Smart Traffic Light System

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Overview

Traffic congestion during peak hours in India costs the economy Rs.1.47 lakh crore annually.As the time is fixed,the people in the lane with the greatest number of vehicles have to wait the most, leading to wastage of time, money and natural resources such as petrol and diesel. Smart traffic light systems are the future and with the help of hardware and software technology,this problem can be effectively controlled. The system uses vehicle detection technique on roads in real time. The time limit for the green light depends on the number of vehicles in the different lanes on the road. The proposed paradigm detects the total number of vehicles present in a specific lane using camera and compares it with the other lanes and increases the time of green light for the lane with the maximum vehicles.

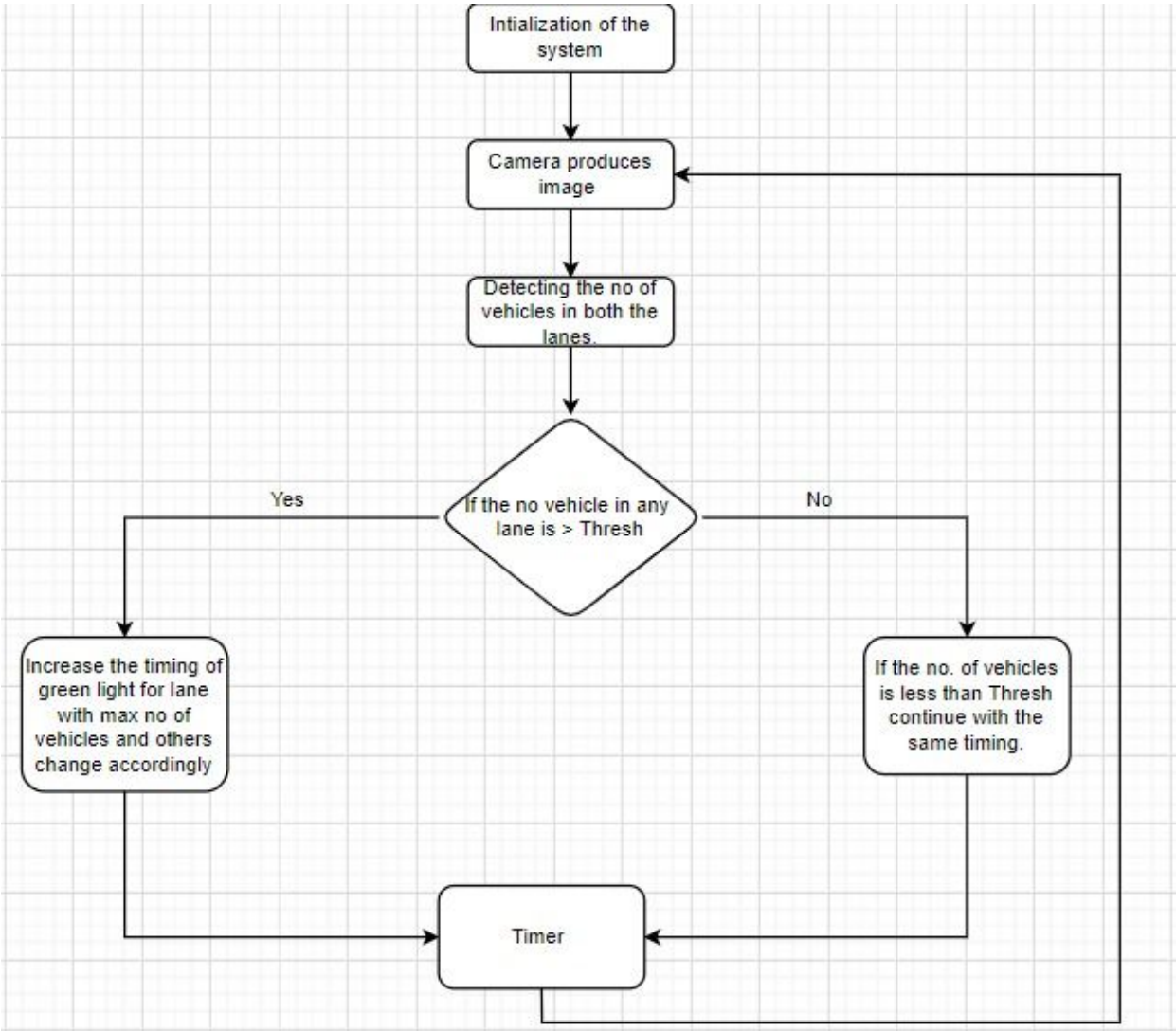
Technology Stack

Amazon Web Services EC2 Compute, AWS S3 Storage, AWS Sagemaker, Processing Graphical Library, Windows PowerShell, Python, Keras, Tensorflow, OpenCV

Outcomes

1. Provide a smart traffic light solution for efficient management of traffic.
2. In order to support the expansion, build a scalable product.
3. Improve the vehicle detection algorithm for exact number of vehicles.
4. Save time, efforts and natural resources as petrol and diesel.

Block Diagram



Theory

As per the scheduling algorithm and deep learning algorithm that detects the number of vehicles; the calculation and test cases are as follows: The time scheduling algorithm takes into consideration the number of vehicles whether the total number of vehicles is greater than the set threshold value or is it equal or lesser than it. The number of vehicles in the lane is detected using the deep learning algorithm with YOLO algorithm. The Deep Learning script on AWS Sagemaker stores the file "data.txt" in Amazon S3 so that it can be fetched using the time scheduling algorithm on AWS EC2 Windows instance using a Windows

PowerShell Script. The green time should be 30 seconds if the number of vehicles in the lane is less than or equal to prescribed time called threshold value. The green time should be ((2 * ([number of vehicles]- threshold value)) + 30) seconds if the number of vehicles is more than threshold value. These calculations are then used to render the appropriate lights for the lanes and with the calculated amount of timer count which dynamically changes according to the amount of traffic.
Test Case -

Lane Number	Lane 1	Lane 2
Number of Vehicles	7	2
Time for green light to be given	38	30