Project School Certificate

Title : Diabetic Retinopathy Detection (Web-Application)
Faculty Incharge : Dr .Devika Rubi
Session Duration : 5/09/2022- 15/12/2022

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Signature of Faculty Signature of student

Diabetic Retinopathy Detection

5/09/2022-15/12/2022

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Overview:

Diabetic retinopathy is a diabetes complication that affects eyes. It's caused by damage to the blood vessels of the light-sensitive tissue at the back of the eye (retina).

Diabetic retinopathy affects up to 80 percent of those who have had both type 1 and type 2 diabetes for 20 years or more. In at least 90% of new cases, progression to more aggressive forms of sight threatening retinopathy could be reduced with proper treatment and monitoring of the eyes The longer a person has diabetes, the higher his or her chances of developing diabetic retinopathy. Each year in the United States, diabetic retinopathy accounts for 12% of all new cases of blindness. It is also the leading cause of blindness in people aged 20 to 64.

So, We create a Web Application designed to classify the stages of diabetic retinopathy (DR) and predict the probability of its occurrence in the patient's retina.

Dataset Source:

The dataset used for the project is “Diabetic Retinopathy Detection” from Kaggle. Link to the dataset:

https://www.kaggle.com/competitions/diabetic-retinopathy-detection/data

The dataset consists of 35,122 Training images. A clinician has rated the presence of diabetic retinopathy in each image on a scale of 0 to 4, according to the following scale:

0-No DR

1-Mild DR

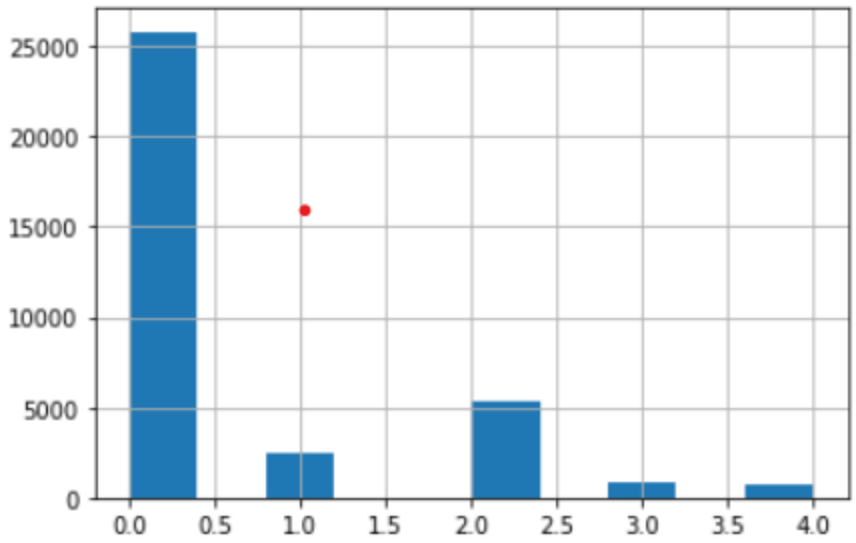
2-Moderate DR

3-Severe DR

4-Proliferate DR

The distribution of 5 classes is as follows.

```
0    25810
2     5292
1     2443
3      873
4      708
Name: level, dtype: int64
```



Data Preprocessing:

Since, the data was very undistributed across various classes, the dataset size has been limited to 10,000 Training images. Class -3, Class-4 have been Augmented by 3 times, 4 times using ImageDataGenerator(rotation_range=5, shear_range=0.1, zoom_range=0.1, horizontal_flip=True) function from keras.preprocessing.image library,making class 3 a total of 2619 and class 4 a total of 2832 images. Finally, the dataset consists of 2000 images from each class. The images are then resized to 128*128 .

Model Used - MobileNet Deep Learning:

MobileNet uses **depth wise separable convolutions.** It significantly **reduces the number of parameters** when compared to the network with regular convolutions with the same depth in the nets. This results in lightweight deep neural networks.A depthwise separable convolution is made from two operations.

1. Depth Wise Convolution
2. Point Wise Convolution

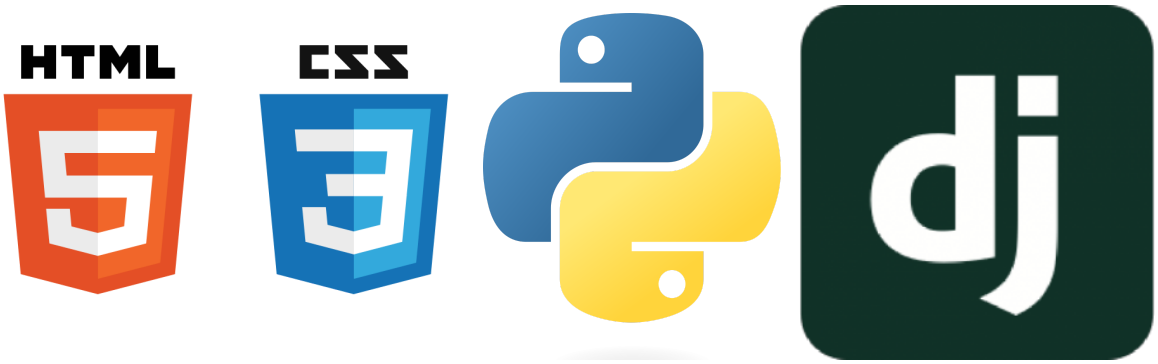
MobileNet is a class of CNN that was open-sourced by Google, and therefore, this gives us an excellent starting point for training our classifiers that are insanely small and insanely fast.

Table 1. MobileNet Body Architecture

Type / Stride	Filter Shape	Input Size
Conv / s2	$3 \times 3 \times 3 \times 32$	$224 \times 224 \times 3$
Conv dw / s1	$3 \times 3 \times 32$ dw	$112 \times 112 \times 32$
Conv / s1	$1 \times 1 \times 32 \times 64$	$112 \times 112 \times 32$
Conv dw / s2	$3 \times 3 \times 64$ dw	$112 \times 112 \times 64$
Conv / s1	$1 \times 1 \times 64 \times 128$	$56 \times 56 \times 64$
Conv dw / s1	$3 \times 3 \times 128$ dw	$56 \times 56 \times 128$
Conv / s1	$1 \times 1 \times 128 \times 128$	$56 \times 56 \times 128$
Conv dw / s2	$3 \times 3 \times 128$ dw	$56 \times 56 \times 128$
Conv / s1	$1 \times 1 \times 128 \times 256$	$28 \times 28 \times 128$
Conv dw / s1	$3 \times 3 \times 256$ dw	$28 \times 28 \times 256$
Conv / s1	$1 \times 1 \times 256 \times 256$	$28 \times 28 \times 256$
Conv dw / s2	$3 \times 3 \times 256$ dw	$28 \times 28 \times 256$
Conv / s1	$1 \times 1 \times 256 \times 512$	$14 \times 14 \times 256$
$5\times$ Conv dw / s1	$3 \times 3 \times 512$ dw	$14 \times 14 \times 512$
$5\times$ Conv / s1	$1 \times 1 \times 512 \times 512$	$14 \times 14 \times 512$
Conv dw / s2	$3 \times 3 \times 512$ dw	$14 \times 14 \times 512$
Conv / s1	$1 \times 1 \times 512 \times 1024$	$7 \times 7 \times 512$
Conv dw / s2	$3 \times 3 \times 1024$ dw	$7 \times 7 \times 1024$
Conv / s1	$1 \times 1 \times 1024 \times 1024$	$7 \times 7 \times 1024$
Avg Pool / s1	Pool 7×7	$7 \times 7 \times 1024$
FC / s1	1024×1000	$1 \times 1 \times 1024$
Softmax / s1	Classifier	$1 \times 1 \times 1000$

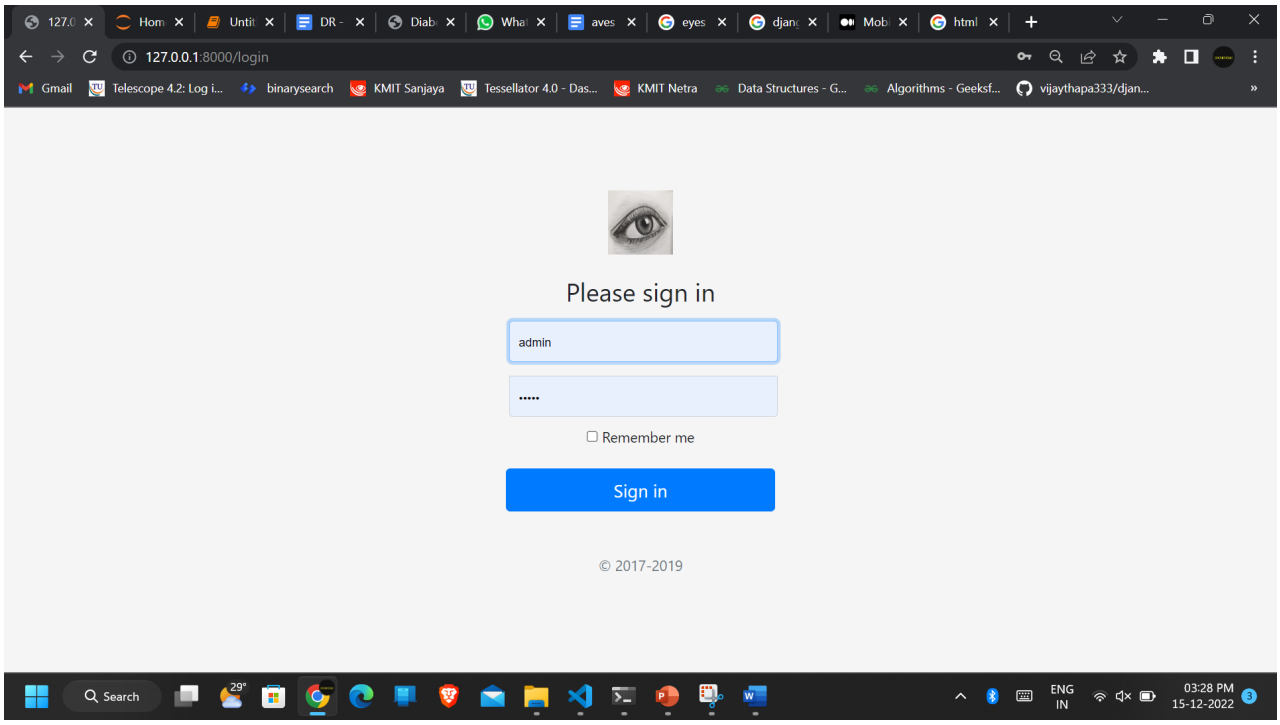
Tech Stack:

- Diabetic Retinopathy is detected using MobileNet CNN Algorithm.
- Front-End accepts the Patient Information , Eye images and displays the results, Front end is built using HTML & CSS
- Django is used as a database and Python serves as a backend framework.

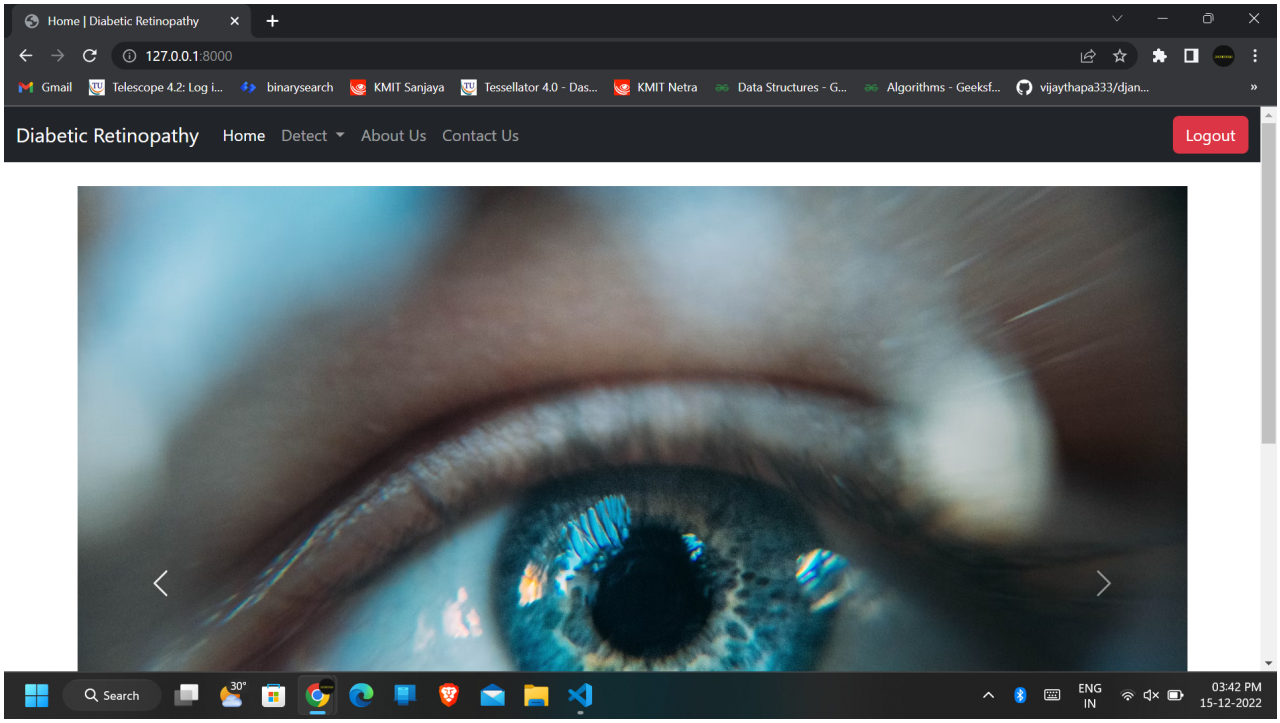


Project Screenshots:

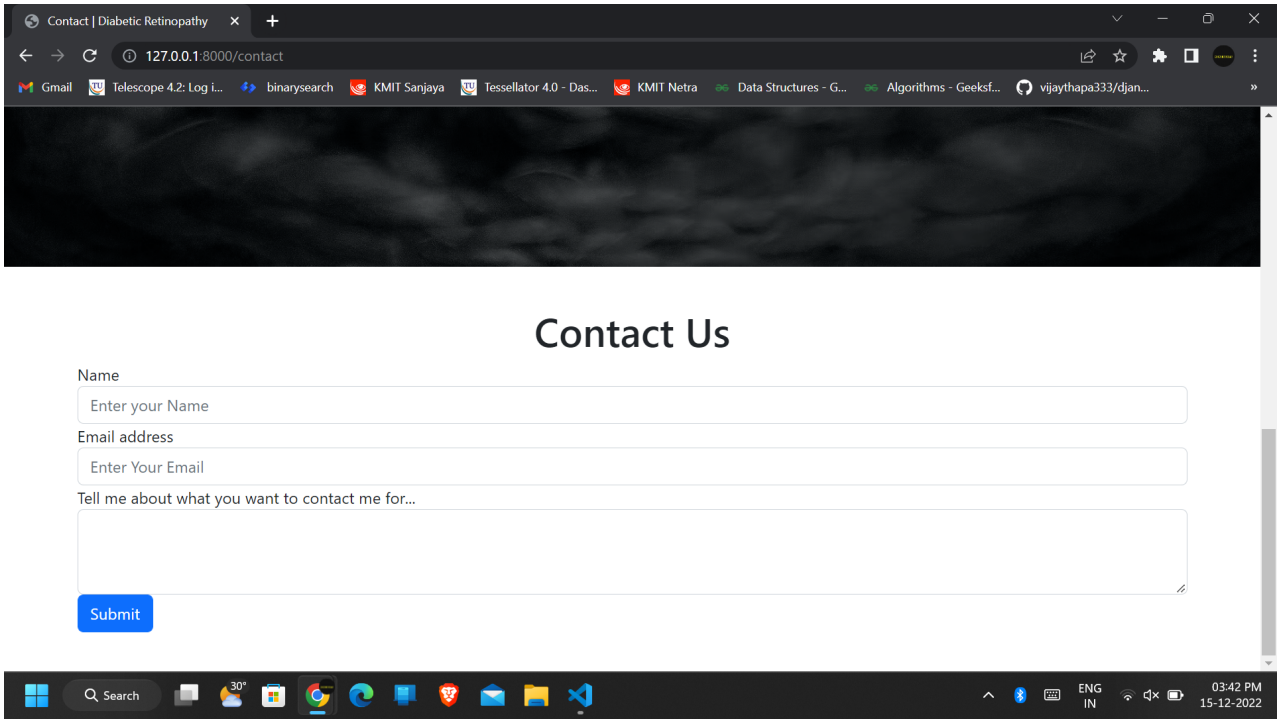
1. Login Page



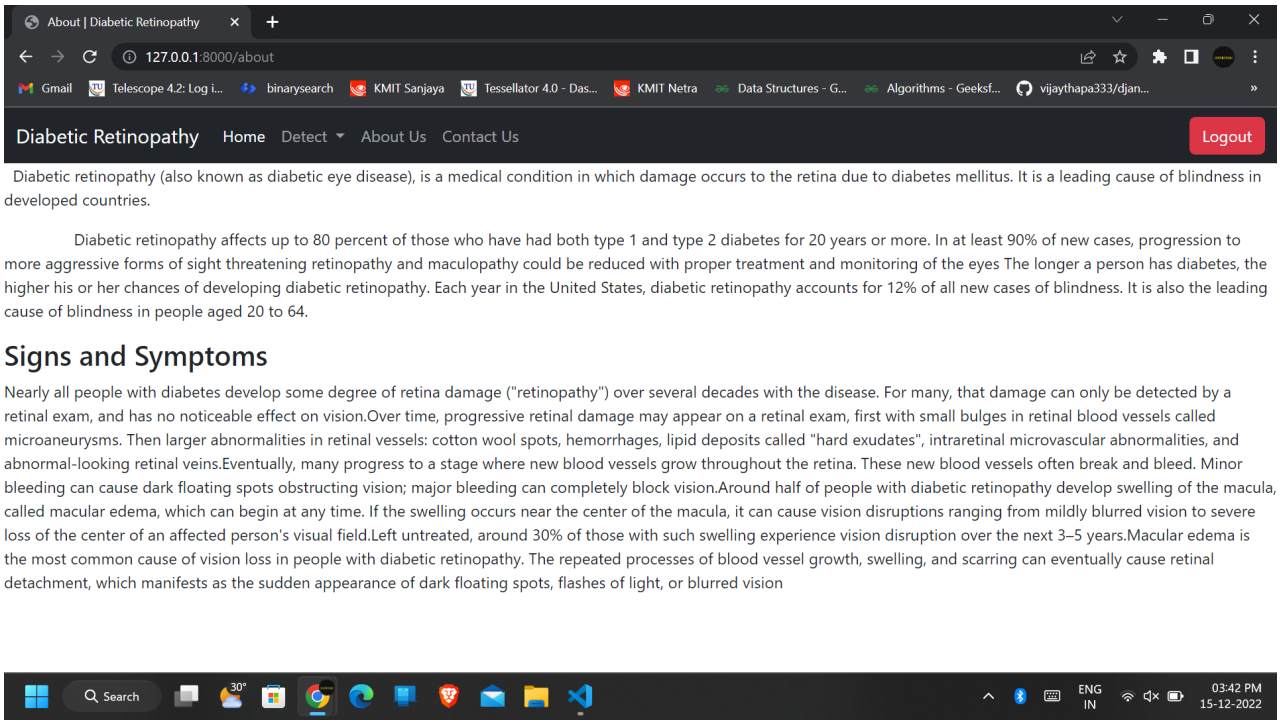
2. Home Page



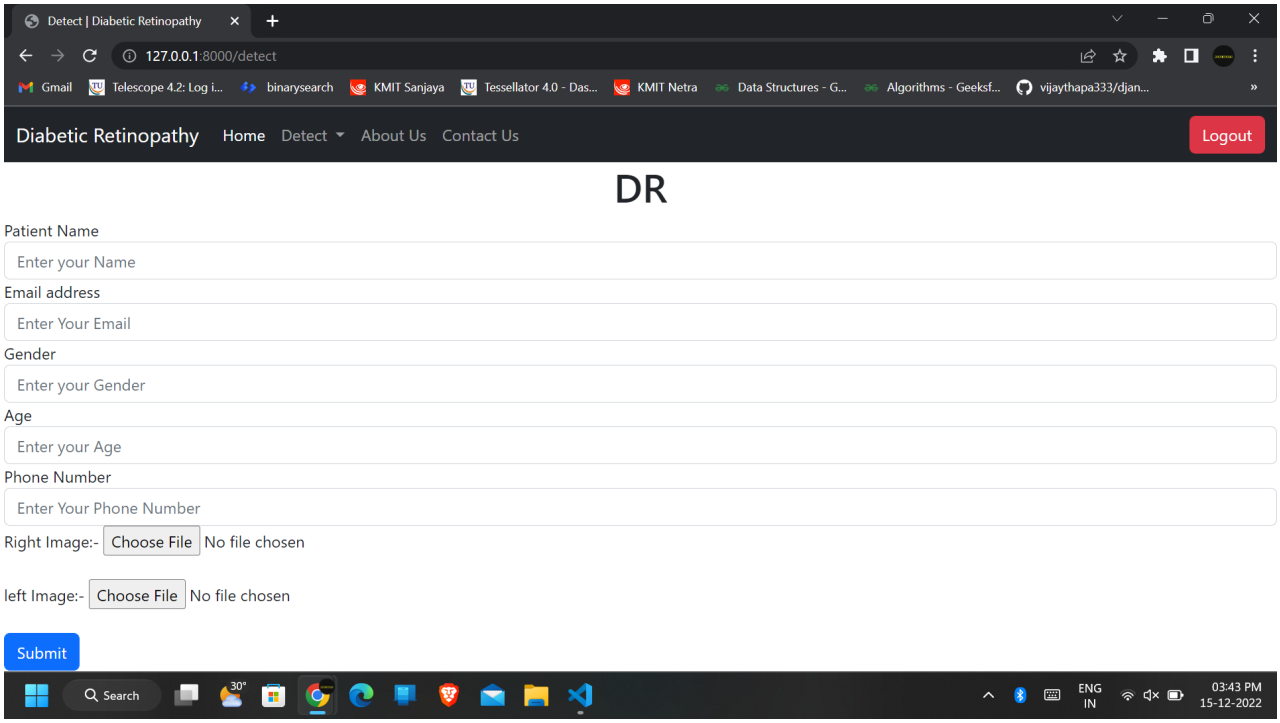
3. Contact Page



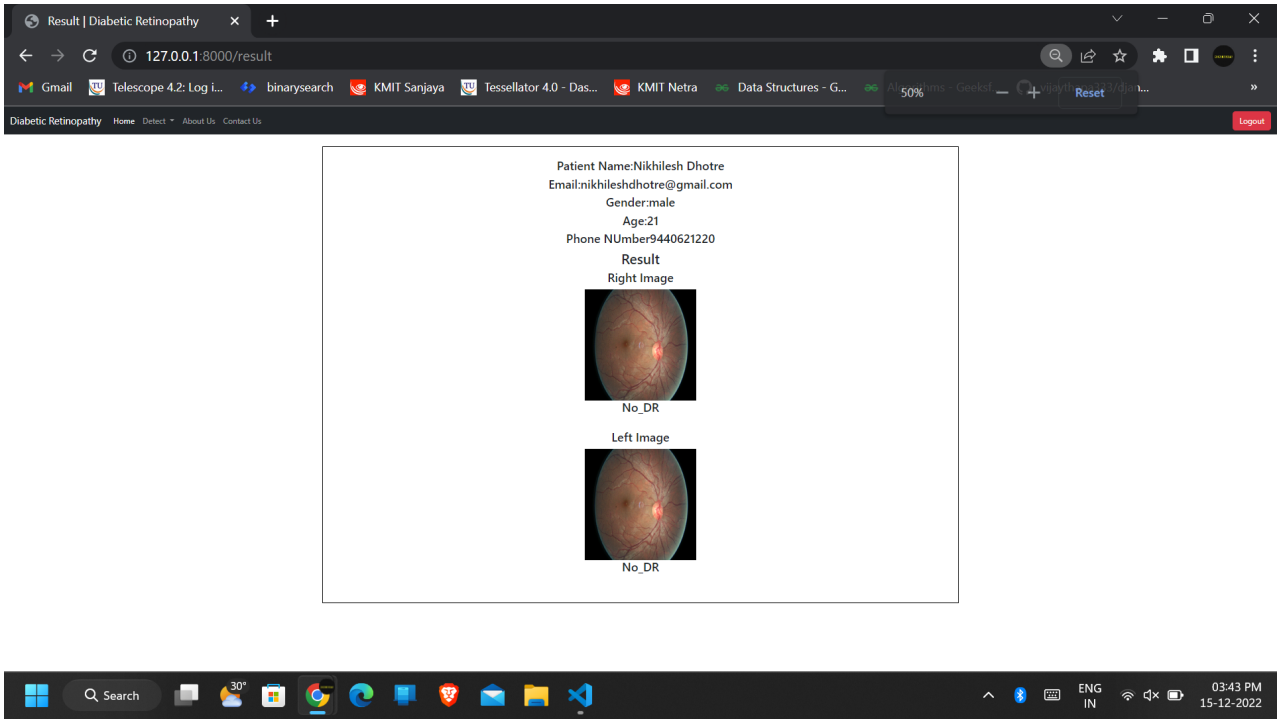
4. About Page



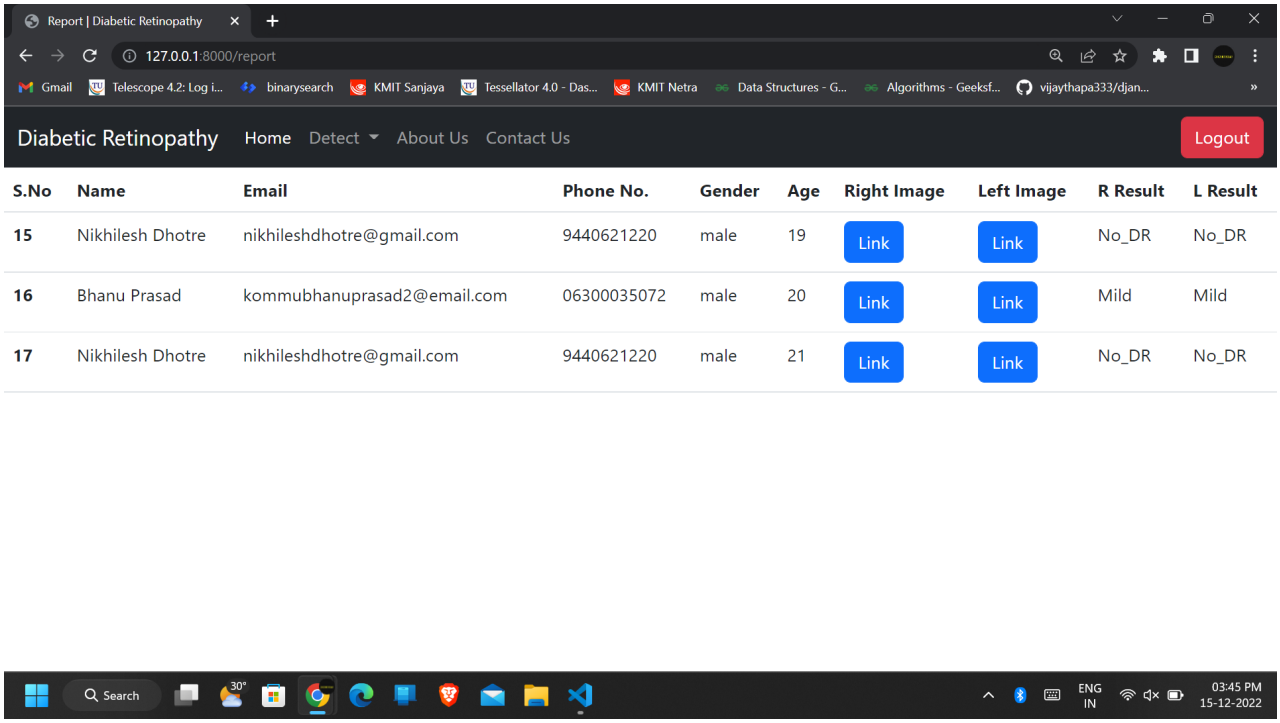
5. Detect Page



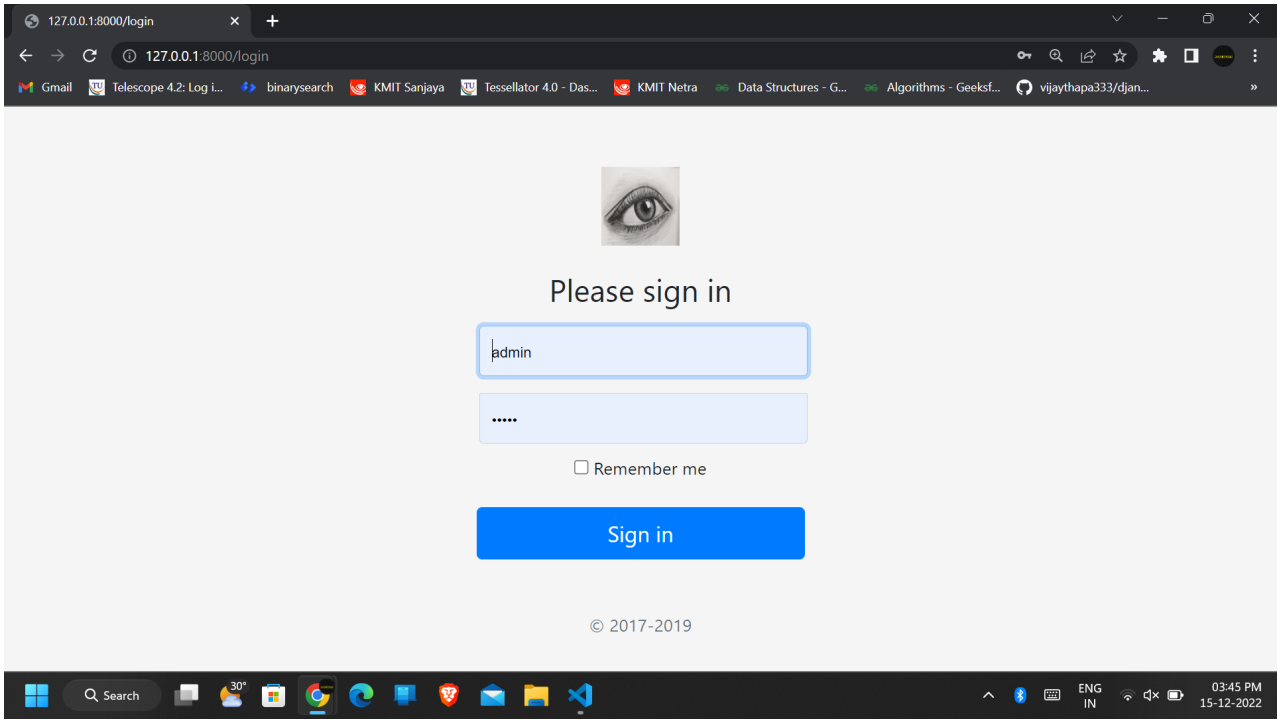
6. Output Page



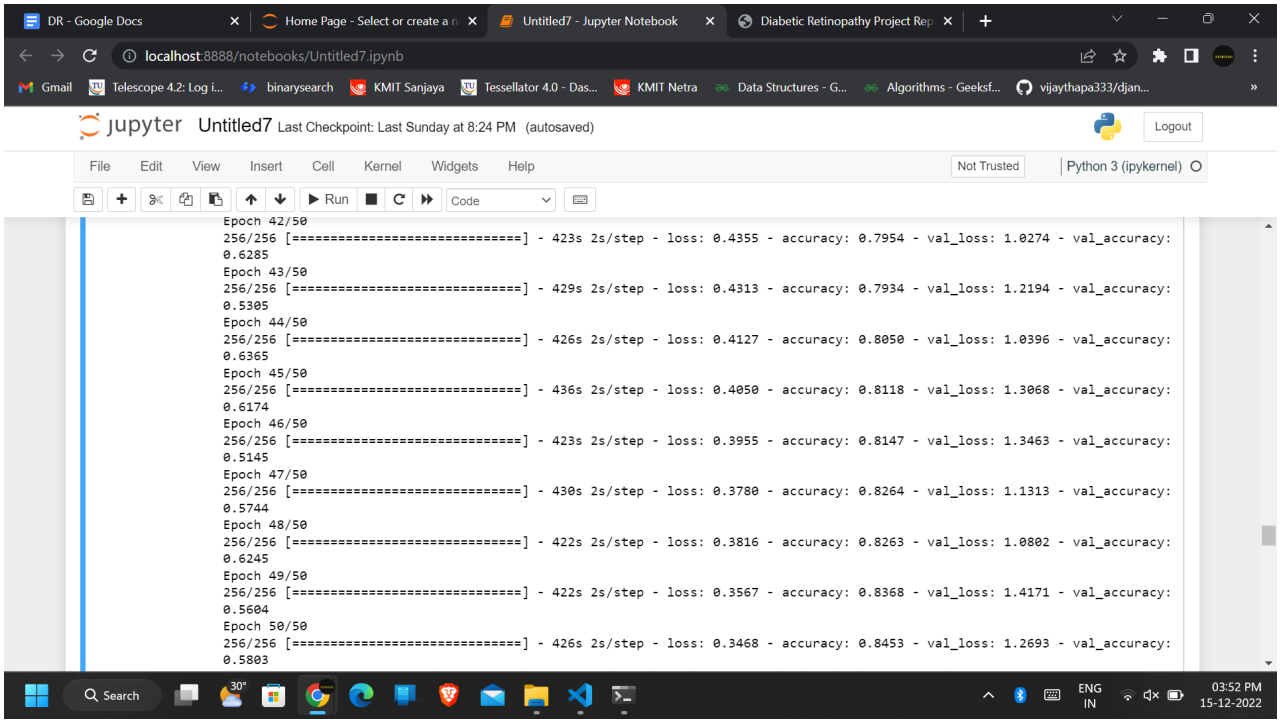
7. Results Page



8. After Logout



→ Train accuracy of Model:



→ Test Accuracy of Model: