IoT

Traffic Monitoring System

Introduction

As increase in the population, the usage of road is increased day by day. The managing of the traffic is one of the major challenges to be tackled in a big city. The usage of vehicles rise to congestion of the road traffic which will leads to increasing cost of transportation because of wastage of time and extra fuel consumption due to waiting in the traffic signal. The most common reason of traffic congestion in the world is an inefficient traffic signal controlling which affects the traffic flow. So the traffic signal has to be changed based on the current traffic in the lane. In the existing traffic system in our cities, predefined timers are used in the traffic signal for controlling the traffic. It will not consider for real time scenario of traffic in the roads. As result the green signal is for lane with no vehicle and lot of vehicle has to be wait in the red signals because same wait timing is used for all the lanes. India loses billions of money in the year 2016, due to lot of traffics which will leads to wastage of fuel, vehicles speed is reduced and waiting time of vehicles at toll plazas are increased. The most road traffic congestion city are Mumbai, Pune, Kolkata are statics of the traffic given by “The Times of India”.

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The system has to developing order to handle the traffic in the India. The Internet of Things plays important roles in sensing the road traffics and make intelligent decision on that current situation. IOT is connecting with the devices by sense the data, send the Manuscript published on 30 September 2019. * Correspondence Author (s) G.Shobana, Assistant Professor, Department of Computer Science and Engineering,Kumaraguru College of Technology, Coimbatore, Tamilnadu, India. Dr.M.Suguna, Assistant Professor, Department of Computer Science and Engineering, Kumaraguru College of Technology, Coimbatore, Tamilnadu, India. information to other end, after that it process based on that decision are made. Analysis of the transportation data are helpful for project planning for developing the Intelligent system in transport by using the vehicle count, speed, types of vehicles etc. For estimating the traffics in the road, sensors are used for monitoring traffic and Information system related to classification of vehicles.

Introduction

In the current situation, vehicles count can be obtained by magnetic loop detectors. The count is calculated by passing the vehicle over them. Other parameter for traffic monitoring such as vehicle classification, size are obtained by Vision-based video monitoring systems. In the metropolitan city, the monitoring the traffic can be done by video camera which is mounted in the poles which will focus on the each lane and record the traffic in each lane. It will be used for detecting and classifying vehicles in different lanes and for any direction of traffic flow. This information will be helpful for analysis of the traffic in particular areas. In today's world, the signals are working in each road. In the system, vehicles in one path (P1) are passed and vehicles in another path (P2) still in waiting state because time is not over and hence signal is still red. These systems are not efficient to handle the present situation. The main drawback in the existing system has unnecessary waiting time even though there is less number of traffic in the road and there is no facility to handle emergency vehicles in the traffic. The system is developed to handle the situation, which performs execution based on density of vehicles in the each path. Based on number of vehicle the signals will be allotted for a particular side. For processing this scenario sensors and Arduino is used as a microcontroller which provides the signal timing based on the traffic density.

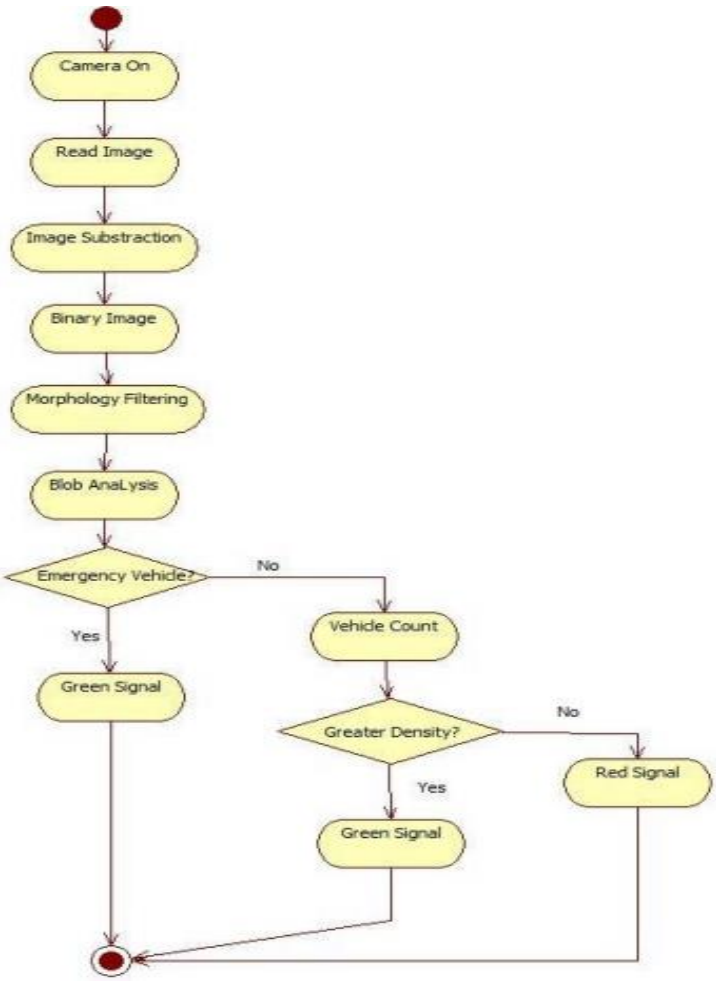
Proposed System

The proposed system helps to reduce the possibilities of traffic congestion in the roads, which is caused by the traffic lights signals, to some extent by clearing the road with contains high density of vehicles. It also provides the clearance for the emergency vehicle by capturing the images from path. The process of the maintaining the traffic in the roads is shown in the figure.

1. *Image acquisition :* The images of each lane are captured by the video camera which is placed on the top of the pole which is near the traffic signal. From which it can able to capture the image of vehicle clearly. The information are extracted from video camera, from that images are separated into the frames continuously from the real time. The data are processed by converting the images from RGB format to grayscale for processing. Reference image are image which are captured during no vehicle present in the road.
2. *Image Pre-Processing :* The continuously record the traffic video from the each Lanes. Consider one frame per second from video using image processing. The unnecessary background information from the video images is removed. In the system initial background image without vehicles are stored that is subtracts from the current image of traffic. The dimensions of the road are already calculated. It performs Image Filtering. It uses two processes such as roads are converted to white and other that is converting to black.
3. *Finding Traffic Density :* Vehicle detection is required to identify type of vehicles and count of vehicle, which are present in particular area. Identification of vehicles can

Proposed System

1. *Finding Traffic Density :* Vehicle detection is required to identify type of vehicles and count of vehicle, which are present in particular area. Identification of vehicles can be done by rectangular area. If more than one area is collapsed then it will be filter out. After finding the number of vehicle in the each lane, the signal can be changed by comparing with the other lanes vehicle density. If it find any emergency vehicle in the lane then signal can be changed according to it.



Python Script

```
#!/usr/bin/env python

##############################################################################
#
# ipsec_traffic.py
##############################################################################
#
#  Collects Libreswan IPsec traffic information using ipsec cli
#  The result is reported in Bytes per IPsec connection
#  Script arguments (not mandatory) to be used:
#  -h, --help            show this help message and exit
#  -a ADDRESS, -address ADDRESS, --address ADDRESS
#                        IPsec Traffic Metrics are exposed on this IP address
(default = 0.0.0.0)
#  -p PORT, -port PORT, --port PORT
#                        IPsec Traffic Metrics are exposed on this port
(default = 9754)
#  -i INTERVAL, -interval INTERVAL, --interval INTERVAL
#                        IPsec Traffic Metrics read interval in seconds
(default = 15)
##############################################################################
#

import prometheus_client as prom
import os
import time
import argparse as ap

# exporter default port
exporter_port = 9754
# default interval in seconds for generating metrics
scrape_interval = 15
# default IP address is 0.0.0.0
listen_address = '0.0.0.0'

# get command line arguments
parser = ap.ArgumentParser(description='IPsec Traffic Exporter arguments')
parser.add_argument('-a', '-address', '--address', dest='address',
required=False,
                    help='IPsec Traffic Metrics are exposed on this IP
address')
```

Python Script

```
parser.add_argument('-p', '-port', '--port', dest='port', required=False,
type=int,
                    help='IPsec Traffic Metrics are exposed on this port')
parser.add_argument('-i', '-interval', '--interval', dest='interval',
required=False, type=int,
                    help='IPsec Traffic Metrics read interval in seconds')
args = parser.parse_args()

if args.address is not None:
    listen_address = args.address
if args.port is not None:
    exporter_port = args.port
if args.interval is not None:
    scrape_interval = args.interval


def get_ipsec_info(cmd):
    output = os.popen(cmd).read()
    lines = output.split('\n')
    return lines


def main():
    gauge = prom.Gauge(
        'ipsec_traffic',
        'Display IPsec Traffic Info',
        ['connection', 'left_subnet', 'right_subnet', 'direction']
    )
    prom.start_http_server(exporter_port, addr=listen_address)

    while True:
        connections = {}
        traffic_list = get_ipsec_info("sudo ipsec trafficstatus")
        if len(traffic_list[-1]) == 0:
            del traffic_list[-1]
        for line in traffic_list:
            connection = line.split('"')[1]
            tmp = line.split(',')
            in_bytes = (tmp[3]).split('=')[1]
            out_bytes = (tmp[4]).split('=')[1]
            connections[connection] = {"in": in_bytes, "out": out_bytes}
```

Python Script

```
 connection_list = get_ipsec_info("sudo ipsec status|grep '; eroute owner:'")
        if len(connection_list[-1]) == 0:
            del connection_list[-1]
        for line in connection_list:
            connection = line.split('"')[1]
            tmp = line.split('=')
            left_subnet = tmp[0].split(' ')[-1]
            right_subnet = tmp[-1].split(';')[0]
            if connection in connections:
                connections[connection]["left_subnet"] = left_subnet
                connections[connection]["right_subnet"] = right_subnet

        gauge.clear()
        for i in connections.keys():
            gauge.labels(
                i,
                connections[i]['left_subnet'],
                connections[i]['right_subnet'],
                'in'
            ).set(connections[i]['in'])
            gauge.labels(
                i,
                connections[i]['left_subnet'],
                connections[i]['right_subnet'],
                'out'
            ).set(connections[i]['out'])

        time.sleep(scrape_interval)


if __name__ == '__main__':
    main()
```

References

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Conclusion

This IoT Traffic Monitoring system reduces the possibilities of traffic congestion in the roads. By monitoring the vehicle density in each path in the road and based on real time traffic congestion green signal are changed accordingly. Information obtained from traffic signals are stored for analysis of the traffic particular.