Real Time Traffic Control System Using Image Processing

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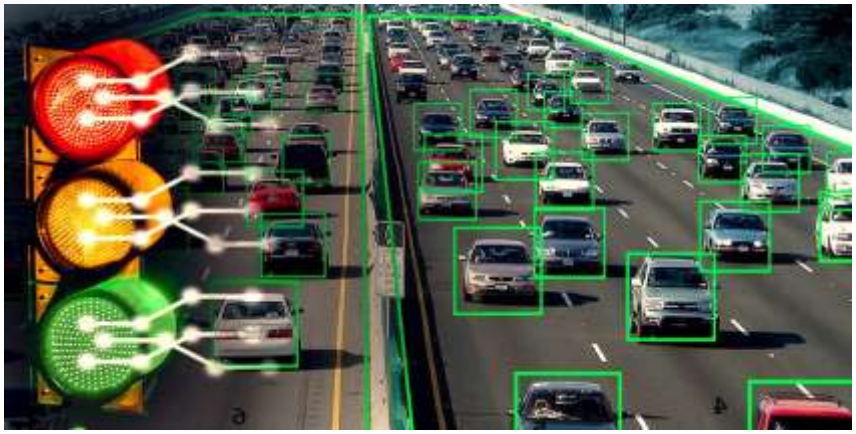
Traditional Approach

Traffic congestion

Manual operation

Proposed System



System Design

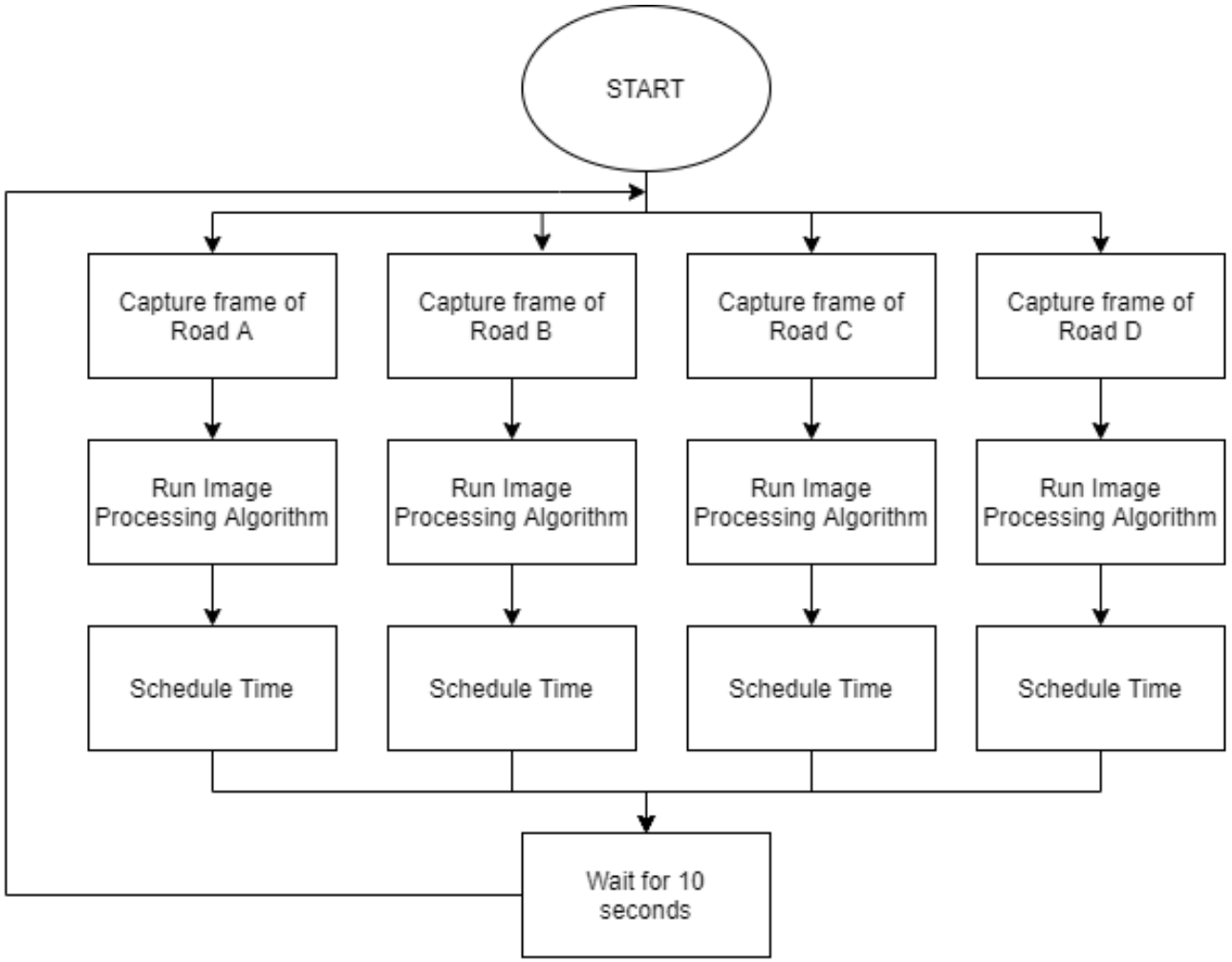
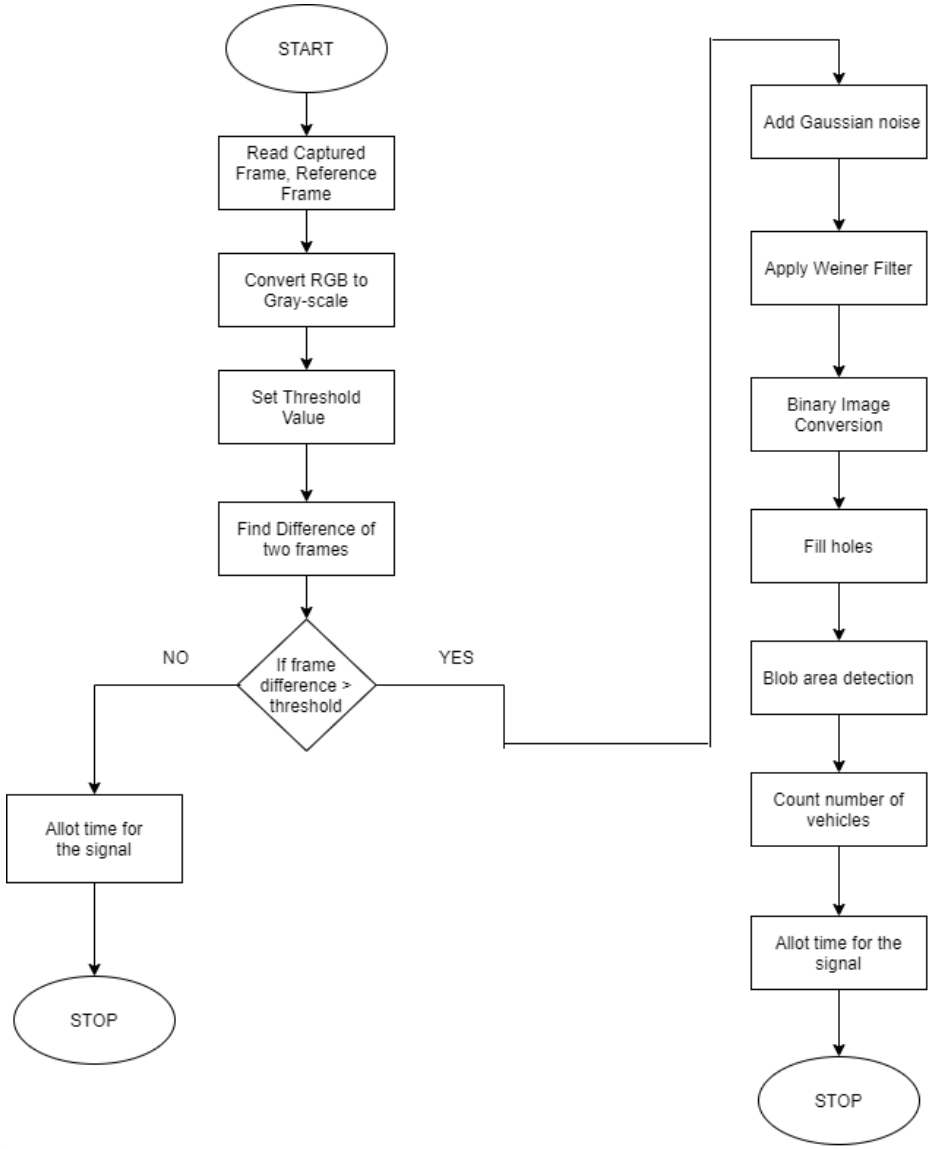


Image processing Algorithm

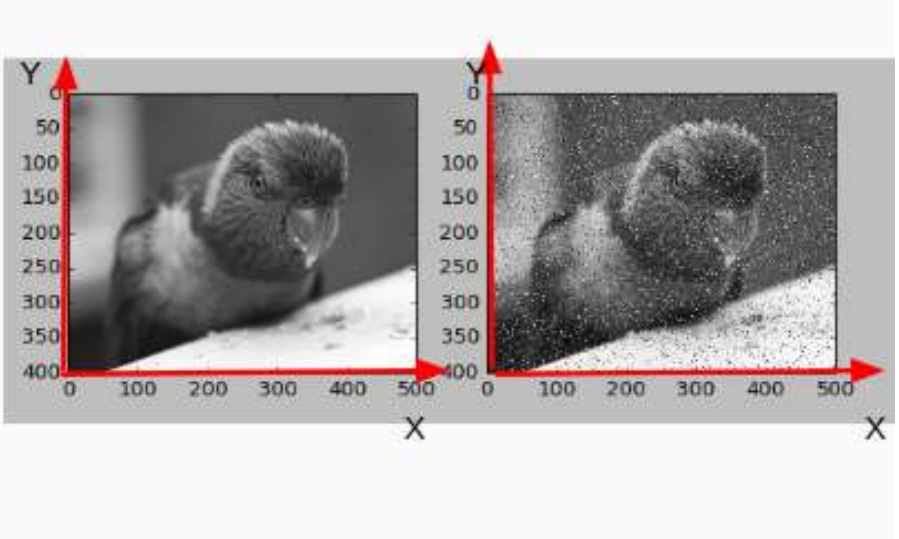


RGB to Gray-scale

Gray-scale = 0.299R + 0.587G + 0.114B

Need: Because it is a one layer **image** from 0-255 whereas the **RGB** has three different layer **image.**

Gaussian Noise



Random variation of brightness or color information in the images captured.

Brighter the area the noisier it.

Need: Accurately reflect many systems. **Adding noise** to **images** allows you to test the robustness and performance of an algorithm in the presence of known amounts of **noise**.

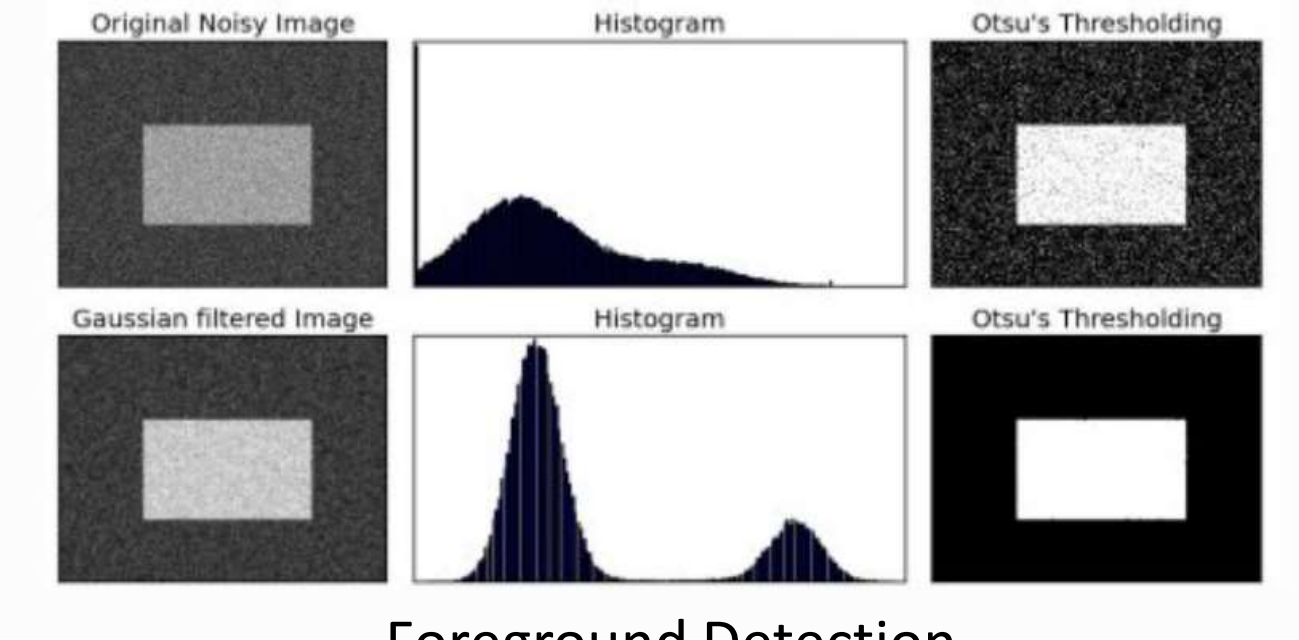
Weiner Filter

Image restoration through noise smoothing

Assumption: If noise is present in the system, then it is considered to be additive white Gaussian noise

Need: Recover a blurred or noisy image.

Otsu's Binarization



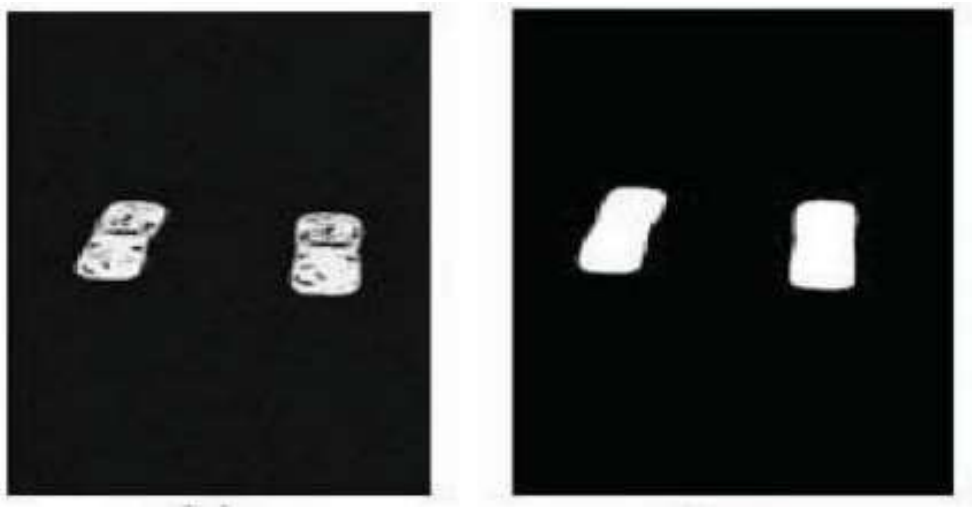
Foreground Detection

Process: 1) Automatically calculates a threshold value from image histogram

2) If pixel value is greater than a threshold value, it is assigned one value (may be white), else it is assigned another value (may be black).

Need: To separate vehicle objects(white) from the background(black)

Filling holes and Blob Analysis

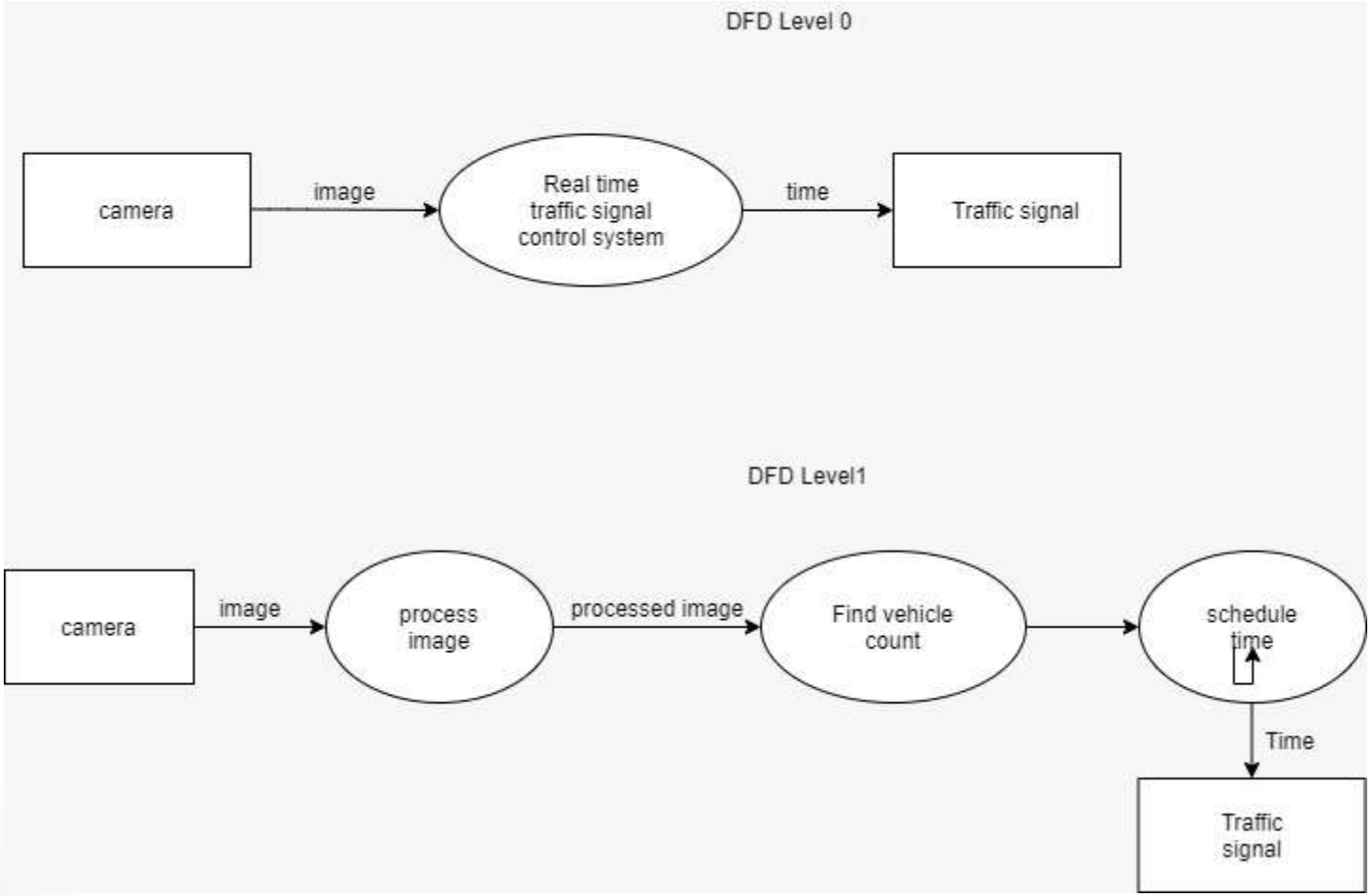


Analyzing an image that has undergone binarization.

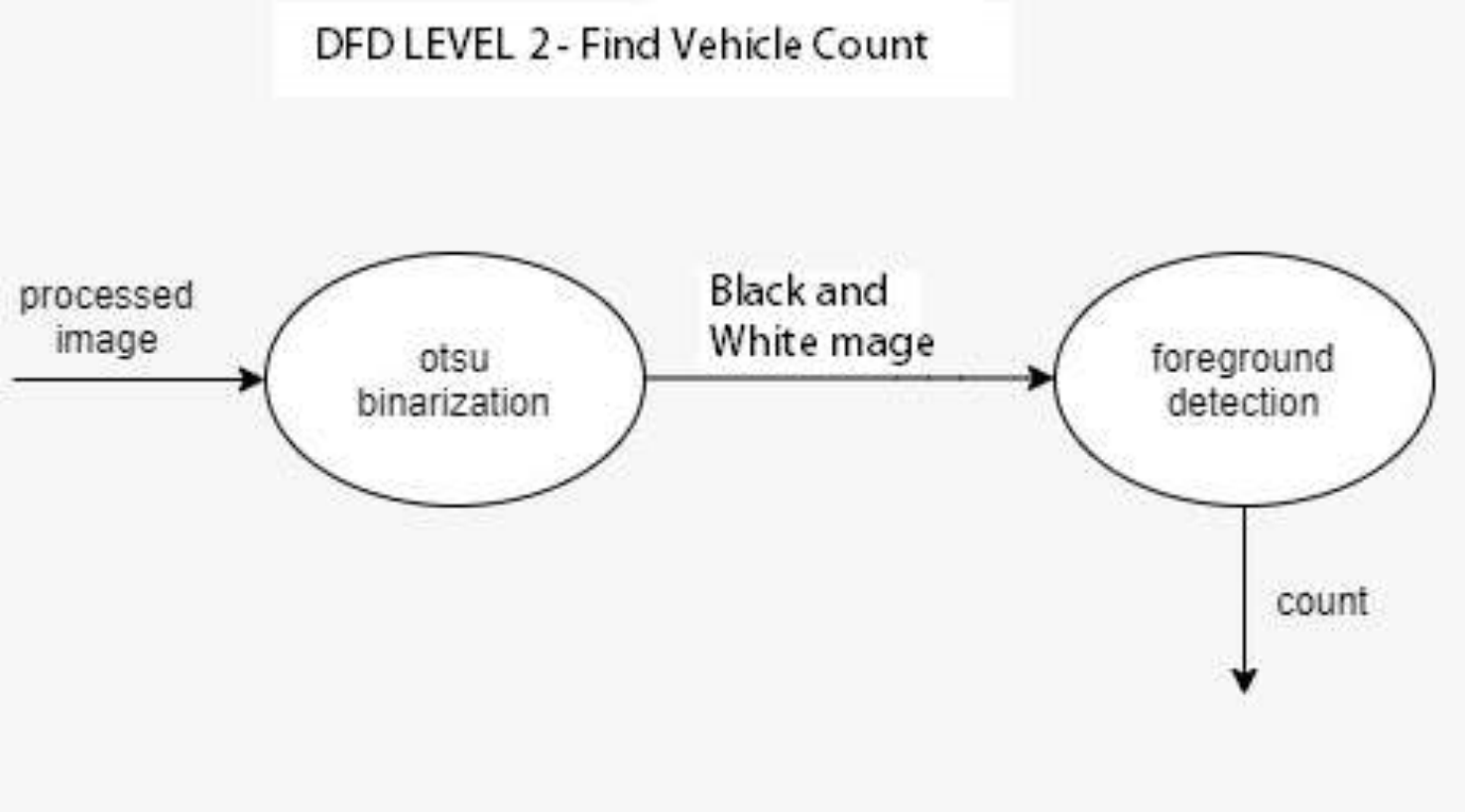
Process: 1) Fill holes
2) detect regions in a digital image that differ in properties, such as brightness or color, compared to surrounding regions.

Need: To count number of vehichles (blob area > 1000)

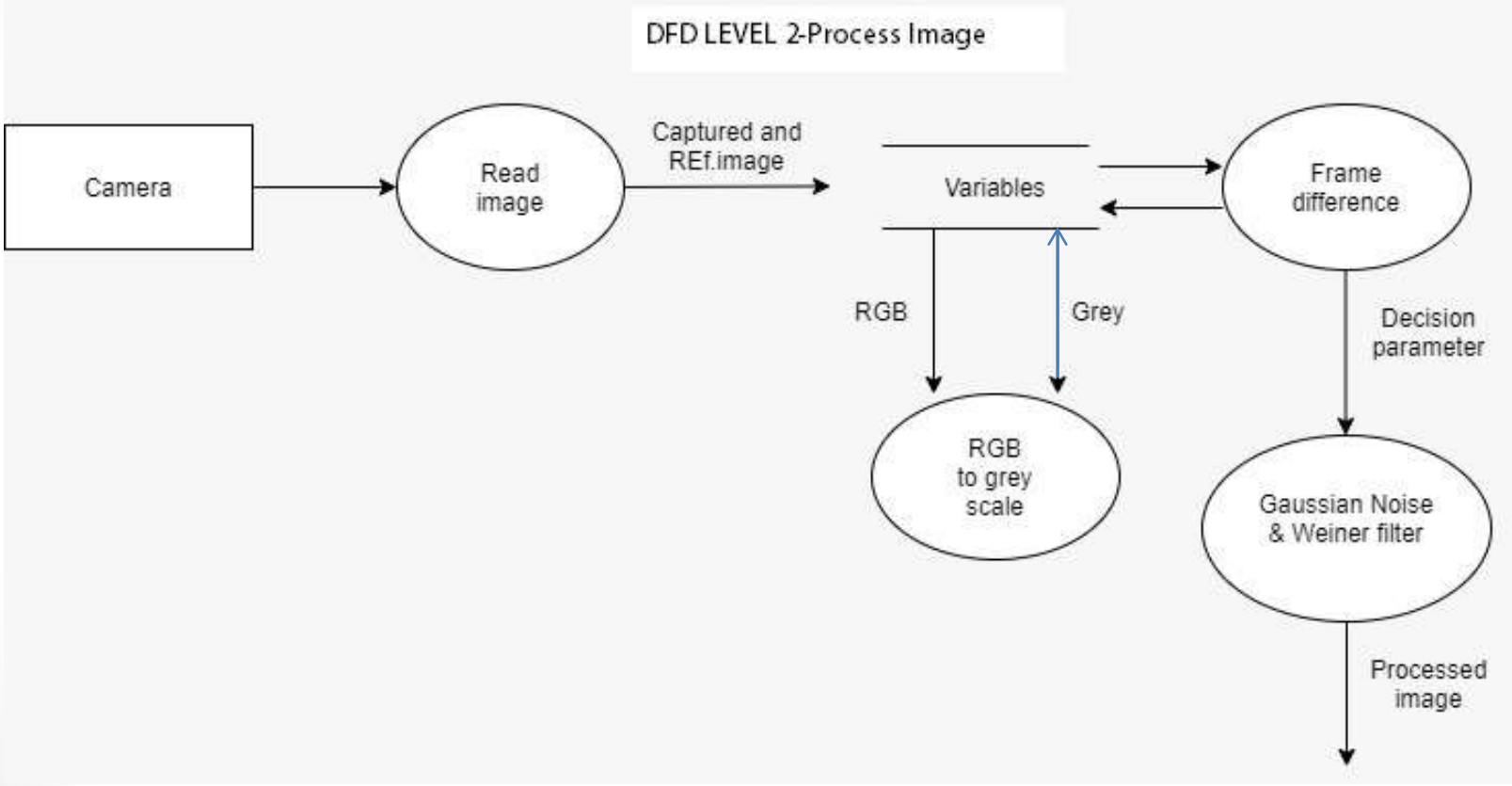
Data Flow Diagram



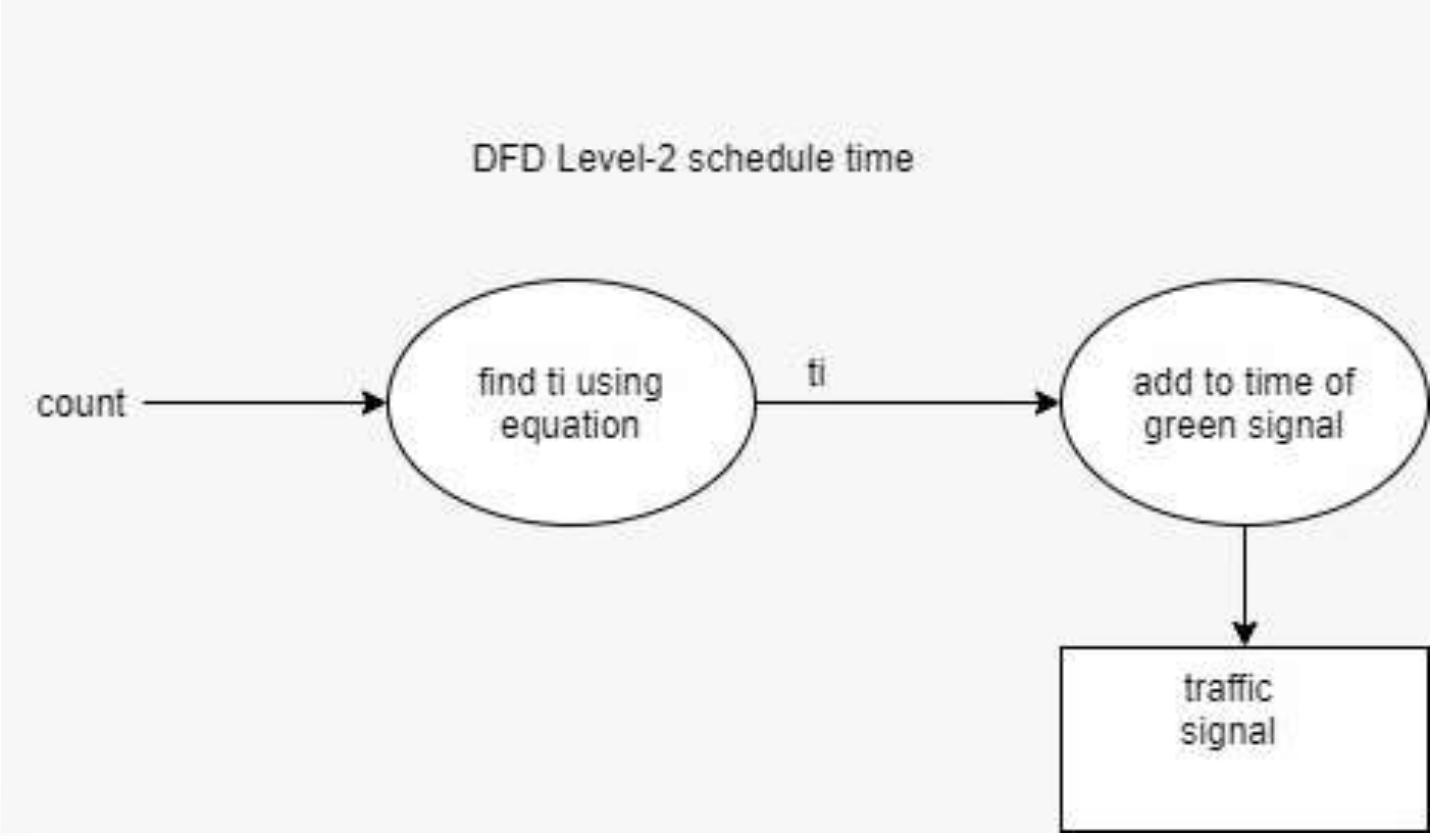
Data Flow Diagram



Data Flow Diagram



Data Flow Diagram



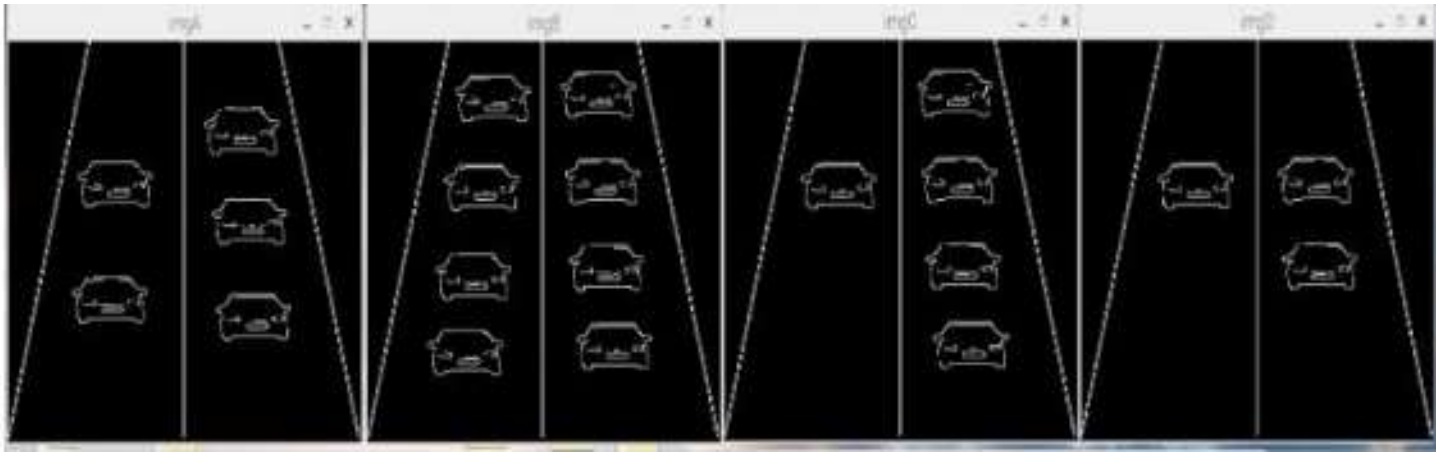
Equations

$$Density\ of\ Vehicle = \frac{Number\ of\ Objests}{Total\ Size\ of\ Image}$$

$$t_i = w_i\ (1/1\text{-}D)^*\ T_0$$

- t_i represents the timing of green light on ith road
- w_i is the weight factor for the density on i th road.
- D represents the density percentage on i th road and
- T_0 is the time unit(usually, 10 seconds)

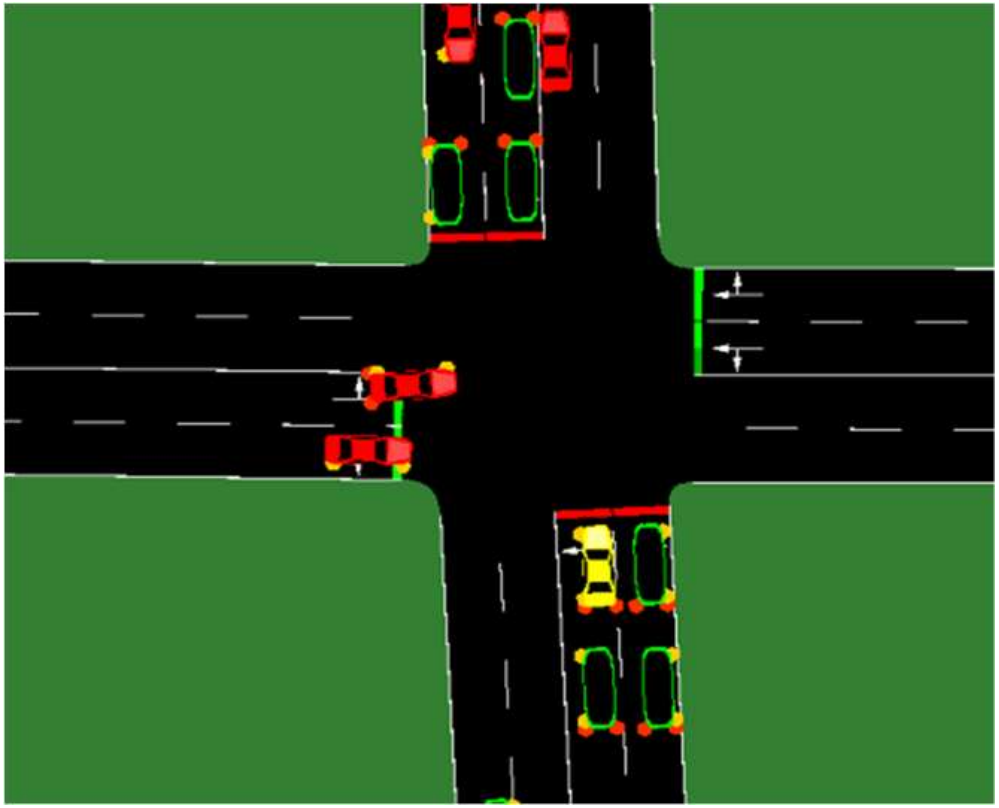
Sample Output



A B C D

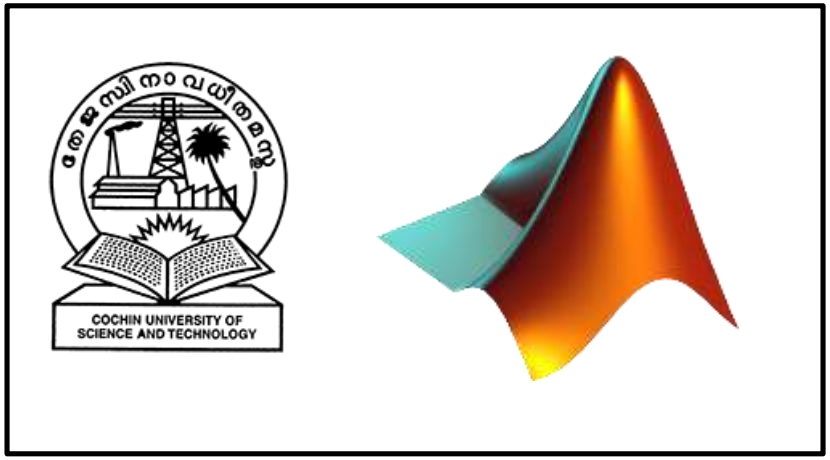
A 30 seconds schedule was allocated to direction A with 51% density. Over 50 seconds was allocated to direction B, which had a higher percentage of density than direction A. Finally, 30 and 20 seconds respectively were allocated to direction C with 52% density and direction D with 40% density. In this case, the time unit was considered to be 10 seconds.

Simulation



To understand the efficiency of the proposed system.
To visualize the flow of traffic under various situations.

Implementation Tools



MATLAB

SUMO SIMULATOR

SUMO

Gantt Chart

Task/Month	January	February	March	April	May
Requirement Analysis					
Design phase					
Code Image Conversion module					
Code Image Enhancement module					
Code Foreground detection module					
Code Set Time Module					
Simulation					

Thank You