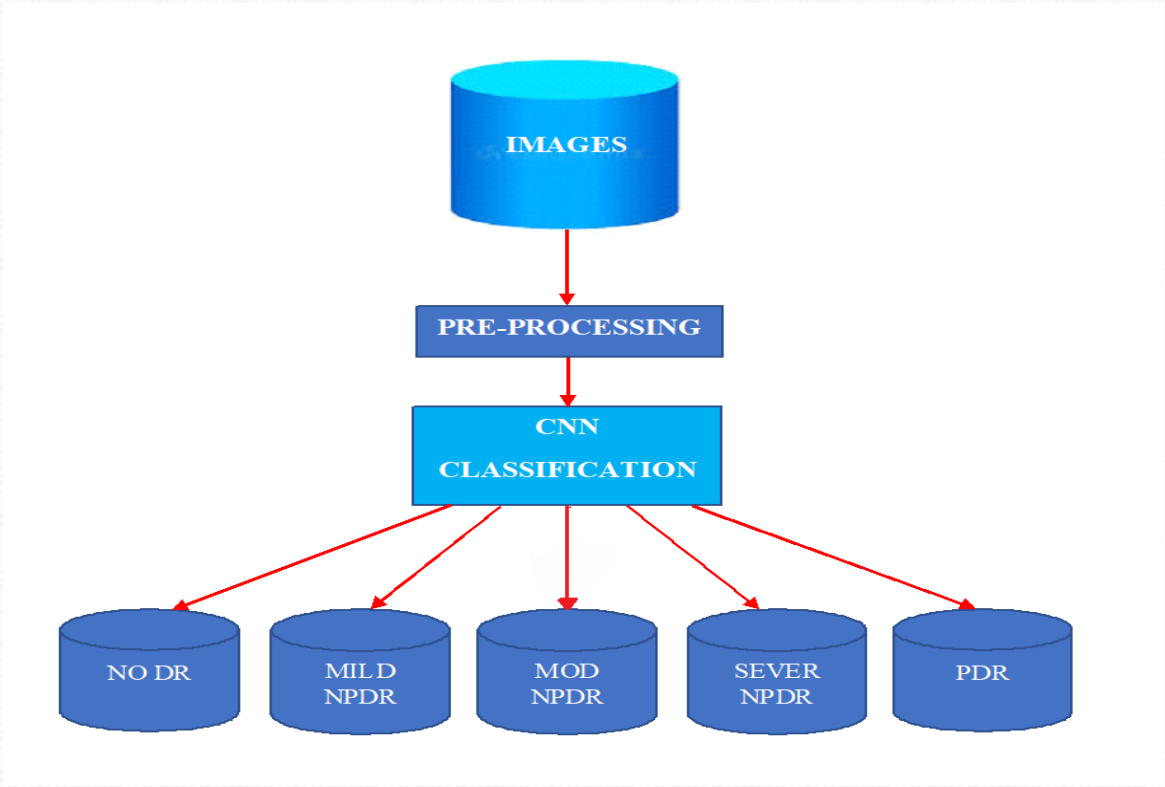


Fig:1 Steps involved in Diabetic Retinopathy Detection

Overview of phase-I

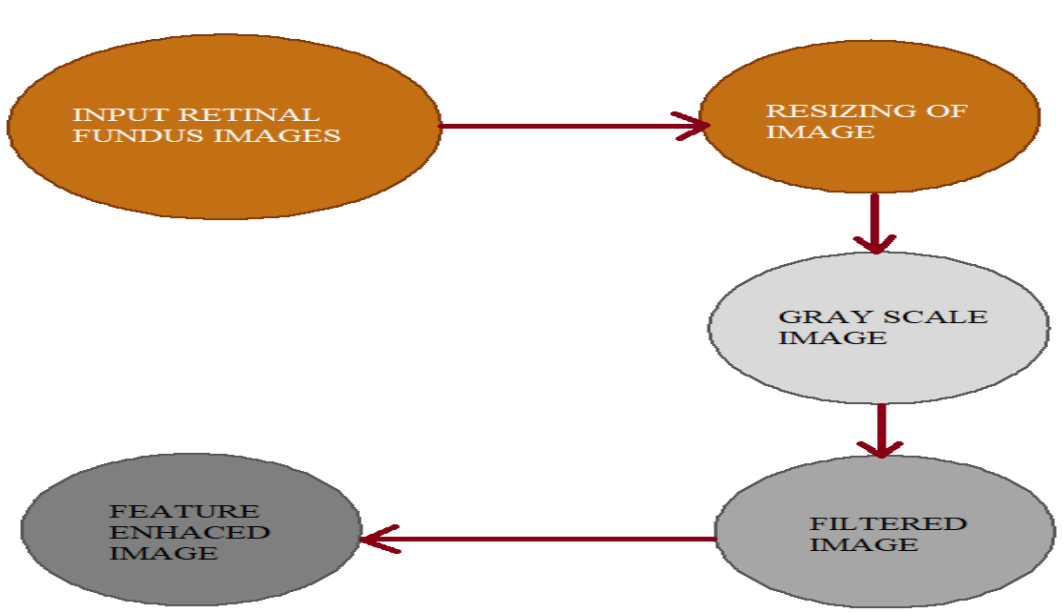
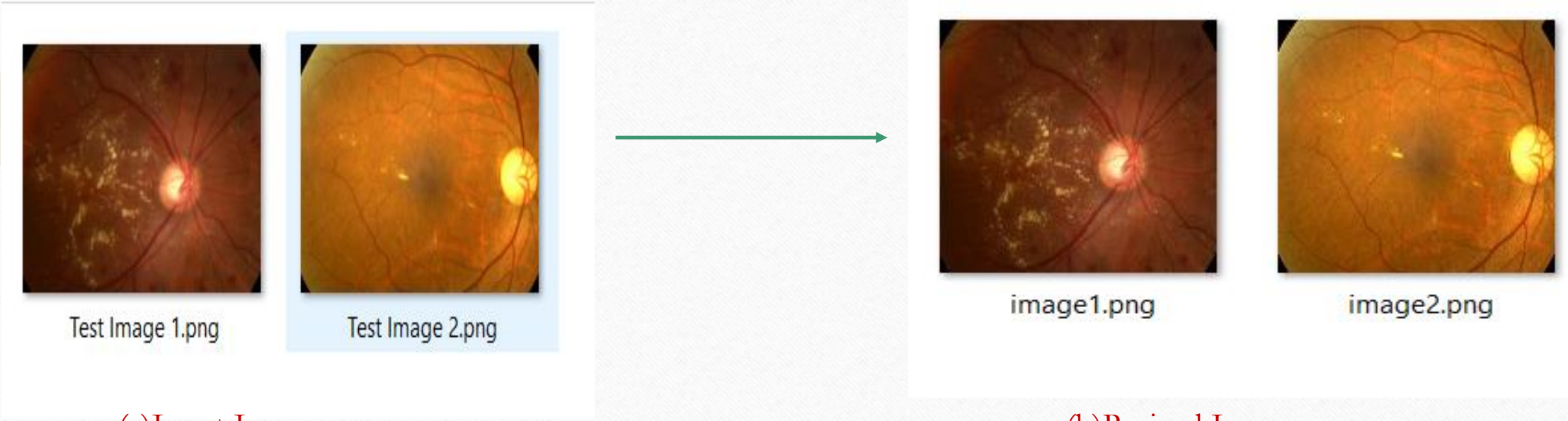


Fig:2 Steps involved in Image pre-processing

Overview of phase-I

- **Kaggle Dataset**: “Aptos 2019 blindness detection dataset”.
- **Resizing of Image**: Resized in 150x150 pixels.
- **Gray Scale Image:** Converted to a grey-scale image to reduce the contrast.
- **Filtering of Image:** Removes noise from images by Gaussian Blur.
- **Contrast Enhancement:** Produce the enhanced image which removes the noisy feature such as edges and contrast boundaries using Clahe.

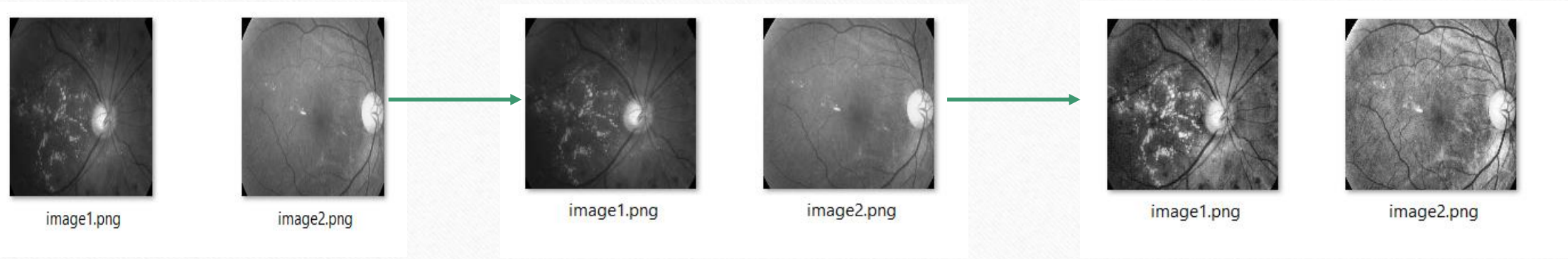
Overview of phase-I



(a)Input Images (b)Resized Images

Fig:3 IMAGE PREPROCESSING

Overview of phase-I



(c) Gray Scale Image (d) Filtered Image (e) Enhanced Image

Fig:4 IMAGE PREPROCESSING

LITERATURE SURVEY

AUTHOR	TITTLE AND YEAR OF PUBLICATION	DESCRIPTION	ADVANTAGES
Prakruthi M K Komarasamy G	Novel Framework for Enhanced Learning-based Classification of Lesion in Diabetic Retinopathy(2022)	The proposed scheme introduces a computational framework where a simplified feature enhancement operation is carried out, resulting in artifact-free images with better features	Advantage: It can smartly identify the essential features from the input data subjected to either segmentation or classification tasks. Disadvantage: There is a need to carry out training that demands extensive data.

AUTHOR	TITTLE AND YEAR OF PUBLICATION	DESCRIPTION	ADVANTAGES & DISADVANTAGES
Saad ALBAWI , Tareq Abed Mohammed	Understanding of a CNN (2017)	All the elements important issues related to CNN and these elements works are described and explained	**Advantages:** Parameters that effect the CNN re also discussed. **Disadvantages:** The Time required to train and test the network increases as the number of levels increases
Rahul Chauhan , Kamal Kumar Ghansala , R C Joshi	CNN for Image detection and recognition(2018)	The paper discusses various aspects of deep learning ,CNN in particular and performs image recognition and detection using CPU unit only.	Advantages: The accuracy can be increased by adding more hidden layers. Disadvantages: The accuracy for few datasets can be low.

AUTHOR	TITTLE AND YEAR OF PUBLICATION	DESCRIPTION	ADVANTAGES
Xueli Zhao, Yuan Feng, Mingxu Han, Feng Hong, Chao Liu	The Study Of Improvement Prediction Accuracy of the CNN Based On The Surface Correlation Degree Method.(2020)	It proposes a multi-data point sample selection method. It selects one sample that a set of surrounding data points with high degree of correlation with the central point in one region.	Advantage: It gives a neural network training sample selection model which can increase the speed and training accuracy of initial data selection of neural network.
Wahyudi Agustino, Mohammad Imam Utoyo, Riries Rulaningtyas	A Modification Of CNN Layer To Increase Images Classification Accuracy (2020)	Aims to overcome the problem of additional training time by proposing a modification of CNN layer to increase the accuracy.	Advantages: When compared with existing architecture produces 50% better resulst

Work Progress

- Convolution Neural network(CNN) is used to classify the stages of diabetic retinopathy. The CNN has excellent performance in machine learning problems.
- The enhanced images are given to CNN, to extract the features.
- Using VGG-19 we have taken trained 5000 images, 1000 test images and 1000 validation images.
- The classifier used is **SoftMax**, Optimizer used is **Adam**.

Work Progress

- The total **Epoch** used to train the model is 16 Epoch.
- The loss of the model on the test dataset is 0.13%.
- The accuracy of the model on test dataset is 95.21% and we are trying to attain maximum possible efficiency.

Work Progress

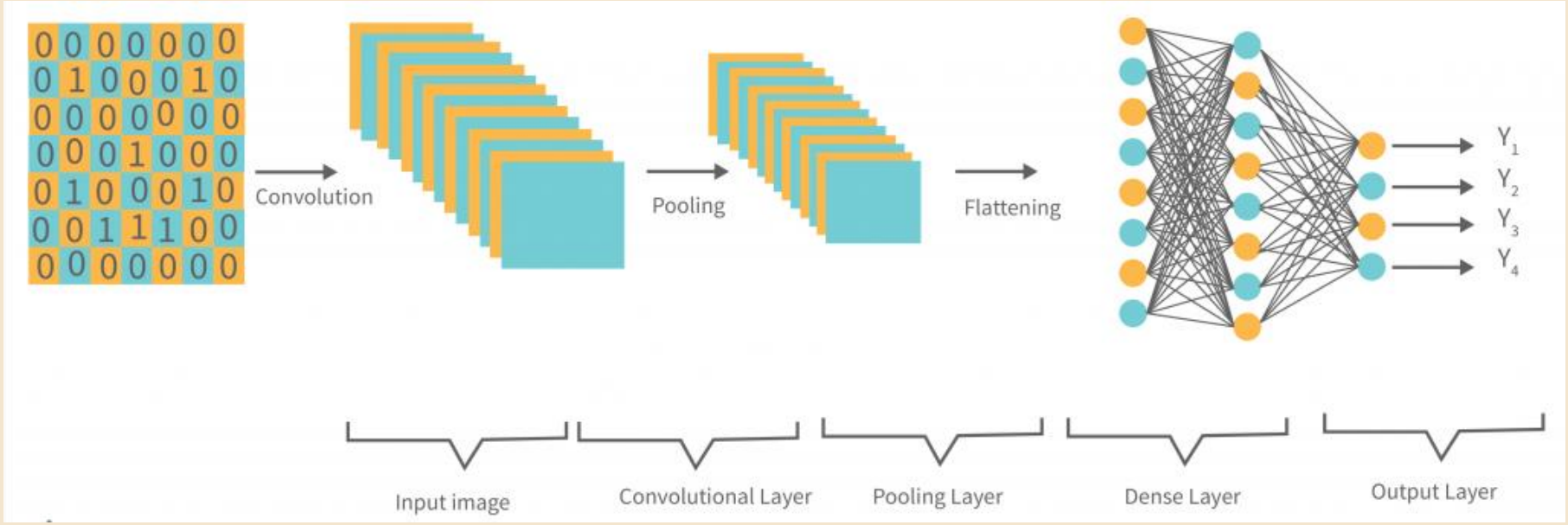


Fig 5: CNN Architecture

Accuracy and Loss graph

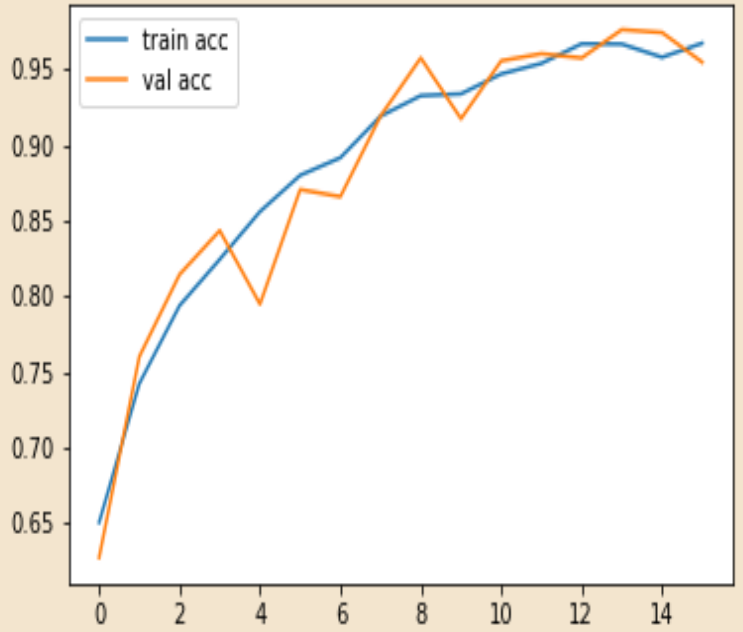


Fig:6 Accuracy Graph

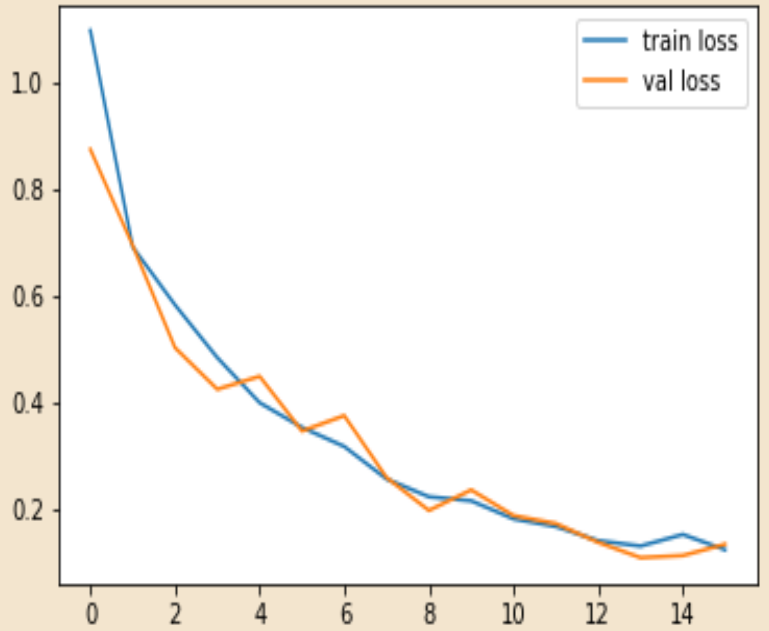


Fig:7 Loss Graph

Result Analysis

	precision	recall	f1-score	support
0	0.88	1.00	0.94	135
1	1.00	0.88	0.94	364
2	0.99	1.00	0.99	392
3	0.89	0.93	0.91	89
4	0.85	1.00	0.92	88
accuracy			0.96	1068
macro avg	0.92	0.96	0.94	1068
weighted avg	0.96	0.96	0.96	1068

Fig 8: Result

Formula

$$Precision = \frac{TP}{TP + FP}$$

$$Recall = \frac{TP}{TP + FN}$$

$$F1 = 2 \cdot \frac{precision \cdot recall}{precision + recall}$$

TP = True positive

TN = True negative

FP = False positive

FN = False negative

$$Accuracy = \frac{(TP + TN)}{(TP + FP + TN + FN)}$$

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