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Road Accident vehicle detection using Particle Swarm Optimization technique

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Abstract - *In present days, the major road ways are monitored using surveillance camera. When an accident happen with in this surveillance area, the existing system has the information about the accident and it was failed to alert the authority unless manually initiated. Our proposed system will send the information to the authority as earlier as any mesh up happened. This process is done by following two step.The images are taken with and without object in the surveillance area, the features are extracted and stored in the database. Classification is done between normal and abnormal images using Particle Swarm optimization.*

Keywords: PSO, MYSQL,FS

1.INTRODUCTION

Intersections also tend to experience severe crashes due to the fact that several types of injurious crashes, such as angle and left turn collisions, commonly occur there. Therefore, accurate and prompt detection of accidents at intersections offers tremendous benefits of saving properties and lives and minimizing congestion and delay.

1.1ROAD NETWORK

India has a road network of over 4,689,842 kilometers (2,914,133 miles) in the2013,the second largest road network in the world. At 0.66 km of roads per square kilometer of land, the quantitative density of India's road network is similar that of the United States (0.65) and far higher than that of China (0.16) or Brazil(0.20 While national highways constitute 1.7% of Indian roads, they carry 40% of the traffic. The majority of existing national highways are two-lane roads (one lane in each direction), though much of

this is being expanded to four-lanes, and some to six or more lanes. Some sections of the network are toll roads. Over 30,000 km (19,000 mi) of new highways are planned or under construction as part of the NHDP, as of 2011. This includes over 2,600 km(1,600mi) of expressways currently under construction.

1.2 ISSUES IN ROAD

Most of the Indian roads are unsurfaced (42.65%) and are not suitable for use o vehicular traffic. The poor maintenance of the roads aggra-vates the problem especially in the rainy season.

Way side amenities like repair shops first aid centers, telephones, clean toilets, restaurants, rest places are lacking along the Indian roads. There is very little attention on road safety and traffic laws are willfully violated.

2.EXISTING SYSTEM

2.1Vehicle detection and shape recognition using optical sensors[1]:

Optical systems are well suited for traffic observation and management. The real-time requirements can be met by implementation `of appropriate image processing algorithms in hardware. Being one of the most important applications of optical sensors, vision-based vehicle detection and shape recognition for collecting information about road congestion, for driver assistance and for providing information for future development of roads has received considerable attention over the last one-two decades. There are many reasons for the intense research in this field including security requirements in the countries, the increased number of road accidents, the increased number of vehicles on the roads and the availability of feasible computer technologies that has brought a tremendous progress for computer vision research. This paper provides a critical survey of recent vision based road vehicle detection and shape recognition systems appeared in the literature.

2.2Intelligent traffic cone based on vehicle accident detection and identification using image compression analysis and RFID system[2]

The proposed intelligent RFID traffic cone for vehicle accident detection and identification avoids problems that usually arise with normally vehicle crash reporting systems, especially those related to image processing and insurance techniques. This RFID technique deals with a multi-vehicles, multi lane and multi road even or junction area. It provides an efficiency time management scheme with correct data reporting, in which a dynamic time schedule is worked out in real time for the driver or passengers of each accident situations. The time operation of the system emulates the judgment of a traffic policeman on duty or user that may have PDA nearby RFID traffic cone. The image compression present here is used along with RFID information to get a precise event data that composed of image encoding and decoding algorithms called wavelet transform with principle component analysis (PCA) via vector quantization techniques (VQ). The small bit rates for high-speed data transmission with a small space for data storage are required on wireless transmission channel. Simultaneously, the peak signal to noise ratio (PSNR) has to be maintained. The traffic management system model is constructed for testing on traffic lights, vehicles transit and traffic cone with RFID solution system.

2.3Multi-objective Particle Swarm Optimization(PSO)for feature selection[3]

Feature selection (FS) is an important data preprocessing technique, which has two goals of minimizing the classification error and minimizing the number of features selected. Based on particle swarm optimization (PSO), this paper pro- poses two multi-objective algorithms for selecting the Pareto front of non-dominated solutions (feature subsets) for classification. The first algorithm introduces the idea of non- dominated sorting based multi-objective genetic algorithm II into PSO for FS. In the second algorithm, multi-objective PSO uses the ideas of crowding, mutation and dominance to search for the Pareto front solutions. The two algorithms are compared with two single objective FS methods and a conventional FS method on nine datasets. Experimental results show that both proposed algorithms can automatically evolve a smaller number of features and achieve better classification performance than using all features and feature subsets obtained from the two single objective methods and the conventional method. Both the continuous and the bi- nary versions of PSO are investigated in the two proposed algorithms and the results show that continuous version generally achieves better performance than the binary version. The second new algorithm outperforms the first algorithm in both continuous and binary versions.

2.4Police Eyes: Real World Automated Detection of Traffic Violations[4]

Dangerous lane changing, illegal overtaking, and driving in the wrong lane account for a high percentage of the total accidents that occur on the road, second only to accidents due to over-speeding. Automated traffic applications typically encompass the detection and segmentation of moving vehicles as a crucial process. Background subtraction and shadow detection are amongst the most challenging tasks involved in the segmentation of foreground blobs in dynamic environments. An effective balance between accuracy and speed is required to process a continuous feed of high resolution images from multiple cameras. Police Eyes is a mobile, real-time traffic surveillance system we have developed to enable automatic detection of traffic violations. Police Eyes would be useful to police for enforcing traffic laws and would also increase compliance with traffic laws even in the absence of police. The system detects illegal crossings of solid lines using image processing and efficient computer vision techniques on image sequences acquired from IP cameras. The automatic solid line crossing detection system can be used at locations where the traffic violations are notoriously high and are known to create traffic congestion and avoidable accidents. The system can be installed on an embankment, at an intersection area, at a lane change restriction area, at a no parking area or anywhere there is an observed pattern of drivers intentionally violating traffic laws.

2.5 Detecting Road Traffic Events by Coupling Multiple Timeseries With a Nonparametric Bayesian Method[5]

Road traffic sensors provide rich multivariable datastreams about the current traffic conditions. Occasionally, there are unusual traffic events (such as accidents, jams, and severe weather) that disrupt the expected road traffic conditions. Detecting the occurrence of such events in an online and real-time manner is useful to drivers in planning their routes and in the management of the transportation infrastructure. We propose a new method for detecting traffic events that impact road traffic conditions by extending the Bayesian robust principal component analysis (RPCA) approach. Our method couples multiple traffic datastreams so that they share a certain sparse structure. This sparse structure is used to localize traffic

events in space and time. The traffic datastreams are measurements of different physical quantities (e.g., traffic flow and road occupancy) by different nearby sensors. Our proposed method processes datastreams in an incremental way with small computational cost; hence, it is suitable to detect events in an online and real-time manner. We experimentally analyze the detection performance of the proposed coupled Bayesian RPCA (BRPCA) using real data from loop detectors on the Minnesota I-494. We find that our method significantly improves the detection accuracy when compared with the traditional PCA and non-coupled BRPCA.

3.Proposed System

With the implementation of this approach we will be producing the accurate identification of the fatal accident on road. Here we initially extracting the accident caused video and convert it into frames , we are been considering two frames that is one is the background frame without the object (accident undergone vehicle) and another one is with the accident vehicle. We were first applying a edge detection technique called Sobel Edge Detection Feature Extraction Model. After applying the Sobel edge detection model, we will be applying background subtraction strategy. This could be able to compare those two pictures and came to conclusion that there is a change in the environment. So as a result of that a resultant image is been displayed a background subtraction, only with accident occurred object.

Finally we will be end with the conclusion using the mathematical technique called the particle swarm optimization technique to get the final detection result.

Particle swarm is a population-based algorithm. In this respect it is similar to the genetic algorithm. A collection of individuals called particles move in steps throughout a region. At each step, the algorithm evaluates the objective function at each particle. After this evaluation, the algorithm decides on the new velocity of each particle. The particles move, then the algorithm reevaluates.

The inspiration for the algorithm is flocks of birds or insects swarming. Each particle is attracted to some degree to the best location ithas found so far, andalso to the best location any member of the swarm has found. After some steps, the population can coalesce around one location, or can coalesce around a few locations, or can continue to move. The particle swarm function attempts to optimize using a Particle Swarm Optimization Algorithm.
The following were modular description about each and every description about our project.

3.1 System Architecture

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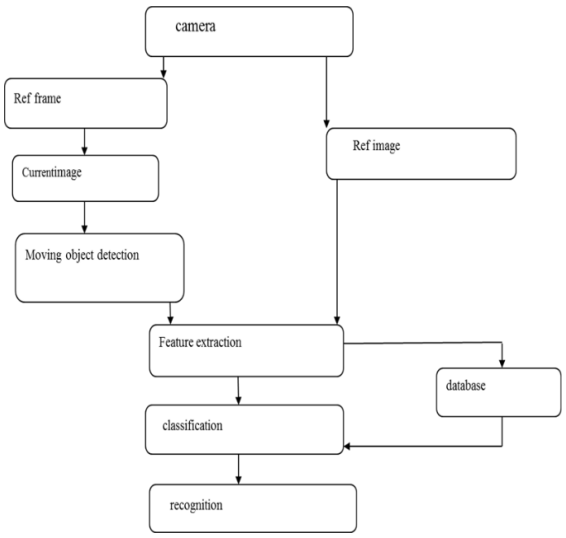

Fig 1: System Architecture

3.2Moving Object Detection

Detection of moving objects and motion - based tracking are very important components of many computer vision applications,including activity recognition,traffic monitoring, and automotive safety. Here we initially extracting the accident caused video and convert it into frames we are been considering two frames that is one is the background frame without the object (accident undergone vehicle) and another one is with the accident vehicle

3.3.Edge Detection

We have been used edge detection technique for the effective visualization of the borders of the object in the frames. Edge detection is the type of feature based detection model. In order to get accurate border of the vehicle, we have chosen edge detection model.

There are many techniques have been discover under edge detection, such as

1.Canny Edge Detection
2.Subpixel Edge Detection
3.Physics inspired edge detection
4.phase congruency-based edge detection
5.Sobel Edge Detection

Sobel Edge Detection

The reason for choosing Sobel is the edges or border of the image are displayed clearly when compared to the other techniques in edge detection. For eg, while using Canon Edge Detection technique on the frames, the interior structure of the object are also be detected. But while using Sobel Edge Detection technique only the border of the object in the frames will be shown clearly. This type of technique is much suitable for our project.

We have applied the sobel edge detection technique on both the frames (Background frame and current frame)

3.4 Background Subraction

The frame which is obtained after applying Sobel Edge Detection technique is been processed under background subtraction. After applying background subtraction we have been facing the problem of displaying the noisy datas.

3.5 Masking

Due to the problem faced after applying background subtraction,we have applied masking for that frame. Initially a type of masking called Dilation is been applied on the frame. This Dialation could expand the frame pixel by pixel.

3.6 Data Collection

The data sets like types of vehicle, dimensional view of the vehicles are been stored in the database.

We have stored the pictures of all the images of vehicle along with all the dimensions of it in the mysql database. We have extracted the features for those images and compared with that of the original image

3.7 Classification

The classification deals with the process of decision making whether the accident is being taken placed or not. This could be don't with method called or the model used is meant to be Particle Swarm Optimization technique.

Here the details about gobalmaximum,local minimum and local maximum are been well defined for the moving object. Figure shows flow process of PSO

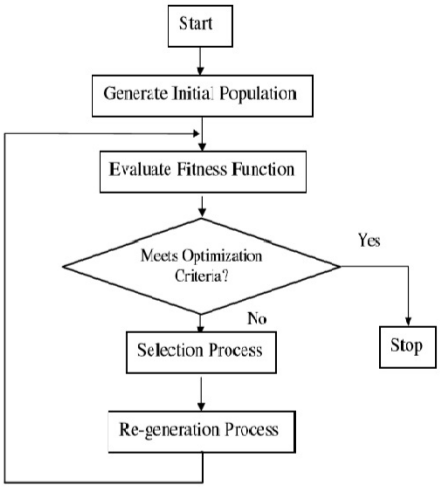

Figure 2: flow chart of PSO

4 Advantage

Since we were using the particle swarm optimization technique, the resultant will be more accurate about the process of reporting that the accident is been taken placed or not.

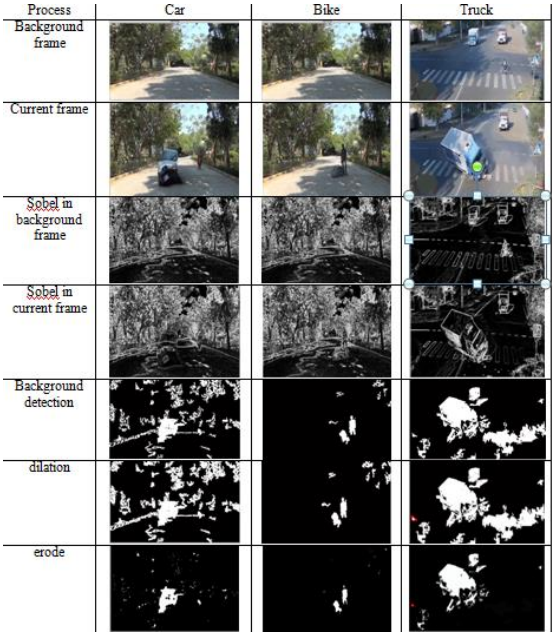

Figure 3: resultant process

5 Conclusion

` We consider the problem of accident occurring in the highways using Particle Swarm Optimisation technique. The reason for choosing Particle Swarm Optimization ,the result obtained from this is more effective and moreover this technique is not been implemented in our reference paper.

6 Future Work

We have implemented this approach using Matlab. In future we have implemented this same approach using java in product level. So that the pocess is been run successfully

We will be implementing the process in the processor. So that the processor will run, detecting the accident in the remote areas and generate an alert message and send to the nearby 108 service station or nearby hospital or police station

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