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Analysis and Identification of Human Motor Activity using KNN algorithm

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ABSTRACT: *This paper proposes a method for human activity detection using K-Nearest Neighbour algorithm. By using this algorithm basic activities of the human are walking, running, hand waving, hand clapping and jogging is detected. Initially video is comprised into frames Next feature extraction takes place. Feature extraction is filtering the high pass, low pass noises and detecting the corners of the human poster in every frame. This is done using Harris corner detection algorithm. Next by using corner points in every frame the activity of the human poster is detected using K-Nearest Neighbour algorithm. In this Kth dataset is used for testing the algorithm.*

Keywords: *K- Nearest neighbour algorithm, CNN algorithm, Harris corner detection, Human activity detection, human motor identification*

I. INTRODUCTION

Normally Human activity recognition plays vital role in video surveillance cameras. It has wide range of applications. Normally surveillance cameras record all the activities done by humans and objects but there is no detection or intimation to the corresponding department. But using this algorithm detection of human activities done in any place at any time. The main objective of this is to record the human activity real time and get the activity if it is under abnormal activity it should be intimate nearby corresponding institute.

Human action recognition is one of the crucial part in computer vision. Computer vision is a type of understanding the data from image or sequence of frames of images in a video. Computer vision is mainly used in industrial applications, activity recognition, majorly in society works like traffic issues, human-computer interactions, surveillance cameras, robotics. There are many types of human action recognition like video based recognition, wearable sensors, wireless sensor networks. Due to high accuracy in the output many industrial application purposes uses video based recognition. Normally video based recognition uses algorithms like CNN, KNN, SVM. Wearable sensors use devices should have attached to the joints of the body to get the required output. Here initially the video is recorded. The recorded video is comprised into frames. Frames should be taken 50 frames as per the length of the video it will be divided. Using loops it will be paused and the snapshots will be taken. Next Feature extraction is done. Feature extraction will consist of several steps converting coloured image into greyscale image, and using median filters can decrease the salt and pepper noises, after find out the corner points in every frame. This detection of corners is done using Harris corner detection. Next using KNN algorithm for differentiating the action done by the human poster in the input video.

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II. LITERATURE REVIEW

Pinky Paul et al [1] proposes human activity recognisation is done using sensors present in the smart phone such as accelerometer and speedometer. This action recognition uses mainly data mining and machine learning algorithms. In this KNN algorithm is used for the classification of actions and improvement of minimum distance and KNN is clustered KNN. Here performance and accuracy between the trained datasets available on mobile phone and thefinally declared as clustered KNN is advantageous.

Allah Bux Sargano et al[2] Human action recognition will come under field of computer vision and it has homogeneous applications. Recently Deep learning came into exitance with more applications like speech recognition, image classification, object recognition. Here deep CNN for pre trained datasets and next is feature extraction and activity classification is done using hybrid KNN and SVM algorithms. Here comparative analysis in performance and accuracy of activities like running, walking, hand clapping using UCF and KTH datasets with an accuracy of 98% and 91%.

Ismael Serrano et al[3]proposes mainly concentrated on fight between two persons or more number of persons. This will be mainly used in prisons, roads, psychiatric wards and inbuilt camera in smartphones. This paper uses deep CNN algorithms for pre trained datasets. Next the image frame works for getting the recognition. Here using movie and sports data sets with an accuracy of 98% and 94%.

Aqib Mumtaz et al[4] proposes a new method for detecting the violence activities from the surveillance cameras. Normally in previous methods are in the type of detecting the wall posters of the human motions of the body. But here using deep learning based transfer learning technique for detecting the activity. The accuracy obtained by using this method is 99% using movie data set.

seymanur Akti et al [5] proposes vision based fight detection from the surveillance cameras is a big task to detect. This is mainly used in public areas and jails. Here LSTM approach for finding the action of persons. Here first the use deep CNN for pre trained datasets next using LSTM for detection weather fight is present or not.

M.Govindarajan et al[6]proposes the derivation of the whole information from the database is called as data mining. Here the activity detection done based on the feature maps and motion detection. After KNN algorithm is used for the classification of activities. Here reduced the error rate and run time from 0.06 to 0.01.

Ersin ESEN et al[7]proposes fight detection from surveillance cameras is an difficult task. Only for fight detection a approached new technique initially extract the motion features from the comprised frames. Next finding the direction and magnitude from the fight frames. By using vector measurements will segregate the actions.

Fath U Min Ullah et al[8]proposes abnormal sequences from surveillance cameras is detected. First the video is comprised into frames using CNN. Next using deep CNN it will find out the actions using the spatiotemporal interests points. By using online data sets finding the accuracy of the algorithm.

G.Akilandasowmya et al[9]proposes initially converting low frequency to high frequency video with some techniques. After KNN algorithm for activity identification. Before that some similar techniques like identification of object, extraction of features from the every frame. After find out the wave pattern of the movement of the body in every frame that is paused. Here two data sets are Kth and WIEZMANN got the accuracy of 98%.

Ivo Draganov et al[10]proposes normally activity identification is done in many types. Here using sensors that is attached to the body. By using the movement of the hands, legs sensor will give some raw data. By using the

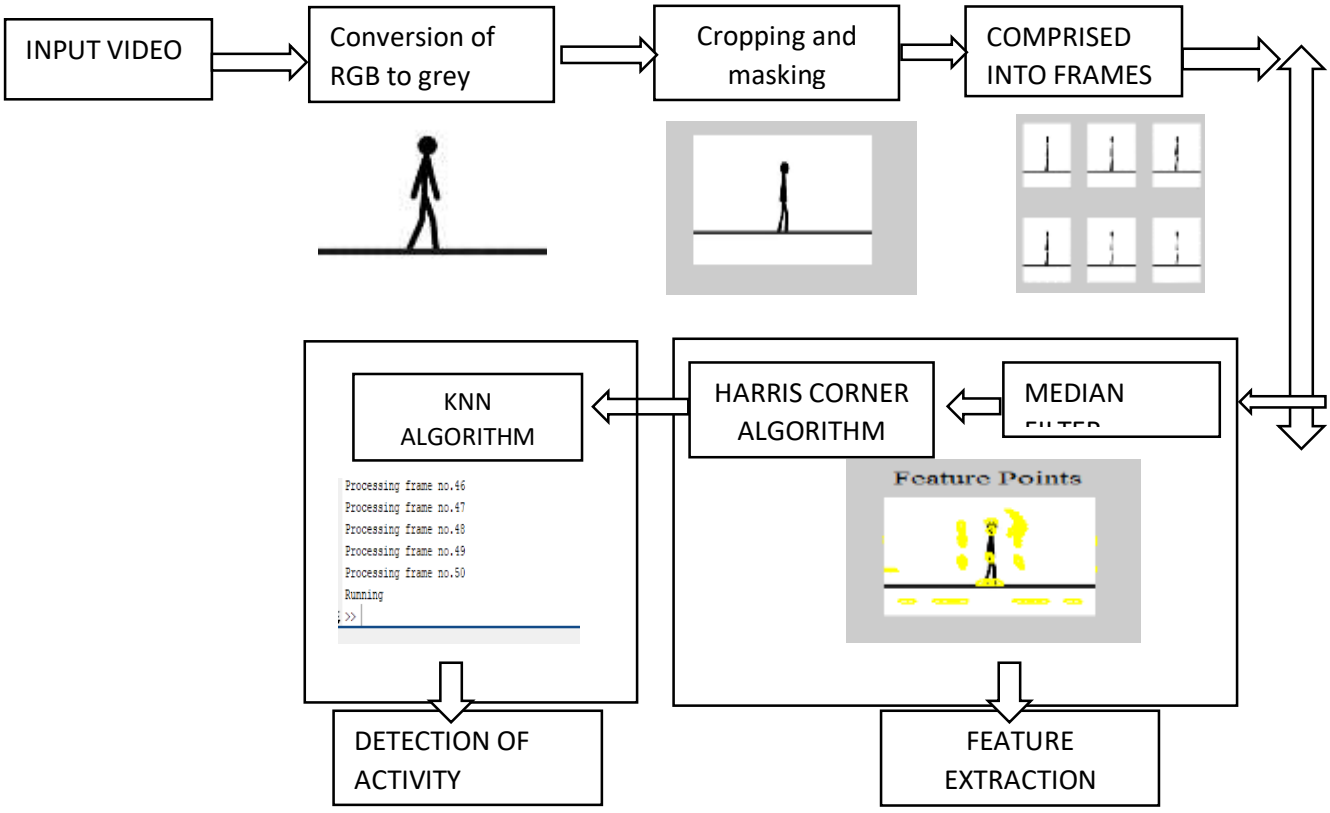
raw data finding out the activity of human body. Here using vector representation for finding the activity using KNN algorithm.

JAN MANTYJARVI [11]proposes human motor identification is done using sensors that is attached to our body. Mainly accelerometer sensor is used. The sensors will collect the raw information using that the waveform will be generated by using two main components PCA and ICA. The accuracy of these sensors is up to 90%.

Michael B et al[12] proposes comparative survey on all the algorithms ,data sets and accuracies. Here merits and demerits of all algorithms is given that is used for the activity recognition. The accuracies obtained by INARC multi view data set is 80% and movie data set is 85% and sports data set is 78%.

Liming Chen et al[13] proposes comparative survey on activity recognition using wearable sensors and accelerometer which is inside the mobile phone. Here differentiates between the data driven methods and knowledge driven approaches.

III. BLOCK DIAGRAM



IV. WORKING

Initially activity of human will be taken from the surveillance camera. Next the video is comprised into frames as per the program module(fig 1). Normally the rate of the frames is divided as per the length of the video. [15]Using necessary command the video is paused at that point of time the frame is divided from the video. Next feature extraction consists of median filter and detection of corners in an image.

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Median filters:

This is a type of non-linear filtering where it can removes noises present in every frame of the image. Mainly this is done in the time of pre processing for recreating exact poster of the frame with out noises. Here median filter works as per the program. Initially it takes all the pixel values the image. The middle value is replaced by the medium value of the matrix. Such that most of the intensity and brightness and noise will be reduced.

Harris corner algorithm:

[16] It is mainly used for the detection of corners and edges in every frame. By using this corner points can see the exact poster of the human or any object. This is done using the changing the intensity in the image. Basically image is converted into the grey scale.

$\Sigma[I(x + u, y + v)-I(x, y)]^2$

Using this formulae can get the change of the intensity values in the image. Eigen values will say weather it is corner or edge or flat.

R~0 flat R>>corner R<<edge

CNN algorithm:

It is a type of neural network where every node is a type of frame that is connected to every other single frame. Normally in CNN every node will have only three node that is connected to the every other node.

Normally it has three steps:

Convolution:

Initially the image is converted into grey scale and floating point image. Where floating point image will be consists of all pixels values that is in the range of 0 to 255. Next feature frames of the poster is selected from the different frames. Window is created in the size of 3*3 or any n*n size of matrix. That window is rotated from top to the bottom of the image. Feature poster will be my multiplied by the respective window. The obtained pixel value is kept at the middle of the window. By using this pixels can shrink the size of the image.

RELU :

In this layer negative values will be given as the zero. And the positive values will be remained as same.

$F(x)= 0$ if $x < 0$

$F(x) = x$ if $x >= 0$

Pooling:

The main aim of pooling is to shrink the size of the matrix where here normally the window size of 2 or 3. The window will be moved from top to the bottom of the image. Here the maximum value in the window will be taken.

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KNN Algorithm:

The main aim of using this algorithm is to differentiate the activities which is followed by human. This is done using value of the k. Value of k is founded using Euclidean distance or Manhattan distance. In that region which group of variables is higher that activity is declared.

Euclidean distance

$((x2 - x1)^2 - (y2 - y2)^2)^{1/2}$

Manhattan distance

$|x2 - x1| + |y2 - y1|$

IMPLEMENTATION AND RESULT:

[Fig1] will describes initial stage of the process video into frames. After that feature extraction takes place. [fig2] Next pre processing of frames is done. [fig 3] After using KNN and CNN algorithm the output is obtained.

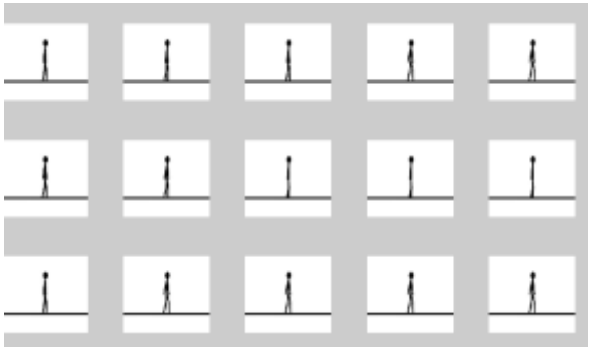

Fig 1

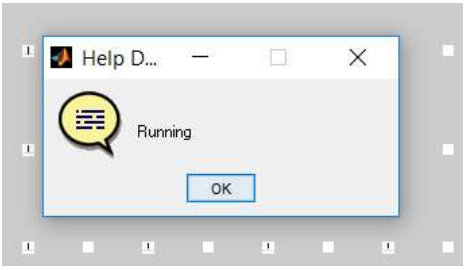

Fig 2

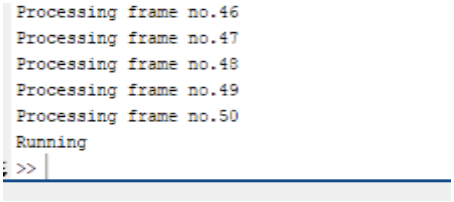

Fig 3

V. CONCLUSION AND FUTURE WORK

In this paper recognising of human activities using CNN and KNN algorithms. Initially frames is divided next feature points is founded. Next CNN algorithm is used for the finding the pixel values of the images this values is sent to the KNN algorithm for differentiate the values. Furthermore will do for the two and more persons in the video.

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