DETECTION OF OBSTRUCTIONS IN VESSELS IN FUNDUS IMAGES

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CONTENTS

INTRODUCTION

- What is the Fundus Image ?
  - Representation of interior surface of the eye
  - Fundus image is obtained by taking a photo of the vessels with the fundus camera

MOTIVATION

- Developing accurate software to reduce doctor effort.
- Preventing the retinal emboli-induced illnesses.
- Main application area is the hospital

PREVIOUS STUDIES

- Unfortunately, there is no software which has a similar purpose with this project.
- There are some methods for the segmentation part;
  - Ant Colony System Algorithm
  - Image Matting Technique
  - Gabor Filter Method

PURPOSE OF THE PROJECT

- Find the congestion spots
- Eliminate the human error

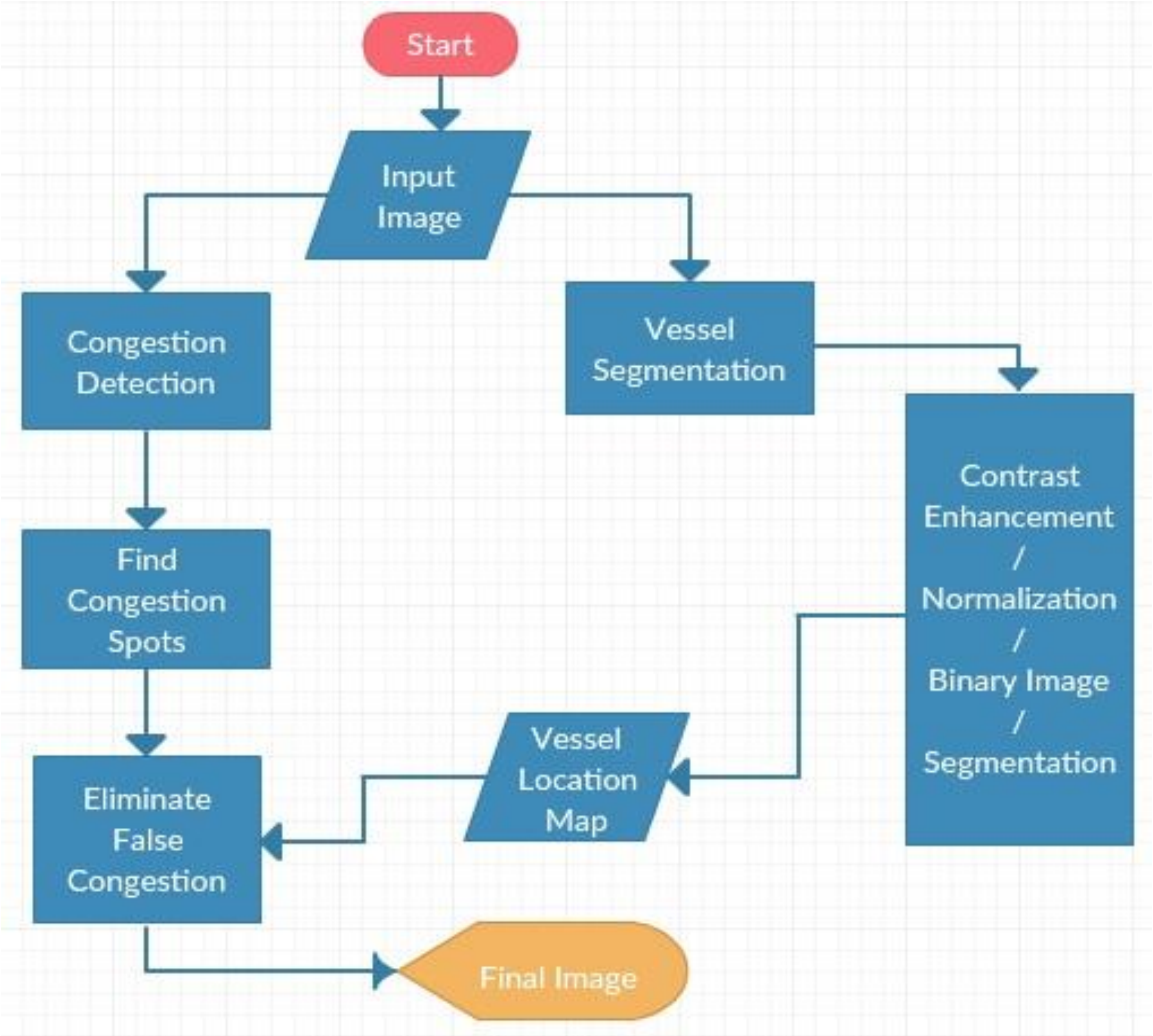
PROBLEM

- Obstructions are most likely to be small spots which are hard to detect
- Even a slightest mistake can lead bigger problems

PROPOSED SOLUTION

- Our algorithm to find a solution for the problems mentioned above divided into 2 parts;

  1. Segmentation Part
  2. Congestion Detection Part


Start
Input Image
Congestion Detection
Vessel Segmentation
Contrast Enhancement / Normalization / Binary Image / Segmentation
Find Congestion Spots
Vessel Location Map
Eliminate False Congestion
Final Image

PROPOSED SOLUTION

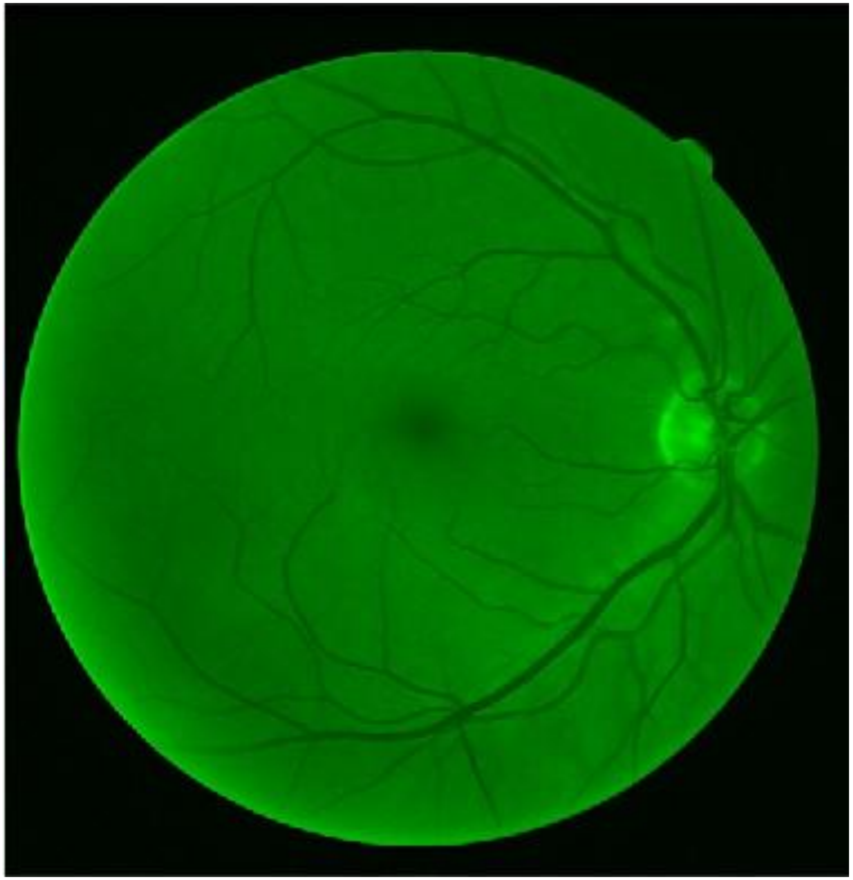
- Segmentation Part
  - Simply increases our project's accuracy and precision
  - After the segmentation process is done, congestion detection process just matches the congestion spots with the vessel locations.
  - Solution will be explained shortly.

PROPOSED SOLUTION

- Contrast Enhancement
  - Segmentation process starts with enhancing the image. Firstly, green channel is extracted then, gray scale of the image is extracted.
  - Green channel is considered to be best among the other channels. It has the least noise in it and shows vessels much more properly.

PROPOSED SOLUTION

- Green Channel Image



PROPOSED SOLUTION

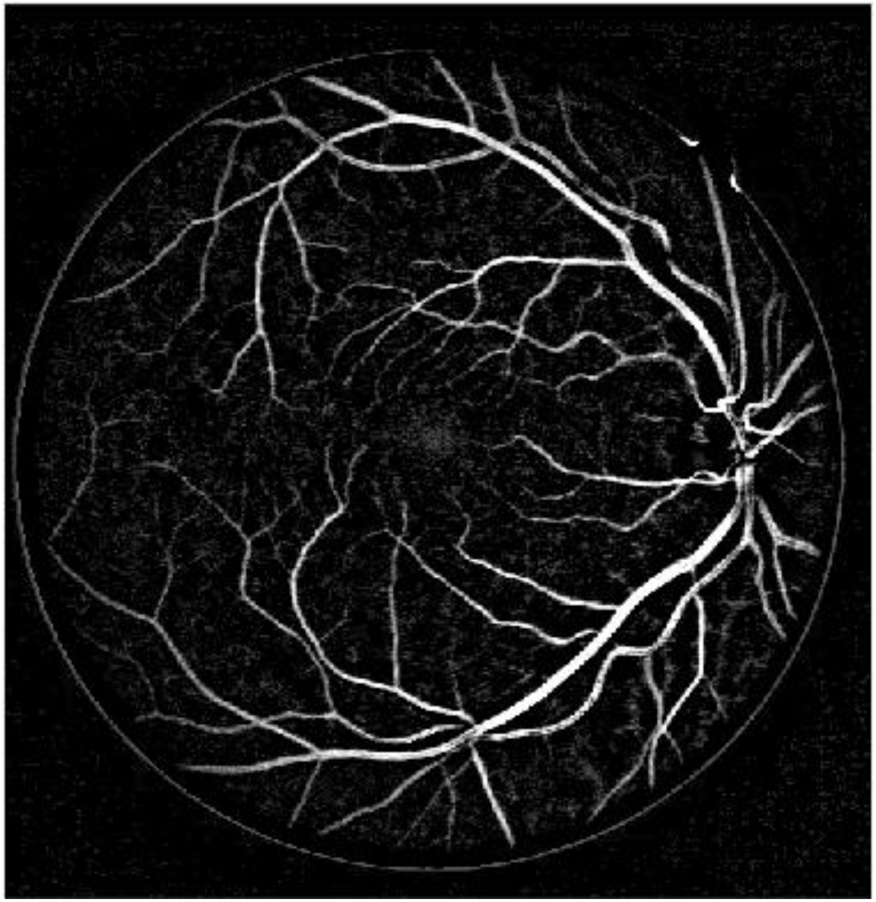
- Gray Scale Image

PROPOSED SOLUTION

- Normalization
  - This process is here to get the maximum amount of quality in the fundus image possible.
  - After normalization process, gray scale of the image is extracted.

PROPOSED SOLUTION

- Normalized Gray Scale Image

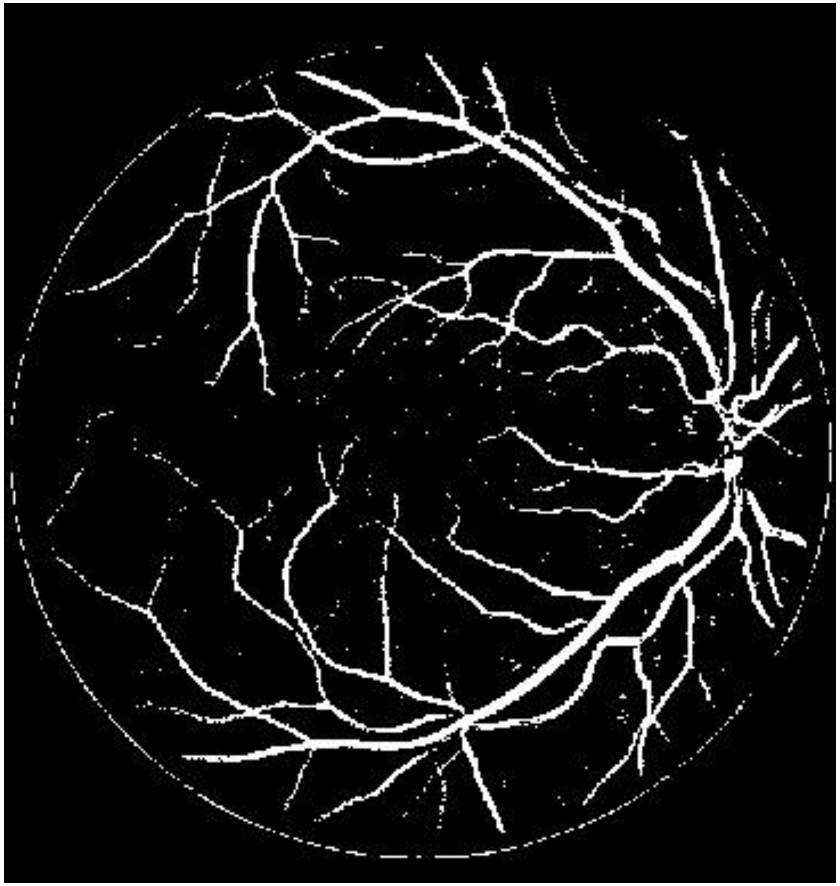


PROPOSED SOLUTION

- Binarization
  - In this step, we get the binarized version of the normalized image in this process. Later on this image is sent to the segmentation process to extract vessel location map consisting of 1's and 0's.

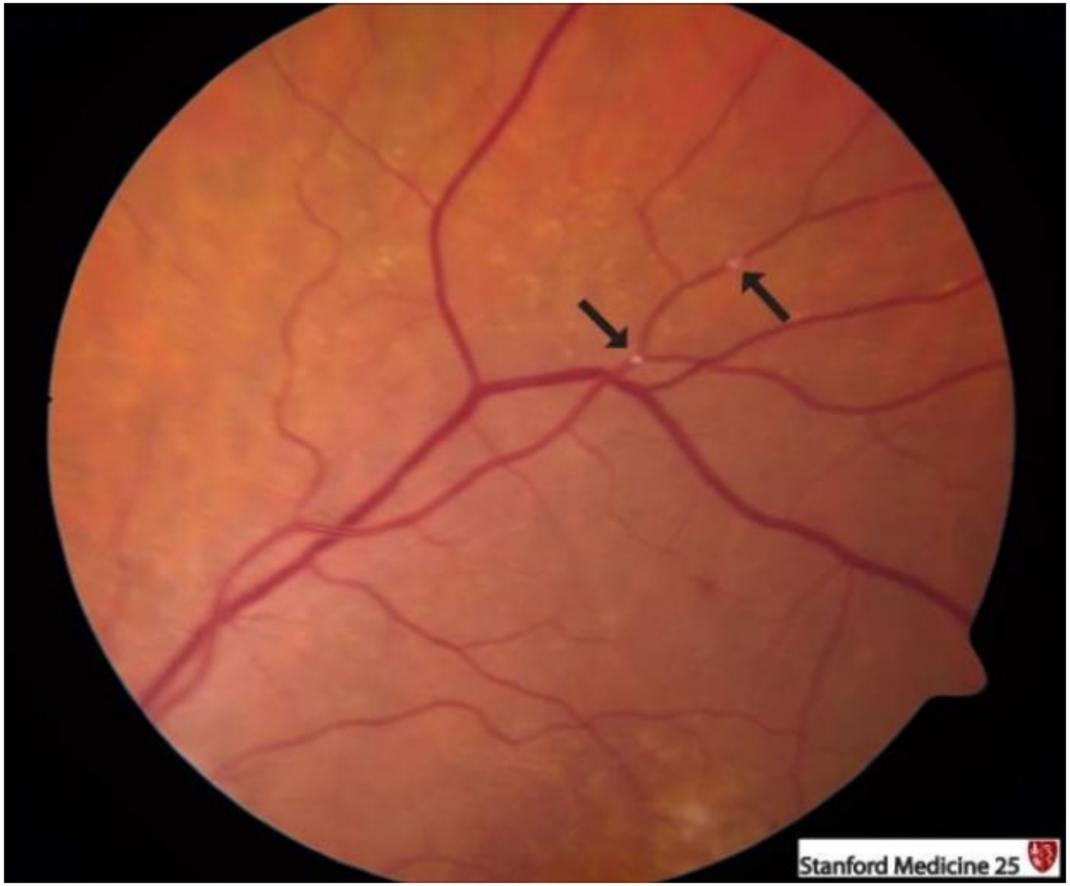
PROPOSED SOLUTION

- Binarized Image



PROPOSED SOLUTION

- Congestion Detection Part
  - Defines the main purpose of our project



PROPOSED SOLUTION

- Congestion Detection Part
  - Not all of the spots declared as congestion are actually congestion points.
  - There may be some noise interfering the input image.
  - Noise in the input image can be confused with congestion points.
  - In order to eliminate this, our project simply matches each of the congestion spots coordinates with the vessel location map.

REFERENCES

1. https://stanfordmedicine25.stanford.edu/the25/fundoscopic.html
2. http://www.wikizero.net/index.php?q=aHR0cHM6Ly9lbi53aWtpcGVkaWEub3JnL3dpa2kvRnVuZHVzXyhleWUp

THANK YOU FOR LISTENING !