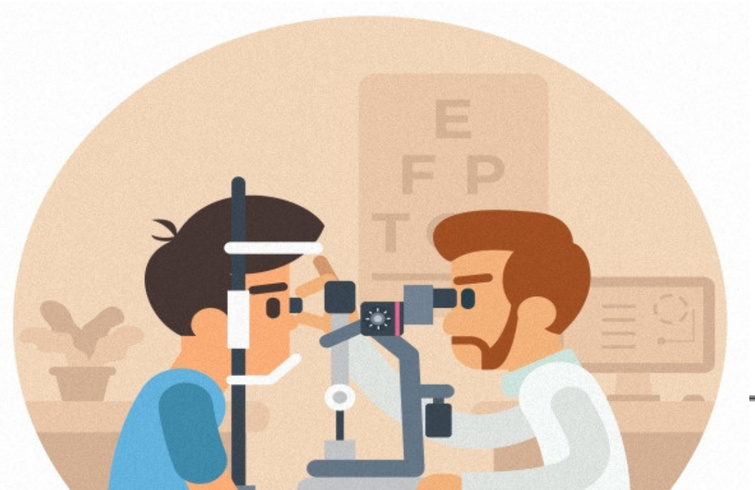
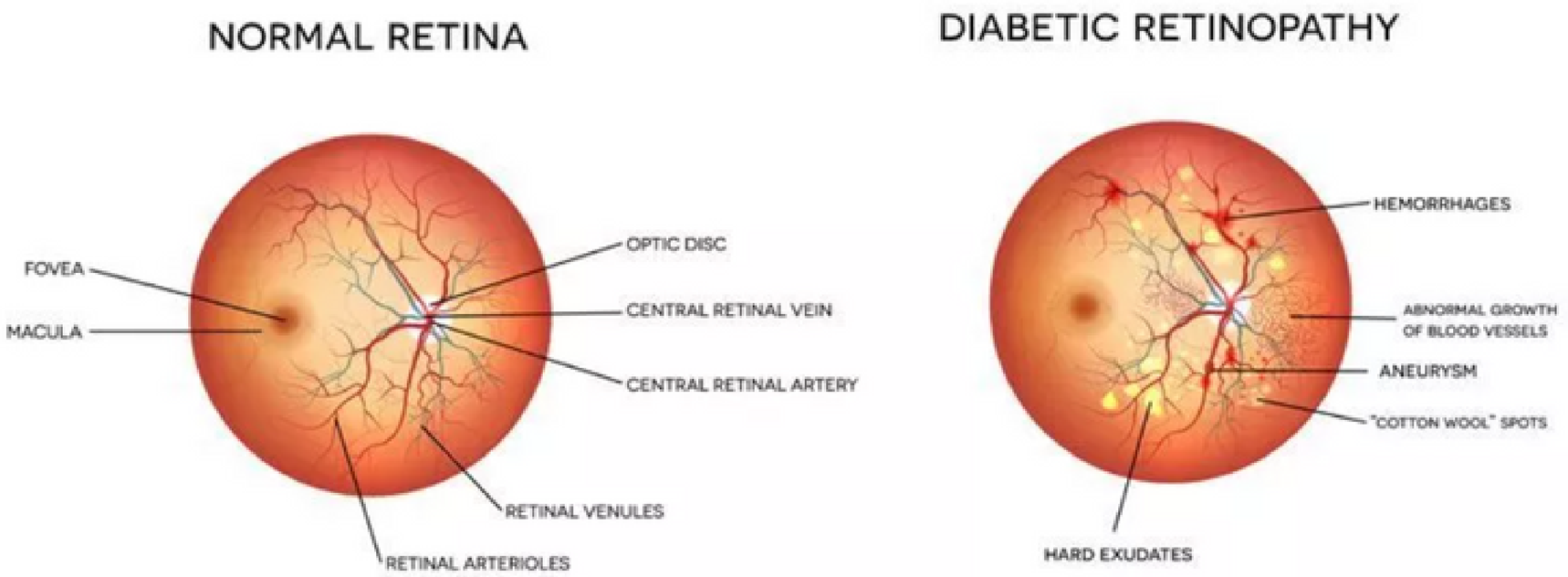
DIABETIC RETINOPATHY DETECTION

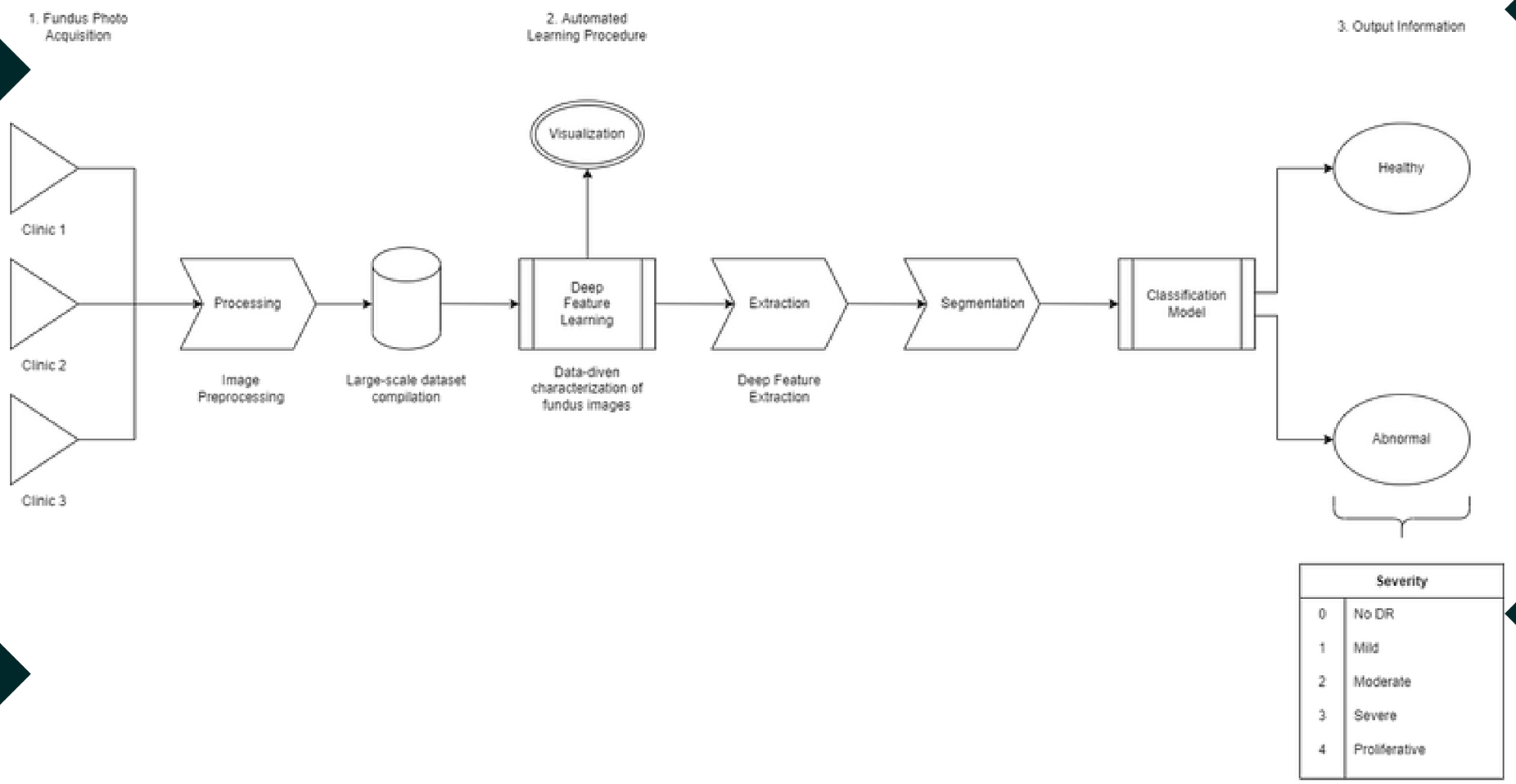


Aayushi Gandhi

What is Retinopathy?



System Overview



Key Responsibilites

Data Acquistion

Gathering data from hospitals, collected images using special fundus camera and building a dataset.

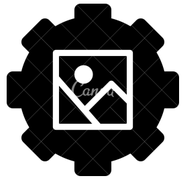


Image Processing and Classification

Applied several image processing algorithms to convert raw images to a usable format, built and applied classification model for prediction of the disease.

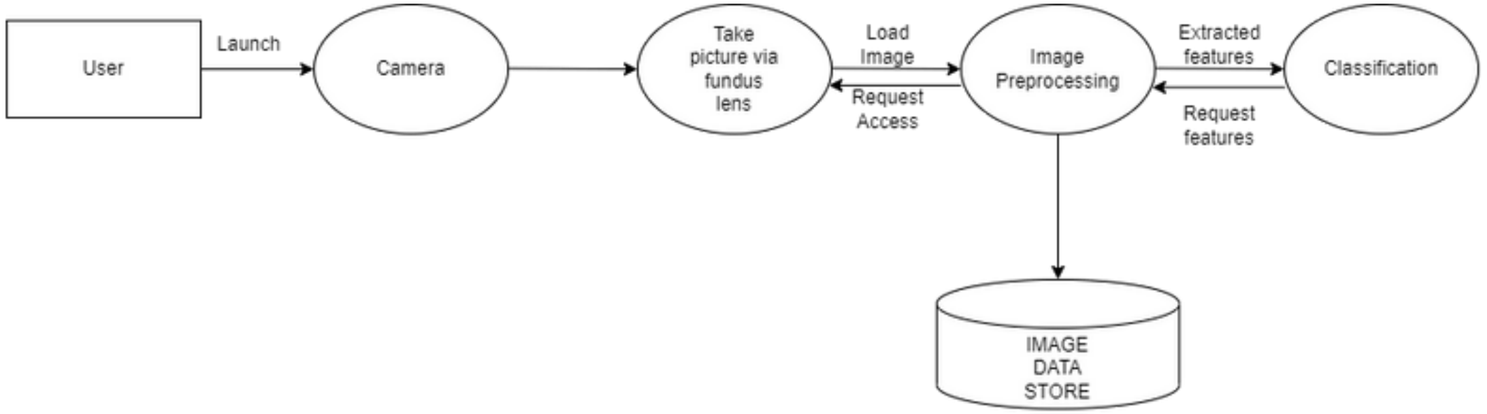
User Testing

Implementation of the system at a few hospitals, clinics and medical centers, and gather their responses in the form of survey regarding the performance and ease of use of the system.

Data Acquisition

- Mount the Fundus camera
- Use the auxiliary plus lens and the camera in the initial external eye view position.
- Focus by eye on the monitor/screen and take the picture.
- Images are then processed by our system, after which the results identify the patient as DR or Non-DR. If DR is present, severity level is predicted.

Flow of the System



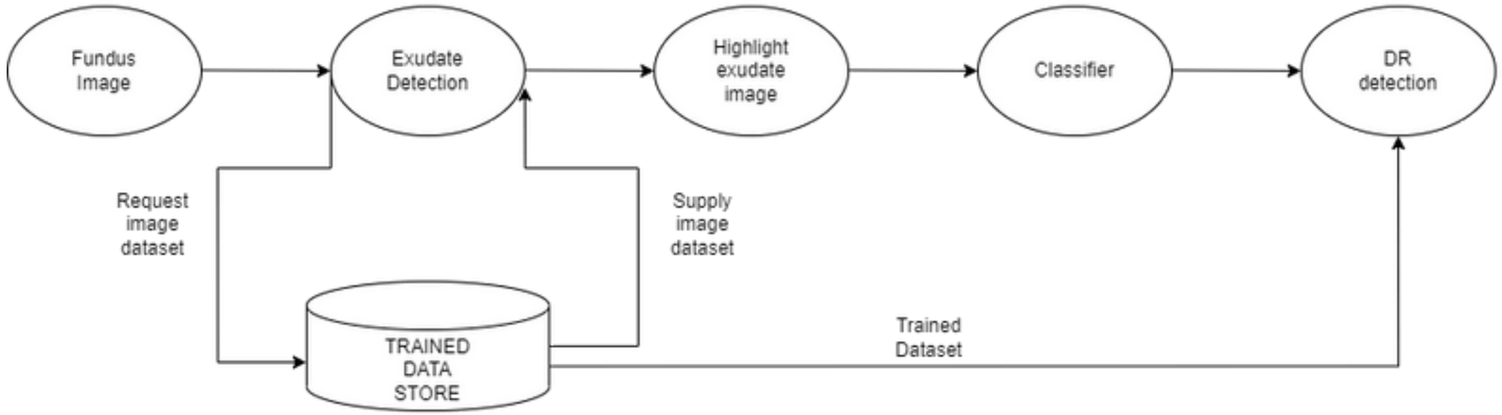
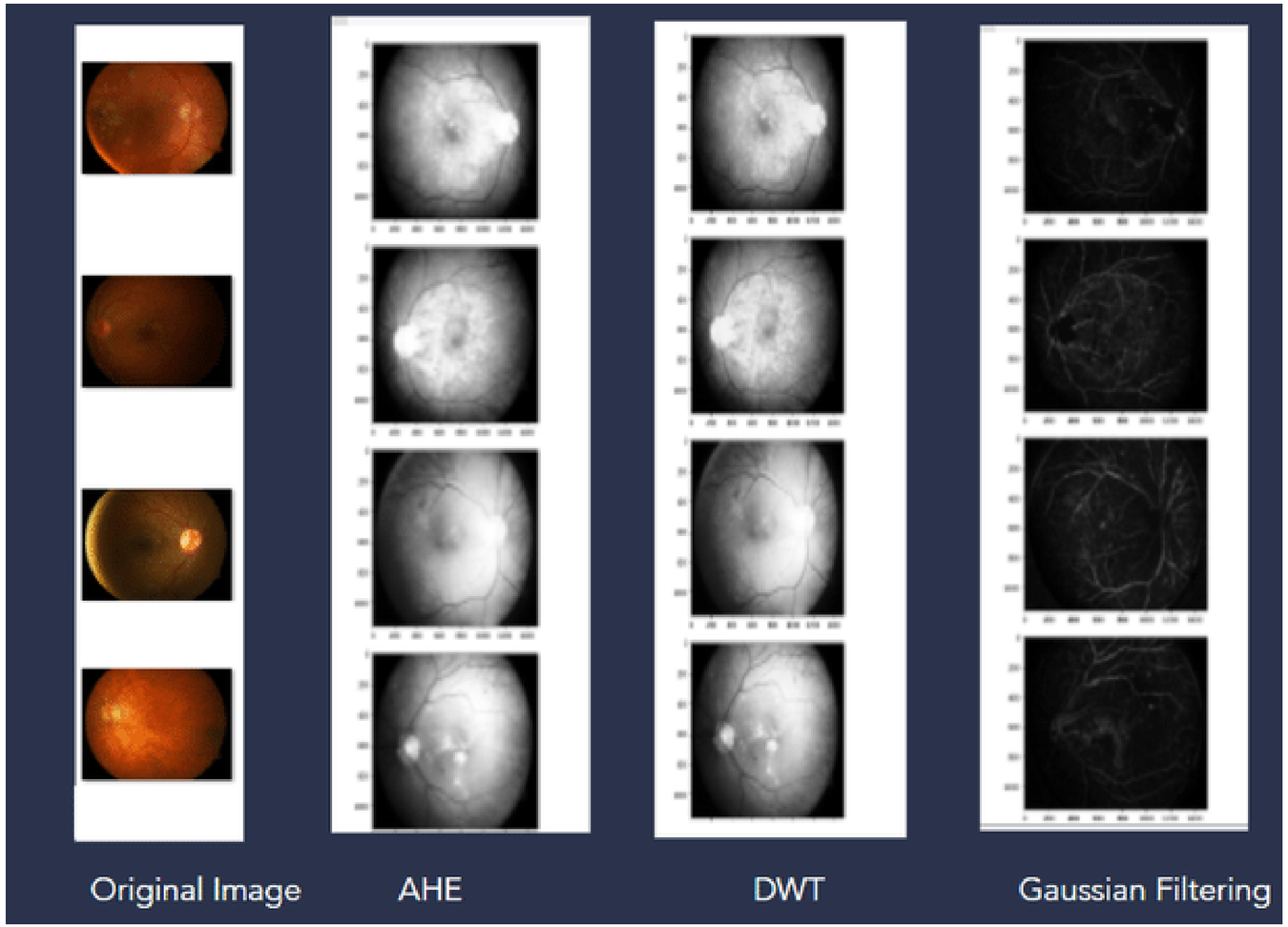


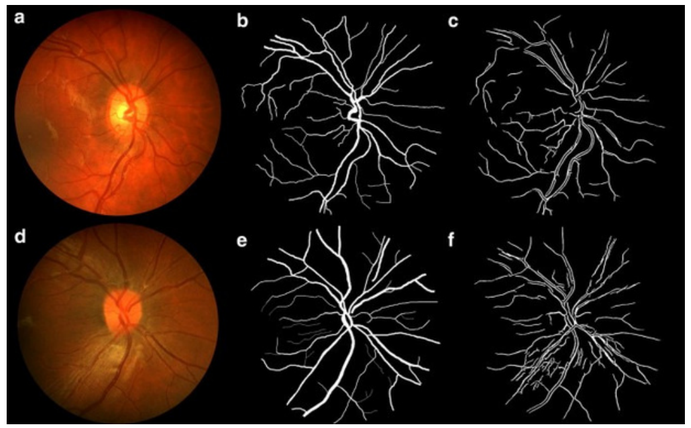
Image Processing Techniques



Algorithms for Classification

01 Segmentation

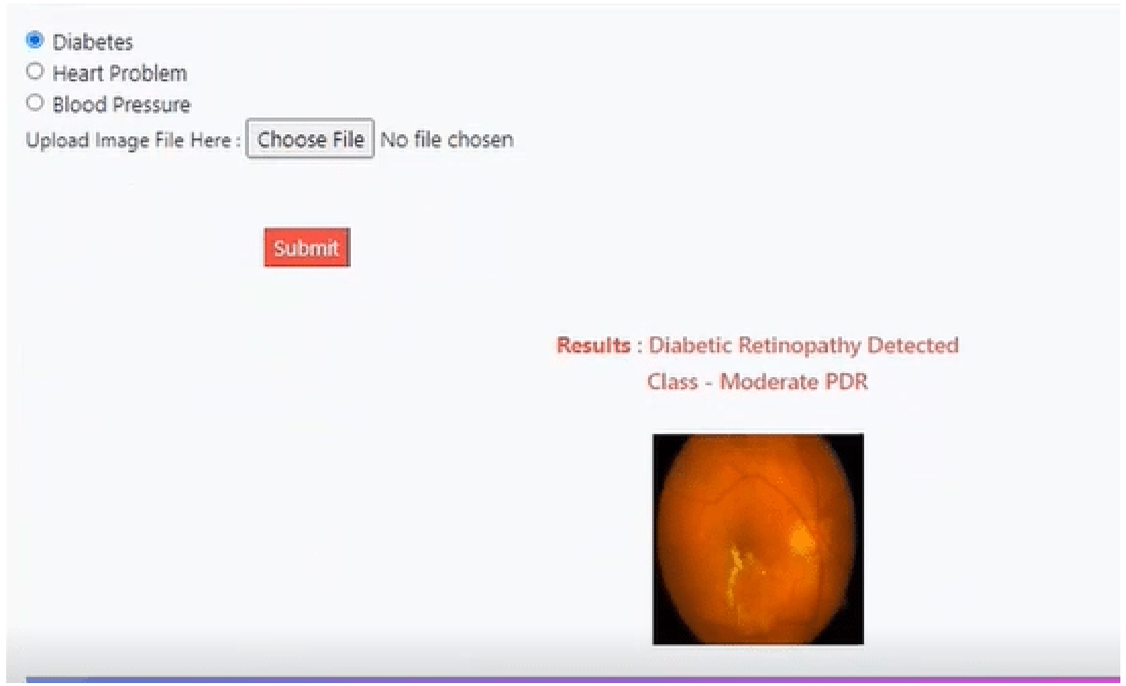
- Partitions images into various segments
- We used a Similarity Detection Approach
- K-Means Algorithm was applied for similarity detection



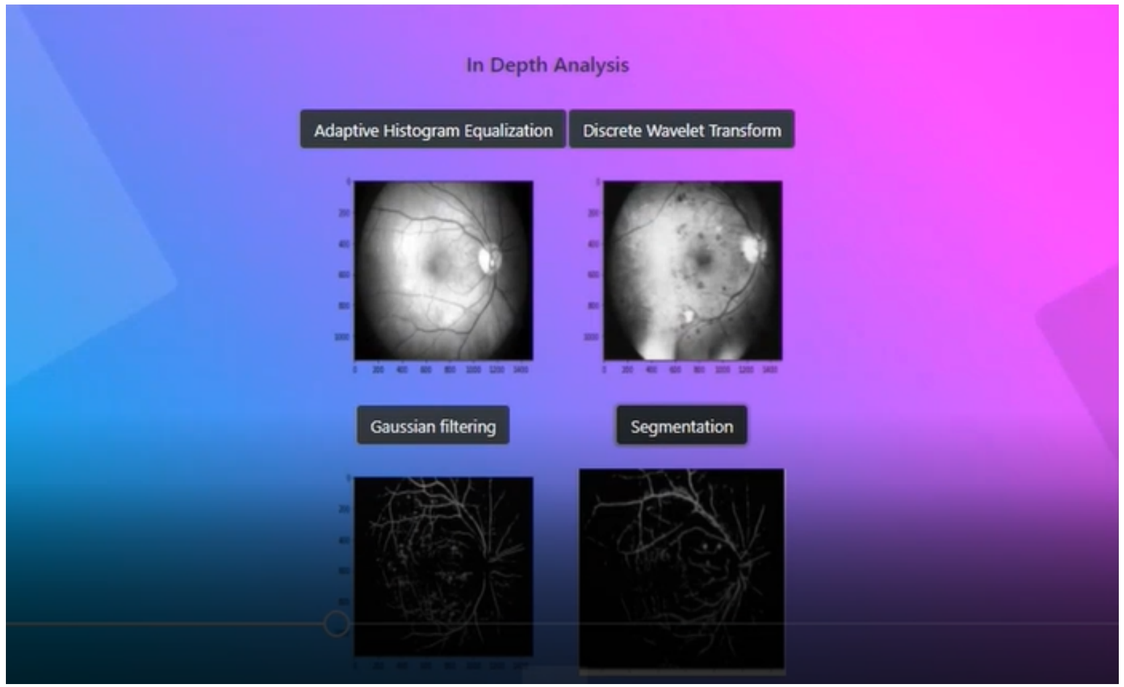
02 SVM

- SVM was used over CNN due to higher accuracy in a smaller dataset
- Model helped detect retinopathy and classify into levels of severity of the disease

User Interface



Final Result Page



Analysis of Result

Results

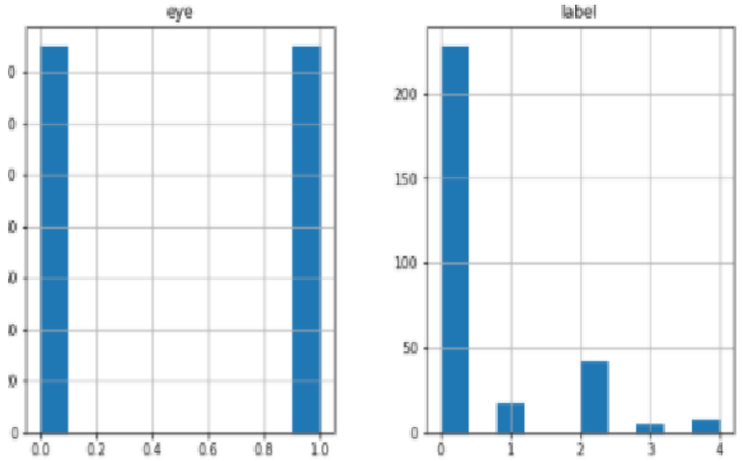


Image Classification Labels

Value Range	Level
0 - 0.2	No DR
0.2 - 0.4	Mild Nonproliferative
0.4 - 0.6	Moderate Nonproliferative
0.6 - 0.8	Severe Nonproliferative
0.8 - 1.0	Proliferative

Severity level

Training and Validation Loss

Impact

Accuracy

The System had an accuracy of ~94.38% in determining whether Retinopathy was present in a patient or not, and had an accuracy of ~83.3% in classifiying Retinopathy into its four types.

Ease of use and implementation

The system was easy to use and could be used by any technology novice, and was implemented in many clinics where the staff uploaded test images to our system and gathered results to help determine the patient's condition.

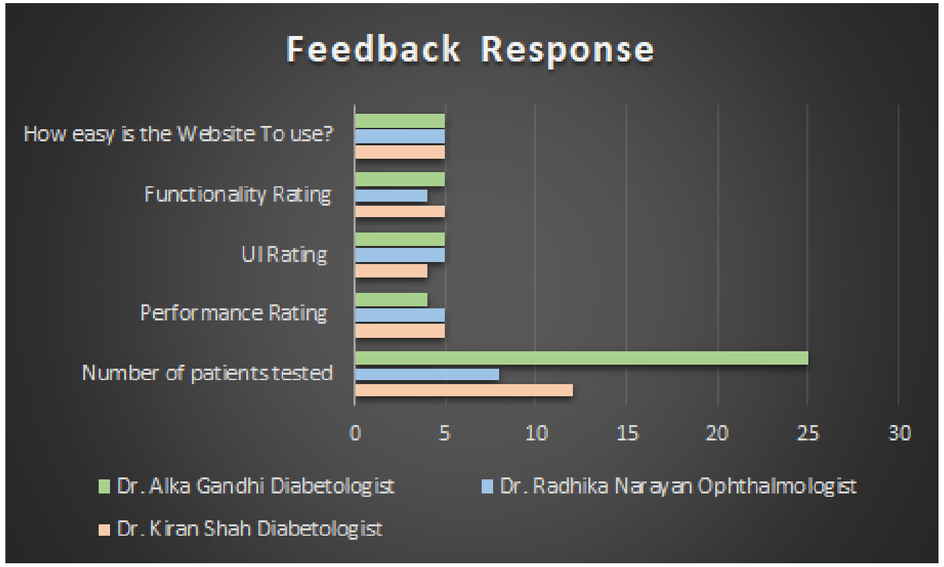
Cost-effective Solution

The purpose of this system, which was to provide easy to use and cost-effective solution for detecting Retinopathy in rural and other hard-to-reach areas, was fulfilled.

Feedback, Recommendation and Future Scope

Feedback

The system was used at multiple locations, and we collected their feedback for different features using Google forms.



Recommendation

Build a more user-friendly and appealing interface. Additional features such as patient history can also be added.

Future Scope

The system can be paired with patients having conditions other than diabetes, such as high blood pressure, and help determine if there is a possibility of diabetes, and in turn, retinopathy.

Thank You