Secure helmet wearing detection by using image processing and machine learning

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ABSTRACT: The secure helmet wearing detection is very needed in power substation. At first, the ViBe background modelling algorithm is used to detect the moving object under a view of fix surveillant camera in power substation. After that obtaining the movement region of interest, the Histogram of Oriented Gradient (HOG) feature is used to relate inner human. And then, based on the result of HOG quality selection, the Support Vector Machine (SVM) is developed to classify pedestrians. Finally, the safety helmet detection will be executed by colour feature identification. gripping experimental results indicated the accuracy and effectiveness of our proposed method .The U.S. construction industry suffers from the large amount of fatalities among all factories, that is, one of five workman expires in private factories were in power substation. Large amount of loss has occurred to the workers family members, the factory, and the countries. Considering the highest and increasing number of substation projects that are being handled in the U.S., there is a highest necessity of developing innovative methods to automatically monitor the safety for the workers at power substation.

KEYWORDS: ViBe, Histogram of oriented gradient, Support vector machine,Color feature recognition

INTRODUCTION

The many accidents occurred in power substation reason of that is not wearing helmet while the time of working. Secure helmet wearing detection is a very common 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 secure helmet or not wearing secure helmet. 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-Neighbour (KNN) classifier for detection.

The objective of our proposed system is to present the practical secure helmet wearing detection method by using image processing and machine learning in power substation. In order to decrease discover range of surveillance video, the ViBe background modelling algorithm is used to detect the motion of objects in foreground frame. After that, we used Histogram of Oriented Gradient (HOG) feature of pedestrians in corresponding range and use Support Vector Machine (SVM) to classify the human. Finally, the color feature is used to determine whether the human wearing secure helmet or not. Our proposed method includes machine learning like extracting HOG features and training SVM, meanwhile includes image processing like color feature recognition in RGB color space. Extensive experimental results in power substation illustrate the effectiveness and efficient of our proposed method.

Mathematical Module:-

• **Input**: ImageCapturedthroughCamera

• **Output:** ClassificationandSafetyhelmetdetection

• **Input Functions (I):**

 I=Image, VB=ViBe algorithm, NOD=No object detect, OD=Object detect, H&S= HOG and SVM extraction, CFR=Color Feature recognition.$Q = \{ q0,q1,q2,q3,qf\}I = \{I, VB, NOD, OD, H\&S, CFR\}qf= Q*I$

Input States (Q) :

$q0$ = Fixed Camera position

$q1$ = Object detection process

$q2$ =Valid object detect

 $q3$ = processed valid pedestrian

 qf= valid pedestrian with helmet
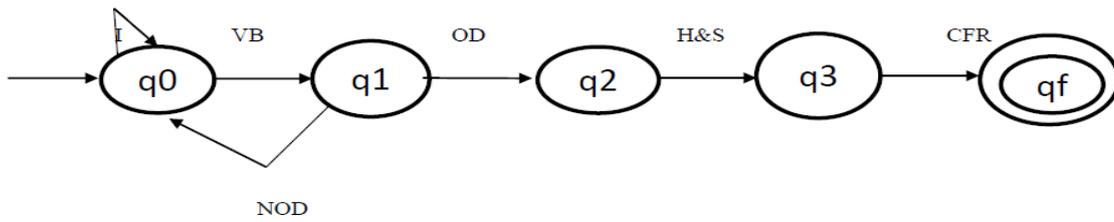
Block Diagram:-
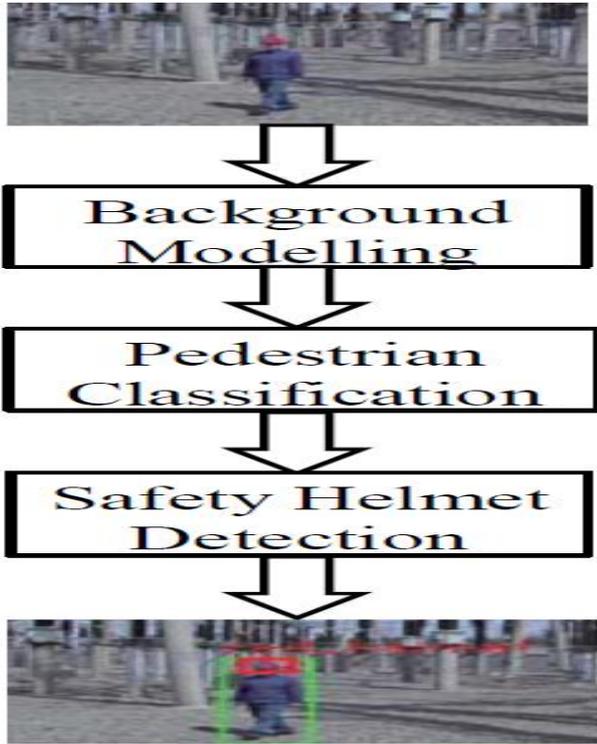
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CONCLUSION:

After this survey we observed that, the lots 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.

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