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REVIEW ON HUMAN ACTIVITY RECOGNITION USING MACHINE LEARNING & OPEN-CV PYTHON

Snehal Wankhede[*1], Dr.Sachin Chaudhari[*2]

[*1]Student Department Of Computer Science, Jhulelal Institute Of Technology, Nagpur, India.

[*2]Guide, Department of Computer Science and Engineering, Jhulelal Institute of Technology, Nagpur, India.

ABSTRACT

The perception of Human Activity is authentically consequential these days as we all are living in the era of the latest technologies where everything comes under surveillance and everything gets recorded. For apperception of human activities through their forms of kineticism, it is paramount to detect body components like the face, ocular perceivers mouth, hand, and other body components, this detection avails in amending apperception of human activities from sundry angles. In this paper detection of the face and its components are discussed. For that, the Open-CV library of python is utilized as a key module. Webcam is utilized as a front reader of the activities.

Keywords: Detection, Body Parts, Opencv, Machine Learning.

I. INTRODUCTION

Human activity apperception plays a paramount role in human-to-human interaction and interpersonal cognitions. Because it provides information about the identity of a person, their personality, and psychological state, it is arduous to extract. The human faculty to analyze another person's activities is one of the main subjects of study of the scientific areas of computer vision and machine learning. As a result of this research, many applications, including video surveillance systems, human-computer interaction, and robotics for human comportment characterization, require a multiple activity apperception system. Human activities, such as "walking" and "running," arise very naturally in daily life and are relatively easy to digest. On the other hand, more involuntary activities, such as "peeling an apple," are more arduous to identify. Intricate activities may be decomposed into other simpler activities, which are generally more facile to perceive. Customarily, the detection of objects in a scene may avail to better understand human activities as it may provide serviceable information about the perpetual event Most of the work in human activity apperception postulates a figure-centric scene of an uncluttered background, where the actor is in liberty to perform an activity.

II. LITERATURE REVIEW

Ong Chin Ann et al.,[1], Human Activity Apperception is one of the active research areas in computer vision for sundry contexts like security surveillance, healthcare, and human-computer interaction. In this paper, a total of thirty-two recent research papers on sensing technologies utilized in HAR are reviewed. The review covers three areas of sensing technologies namely RGB cameras, depth sensors, and wearable contrivances. It discusses the pros and cons of the mentioned sensing technologies. The findings showed that RGB cameras have lower popularity when compared to depth sensors and wearable contrivances in HAR research.

Nattapon Noorit et al., [2], propose a human activity apperception method predicated on the FSM model. The rudimental actions (standing, ambulating, sitting, bending, laying) with their properties (location, kineticism) for each person in the intrigued area, like an activity stream, are perceived utilizing the predefined.

M. S. Ryoo et al., [3], in this paper, authors present a novel approach to human activity presage. Human activity presage is a probabilistic process of inferring perpetual activities from videos only containing onsets (i.e. the commencement part) of the activities. The goal is to enable early apperception of unfinished activities as opposed to the after-the-fact relegation of consummated activities.

Ms. Shikha et al., [4], a perspicacious human activity the apperception system is developed. Convolutional neural network (CNN) with spatiotemporal three dimensional (3D) kernels are trained utilizing Kinetics data set which has 400 classes that depicts activities of humans in their everyday life and work and consist of 400 and more videos for each class.

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Vinitha.V et al.,[5], the practical application of human activity apperception consists of automatically relegating/categorizing a dataset of videos on disk, Training, and monitoring a task to perform opportunely, verifying the task is done. Recently, deep learning methods such as CNN and RNN have obtained results by automatically learning features from the raw sensor data.

Mounika Chalapati et al.,[6], proposed the two main steps that compose aberrant human activity detection systems which are demeanor representation and modeling. And utilized different techniques, cognate to feature extraction and description for demeanor representation as well as unsupervised relegation methods for deportment modeling. In integration, available datasets and metrics for performance evaluation will be presented. Determinately, this paper aimed to detect eccentric deported objects in-crowd, such as expeditious kineticism in a crowd of ambulating people.

III. PROPOSED METHODOLOGY

The proposed methodology consists of detection of face, eyes, and mouth. The system architecture flow given below shows the complete process to be followed during detection.

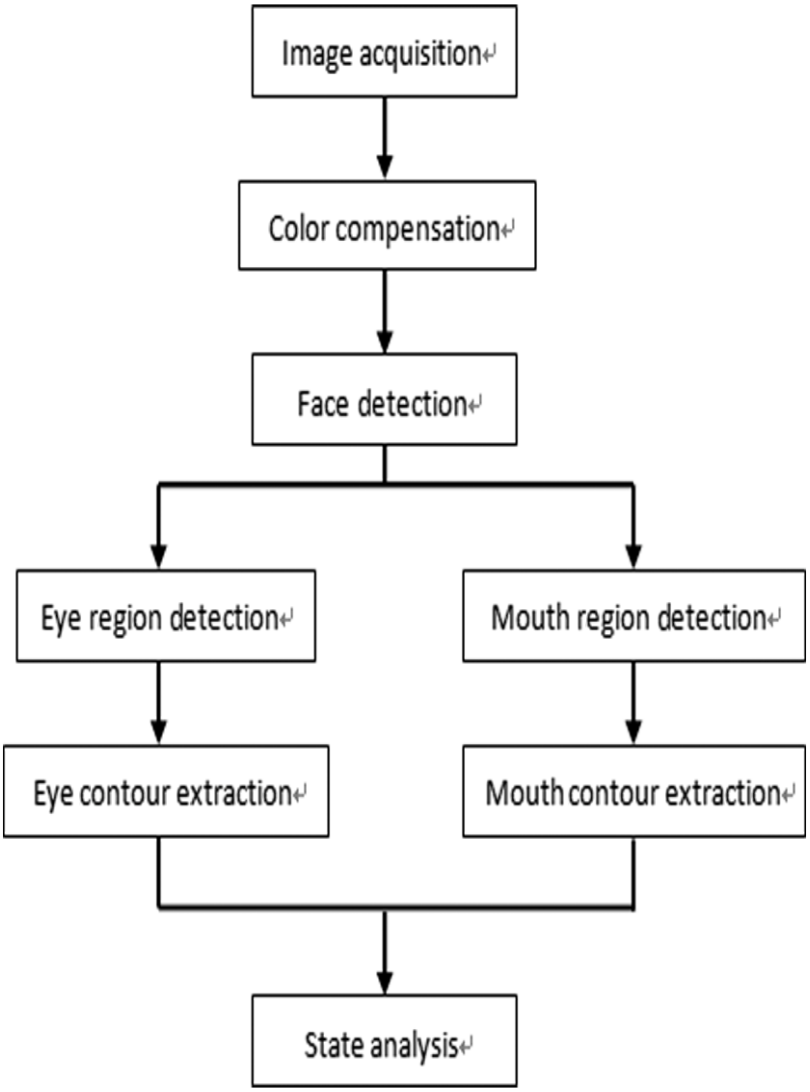

Figure 1: System Flow Diagram

Convolutional Neural Network Algorithm:

With the development of technologies and its integration with hardware and software has become the main adoption method for sundry projects predicated on CNN (Convolutional Neural Network) specially for image relegation process. In this paper fundamental concepts of CNN are studied for the down sampling function in OpenCV to process the picture.

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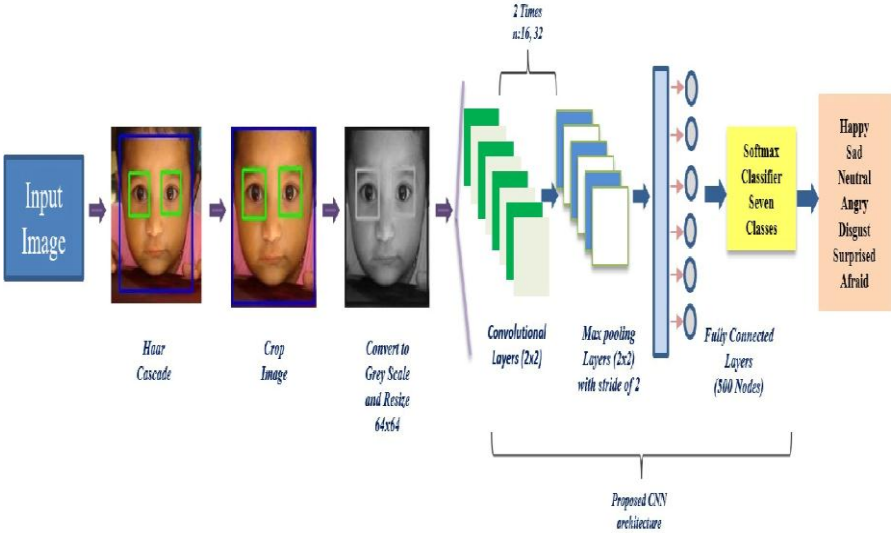

Figure 2: Image Classification using CNN Algorithm

Support Vector Machine Algorithm:

The SVM is a classifier used to classify different expressions and emotion states like sad, happy, anger, fear, neutral, etc., from a Berlin emotional database that gives almost 93.70% accuracy. The relegation task is simply to determine which side of the hyperplane the testing vectors reside in. Minimizing the structural risk abbreviates the average error of the inputs and their target vectors. In the description that follows, training data are relegated to binary classes.

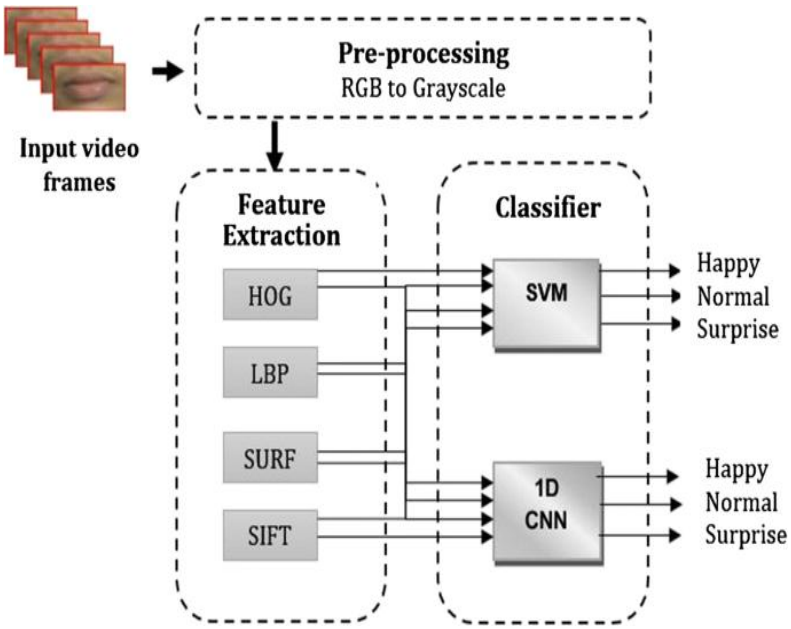

Figure 3: SVM Classification

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IV. SYSTEM WORKING

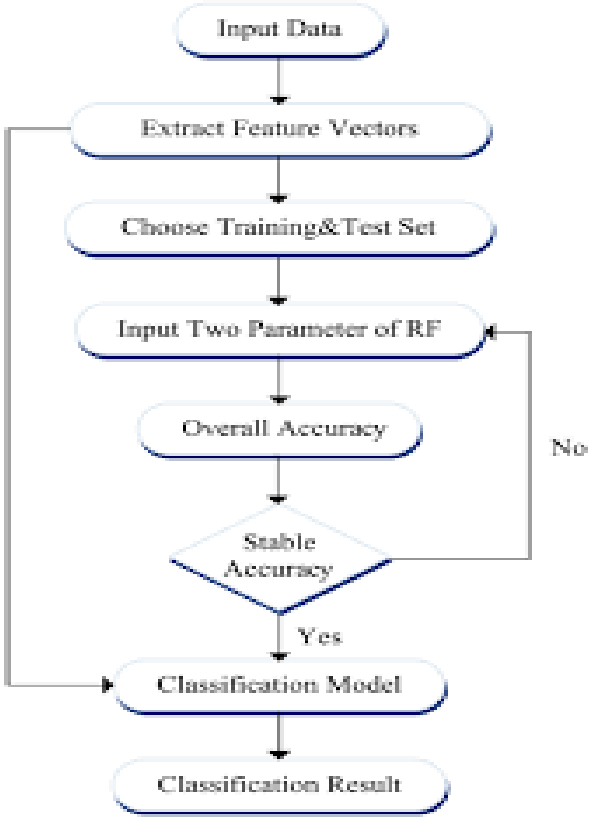

Figure 4: Flow Chart

The complete project is divided into two modules and in this paper, module first is discussed clearly.

Module first: In this module detection of human face, eyes, and mouth is done with the help of HAAR cascade classifier and most important open-cv without which the module cannot be completed.

Module second: In this module full body detection with human activity recognition will be performed. The classification and detention of various human activity via live video streaming can be done using CNN and SVM algorithms that are especially used for classification modules.

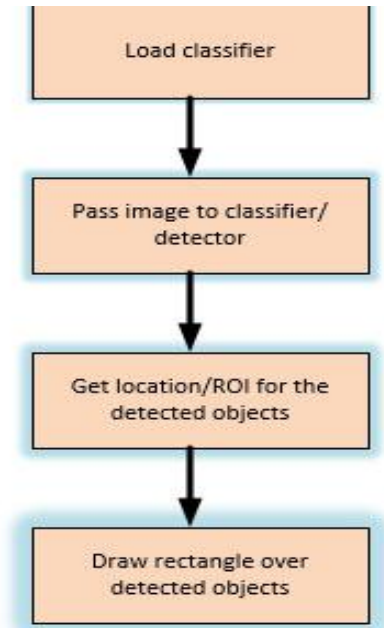

Figure 5: Detection Process Flow

Step 1: Turn on the system to start the live streaming through a webcam.

Step 2: From the live video multiple clips of captured images will be stored.

Step 3: Feature extraction of the captured image is done in this stage, to separate the specific area that contains possibilities of face, eyes, and mouth.

Step 4: The detection of human face, eyes, and mouth will start here using HAAR cascade.

Step 5: After the detection of face, eyes and mouth a rectangular frame is made around the detected area to specify the result obtained.

Step 6: The capturing of video will continue till the stop button is pressed.

V. CONCLUSION

Human activity analysis could be a prevalent activity within the growing business and we have applied thoroughly different machine learning algorithms. A comparative study was performed among the applied sundry techniques KNN, SVM, absolute Forest, Neural Networks, supplying regression, and Naïve Thomas Bayes. In them, supplying Regression and with the neural network gave keenly intellective results whereas abundant Thomas Bayes result wasn't perspicacious. The implementation of Neural Network on Python gave higher results than the one provided within the Orange implementation. The circumscriptions of this work area unit tho' the potency of the neural networks are saccharine, the model isn't dynamic. The shortcoming of obtaining training with authentic-time erudition can coerce the U.S. to coach the model when early cognizance comes. In the future, these results are utilized for engendering smart watches and kindred contrivances that may track a user's activity and exhort him/her of the routine activity log. they will still be utilized for observance of older individuals, jail inmates, or anyone WHO needs constant superintendence.

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