Diabetic Retinopathy Prediction using Retinal images

Bachelor of Engineering Final Year Project based on Machine Learning module, Pune University 2020.

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Introduction:

Diabetic Retinopathy (DR) is a major cause of vision loss in individuals with prolonged diabetes, often indicated by microaneurysms detectable through retinal imaging. The subtleties in detecting these signs—due to variations in lesion size, image contrast, and color—pose significant challenges in automated detection. Leveraging machine learning, this project aims to improve the detection and analysis of DR from retinal images, facilitating early diagnosis and intervention.

Goal:

The project's primary goal is to refine and develop a machine-learning algorithm capable of effectively detecting Diabetic Retinopathy from fundus images.

Responsibilities :

- Algorithm Selection and Optimization.
- Image Preprocessing.
- Integration of Machine Learning Models into the Backend System.

Tools and Technologies:

- Programming Languages: Python
- Libraries and Frameworks: Tkinter, Pillow (PIL), OpenCV (cv2), TensorFlow, NumPy.
- IDE: PyCharm.
- Algorithm: Convolutions Neural Network [CNN].

Code Snippet:

```python
def convert_grey():
    global fn
    if fn !="":
        IMAGE_SIZE=300
        img = Image.open(fn)
        img = img.resize((IMAGE_SIZE,IMAGE_SIZE))
        img = np.array(img)
        x1 = int(img.shape[0])
        y1 = int(img.shape[1])
        gs = cv2.cvtColor(cv2.imread(fn, 1), cv2.COLOR_RGB2GRAY)
        gs = cv2.resize(gs, (x1, y1))
        retval, threshold = cv2.threshold(gs, 0, 255, cv2.THRESH_BINARY_INV + cv2.THRESH_OTSU)
        im = Image.fromarray(gs)
        imgtk = ImageTk.PhotoImage(image=im)
        img2 = tk.Label(frame_display, image=imgtk, height=x1-50, width=y1-50)
        img2.image = imgtk
        img2.place(x=280, y=0)
        im = Image.fromarray(threshold)
```

Result:
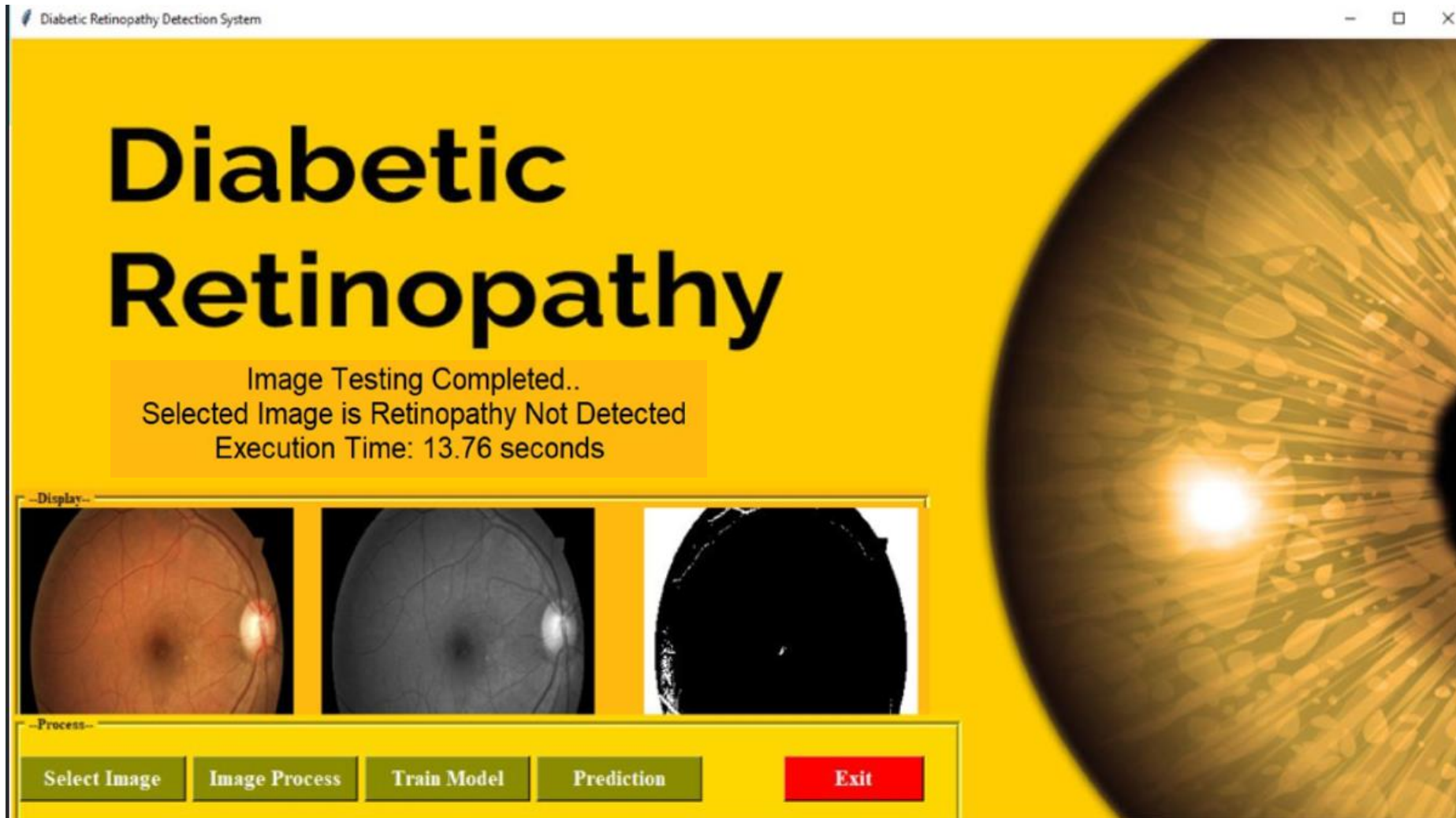
Training Accuracy: 99.69%
Testing Accuracy: 70.25%   [To be improved....]