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A Survey on Safety Helmet Wearing Detection

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Abstract: ***Bike riding is a lot of fun, but accidents happen.People choose motorbikes over car as it is much cheaper to run, easier to park and flexible in traffic. In India more than 37 million people are using two wheelers. Secure helmet wearing detection is very necessary in power travelling. We proposed a innovative and practical safety helmet wearing detection method based on image processing and machine learning. At first, the extract background modeling algorithm is exploited to detect motion object under a view of fix surveilling camera in power substation. After obtaining the motion region of interest, the Histogram of Oriented Gradient (HOG) feature is extracted to describe inner human. And then, based on the result of HOG feature extraction, the Support Vector Machine (SVM) is trained to classify pedestrians. Finally, the safety helmet detection will be implemented by color feature recognition.***

Keywords: ***Histogram of oriented gradient, Support vector machine, Color feature recognition***.

I. INTRODUCTION

Our aims to provide total safety for bikeriders. Recently helmets have been made compulsory, but still people drive without helmets. Pune City has approx. 35 lakh two-wheeler riders, which includes 500-600 accidents every year out of which 300-400 are fatal. Pune ranks first in the city when it comes to two wheelers riders. In the last few years, there has been rapid increase in number of road accidents. Due to rise in road accidents, it has now become necessary to generate a system to limit accidental deaths.

Lots of accidents occurred in power substation because of not wearing helmet while the working. Safety helmet wearing detection is a very common and crucial task for surveillance in power substation.Whereas there are few researches for studying this problem by using image processing techniques. Most researches focus on the approach investigating of motorcyclists whether wearing or not safety helmets. Waranusast et al.developed an automatically detect system for motorcycle riders and was able to ascertain whether they are wearing helmets or not. This system extracts the motion objects and trains a K-Nearest-Neighbor (KNN) classifier for detection. Silva et al.exploited the Hough circular transformation to determine the shape of safety helmet and use the extracted Histogram of Oriented Gradients (HOG) features to train a Multi-layer perceptron classifier, which can effectively and simply detect wearing helmet of motorcyclists. In power substation, the surveillance camera is installed on the fixed location. So the view of camera is fixed which can make sure that the background cannot change in frames. Consider this characteristic, we choose the ViBe background modelling algorithm. Moreover, this method is fast and effective to determine the motion objects. In order to detect the people in power substation whether wearing or not safety helmet, the second step is that obtaining the human location and image information. Thus, we extract the HOG feature of people and train the SVM classifier for people to classify pedestrian in power substation. When we know the human information in frames, we can utilize the color feature to detect safety helmet wearing situations.

II. LITERATURE REVIEW

Jie Li, Huanming Liu, Tianzheng Wang, and Min Jiang describes, [1] the system in which image processing and machine learning is used to detect the safety helmets. They uses three phases to detect safety helmet i.e. background modelling, pedestrian classification and finally safety helmet detection. In background modelling ViBe background modelling algorithm is used to detect motion objects under the fix surveillant, after detecting motion objects they used Histogram of gradient (HOG) which explains the inner human and support vector machine (SVM) is used to classify pedestrians. At last color feature recognition method is used to detect whether the persons wearing safety helmet or not. They also used few machine learning concepts like squeezing out HOG feature and training support vector machine (SVM).The ongoing work of this system is improving accuracy and performance of the algorithms.

R. Silva, K. Aires, and R. Veras [2] describes, Helmet detection on Motorcyclists using image descriptors and classifiers. Theyobserves increasing number of motorcycle accidents due to this they aims to propose a system for detection of motorcyclistswithout helmet. For this they used, Circular Hough transform and the Histogram of gradients descriptors to squeeze out the image attributes. Then they used Multilayer perceptron and final results compared with other algorithms. This system is divided in three phases, 1. Moving objects classification, 2. Moving classification 3. Safety helmet detection. This system was the computer vision system. From this they observes that, results of the systems are promising but can be improved. They also observes that descriptors used in this system return a lots of features and this is difficult to classification.

W. Cai, J. Le, C. Jin, and K. Liu [3] describes, Real-time image identification based anti-manmade misoperation system for substations. This system will be the antimisoperation system which is proposed to prevent manmade misoperations, for this they used real time sign board image identification technology. They applied Hough transformation to detect the border of sign board image. They observed that the system will have accuracy of 97.5%.System is based on projection method and have 100 % character partition accuracy. In this system they also used the concept of Artificial Neural Network (ANN) used identify image characters. The proposed system will used to prevent substation operation workers from accessing the wrong bay. This system can be used to improve the validity and safety of substation operations.

Abu H. M. Rubaiyat, Tanjin T. Toma, Masoumeh Kalantari-Khandani [4] describes, Automatic Detection of Helmet Uses for Construction Safety. The proposed method can be divided into two parts 1) Construction worker detection 2) helmet use detection.In the first part, for extracting frequency domain information from the segmented images Discrete Cosine Transform (DCT) is used after that Histogram of Gradients (HOG) feature is squeeze out from DCT coefficients. In the second part, helmet use is detected with combining color information and Circle Hough Transform (CHT).This proposed system can detect helmets of different colors like yellow, blue, red, white. For extension of the work they aims to make system scalable, for detecting the helmets with different colors.

R.Waranusast, N. Bundon, V. Timtong, C. Tangnoi, and P. Pattanathaburt [5] describes, Machine vision techniques for motorcycle safety helmet detection. The proposed system is developed to detect motorcycle riders are wearing helmet or not. In this system, Firstly system will detects the moving objects and classifies them as a motorcycle or other moving objects. For detection of the safety helmet they used K-Nearest Neighbour classifier (KNN) algorithm. In this system, firstly input image is captured through camera from video sequence then moving objects will be detected, after that motorcycle recognition and then rider count and head extraction will be done, and last head classification is done, finally output will displays motorcycle rider wearing helmet or not.

MinWang, lian-QingWang, Hong Qiao [6] describes, improved Shape Context Algorithm for Online Fast Recognition-An Application in Pedestrian Detection from a Moving Vehicle. In this paper the author will improved the shape context algorithm, shape context algorithm is nothing but the one of the good method for object recognition. The author will invented improved shape context algorithm which gives optimal hierarchical structure and also provides new reference point selection criteria. By comparing this algorithm with original algorithm the authors will realize that the improved shape context algorithm will gives better recognition accuracy as well as it decreases the computational cost. This improved algorithm will helps to detect the pedestrian from moving vehicle.

R.Wachal, J. Stoezel, M. Peckover and D. Godkin [7] describes, computer vision early warning ice detection system for the Smart Grid, in Transmission and Distribution Conference and Exposition. This paper is invented to detect ice for the smart grid,the author was used computer vision technique for detection. This is a ice detection system which provides hoar frost transformation to ice detection.

II. PROPOSED SYSTEM

The main aim of this study is to propose and develop a system for automatic detection of helmets on public roads. The moto of this project is accident prevention by using the methods of helmet authentication, fall detection etc.

Helmet Detection: More than one third who died in road accidents could have survived if they had worn a helmet. Studies shows that usage of helmet can save accident death by 30 to 40%. The rate at which number of two wheelers in India is rising is 20 times the rate at which human population is growing. The risk of death is 2.5 times more among riders not wearing a helmet compared with those wearing a helmet.

- SYSTEM ARCHITECTURE

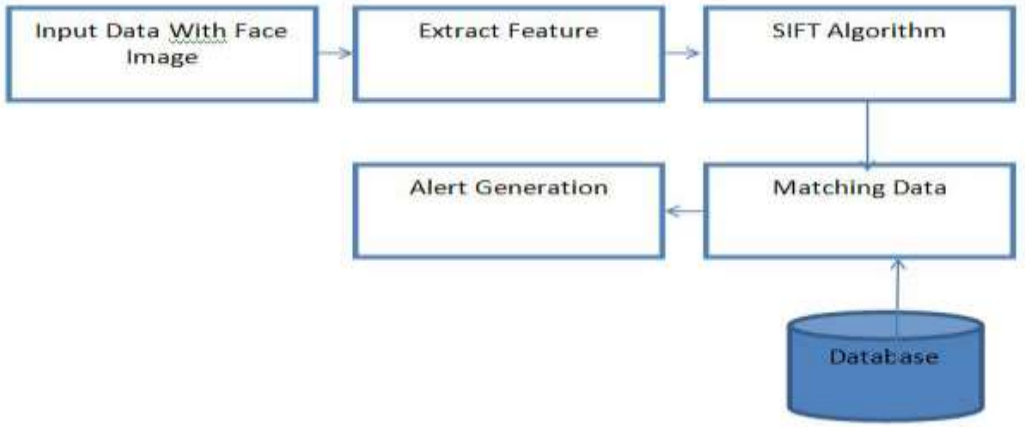

Fig 1-: System Architecture

CONCLUSION AND FUTURE SCOPE

After this survey we observed that, the lot of work is done in the field of image processing for detection of safety helmet, we get that secure helmet wearing detection is done with the help of different algorithms. We extend this work for detection of secure helmet in power substation with the help of different algorithms.

In future we intend to use more advanced safety measures like to check alcohol consumption, lane change detection, collision detection, traffic information, e-toll collection, license renewal etc. We also think of applying deep neural network techniques & make transportation more intelligent

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