Fall Detection in Elderly Old people using the Convolution Neural network

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***Abstract* —** Due to increase in nuclear families the elderly old person at home are having less attention towards their health. This leads to admit them into an old age home or they have to leave their life in loneliness. Due to this most of the time they have to take care of themselves in all the manner like taking medicine or doing daily chores and etc. This may lead to an accidental fall at home or at care centers. The unavailability of the help after fall may cause serious health issues or it may be fatal too. So to identify these falls using the image processing idea always boosts the noble cause of helping old age peoples. To provide the economically feasible solution for this, proposed system uses the concept of Convolution neural network in image processing. There is a need to maintain the vigilance on the lonely person through camera through frame by frame to monitor their falling. Region of interest and pixel displacement in temporal effect is being evaluated using the CNN to measure the fall and send an alert. This approach will be further elaborated in the future editions of this research.

Keywords: *Fall Detection, Image Normalization, Convolution Neural network.*

I. INTRODUCTION

The region of Interest or ROI refers to the particular portion of the image that is of alleviated interest. This is particularly useful in the area of image processing as most of the images that are used for the purpose of evaluation tend to have various objects and areas that are relevant to the process. there are also a lot more areas that are evident in the image that are of no interest in that particular process and therefore need to be removed.

Keeping only the relevant parts of the image to perform processing is very optimal as it reduces the chances of a false positive being detected due to the presence of an unwanted region. The Region of Interest also narrows the field of view of the particular algorithm which results in an increase in the accuracy of the system overall. The exclusive nature of the Region of Interest application also reduces the time and space complexity for the system as the irrelevant parts are purged, which reduces the time is taken and overall efficiency of the system.

The region of Interest is one of the most important aspects of image processing as it enables a lot more optimized approach to image processing by only concerning with the useful parts and not wasting the computational power of the machine by utilizing it for processing the unnecessary parts of the image. More than one Region of Interest can be present in the image and can be used for filtering images efficiently.

CNN stands for Convolutional Neural Networks. They are a subclass of a broad range of algorithms based on the working of a Human Brain, Artificial Neural Networks. These types of networks are in use very popularly as they are designed after a human brain to enable a human-like response from a machine. As human brains have been the source of most of our inventions.

The Artificial Neural Networks were completely modeled after the Human Brain. Therefore, it has characteristics pertaining to it, such as the basic unit of computation in the human brain is the neuron, which is the same as the Artificial neural network, which has its smallest computational unit as the neuron. The Neuron in the human brain can be stimulated with the help of input given through the sensory organs.

The neuron only fires when a certain threshold of simulation is reached, which is thoroughly adapted into the Neural networks. The human brain has an excess of 1 billion neurons that make up the working human brain which can think and make decisions. The artificial neural networks also employ a multitude of neurons that are layered and only fires when a pre-programmed stimulation threshold is reached.

Convolutional Neural Networks deploy a series of convolutional layers which act as independent filters. These filters are capable of analyzing the input thoroughly layer by

layer and therefore turn into valuable control parameters that can determine useful data from the dataset. This property is very useful in the application of Convolutional Neural Networks for the purpose of image processing and recognition.

The Convolutional Neural Networks are quite powerful and they are predominantly used for solvingdescriptive and generative problems. These tasks value human-like behavior and therefore, the use of Neural Networks is preferred. These networks are capable of easily performing computer vision related tasks which can perform recognition on images as well as video.

A decision tree is one of the simplest and powerful method for prediction and classification of data. it has been in widespread use in a variety of classification applications. When the Decision Tree is plotted graphically, it looks like the branches of a tree. Each of the points where it branches out is known as a node.

Each node has a minimum of two possibilities that can exist. This is a very useful approach for classification as the data can be filtered according to the various complexities that are suited for each level. The branches can be innumerable in number and complex and detailed decision trees are known to provide a very accurate classification task. The decision treesisa very useful tool in machine learning and performing image classification tasks.

This research paper dedicates section 2 for analysis of past work as literature survey, section 3 deeply elaborates the proposed technique and whereas section 4 evaluates the performance of the system and finally section 5 concludes the paper with traces of future enhancement.

II. LITERATURE SURVEY

This section of the literature survey eventually reveals some facts based on thoughtful analysis of many authors work as follows.

J. Lee [1] There has been the rapid growth from the last decade in fall detection method due there are many death causes because of the falls mostly in older people. The researchers are attention has been increased towards the fall detection. There are various type falls sun falls, ADL fall, no-one falls this are various fall, which was very hard to predict the real fall, which can cause the death or injury, so the first the vertical velocity based wearable sensor is proposed. Then the velocity is counted between the fall, ADL, non-fall the accuracy rate of high fall is predicted as the real fall which can cause the injury.

K. Cocoa [2] There has a major problem in older ages people there fall and there with no one to help them some time. Thus, this paper is a solution for this I which there are major steps taken for fall detection and fall prevention. There are many methods invented to predict fall detection by using the sensing method. But later most of the researcher shifted towards fall prevention. Fall prevention means the fall should be predicted before the event happen. This is done by using the common ground classification is used. This fall detection and fall prevention tracked by using data processing.

B. So [3] Human falls have been the major issue nowadays mostly in old peoples. In this paper, they have used Wavelet transform to detect the human falls using the ceiling mounted Doppler range control radar. This radar senses the motion of any falls and the moon falls by using the Doppler effect. Thus, this is an elder care application which is a promising technique to detect the fall detection The first stage is the prescreen stage in which there use the coefficients, in which the time locations is given in which the fall can occur and this method is one best method.

N. Otanasap [4] There is the following incident not only with the old ones but also with the young ones, this may cause serious injury or also the death. If fall can be predicted before the fall phase or before profile, then it can reduce the impact of a fall is useful such as the airbag. There is various detection method using the threshold value, but they have used after the fall detection. In this paper there is a threshold value is predicted before falling there several instances are adjusted with both male and female. Thus the accuracy rate of the is above 95%.

T. Nguyen [5] In this paper there is a mobile waist device implemented which monitor I [the subject means the humans if any fall activity event is going to occur it will send the message the on mobile by using the CDMA module. It also produces the sound of 50 Hz, so that the subject can stand or sit. Kionix KXM52-105 tri-axial accelerometer and a Bellwave BSM856 CDMA this mode are used to predict the fall events. Thus, this solution can prevent death by using this unsupervised learning.

L Kau [6] In this paper the novel architecture for the accident the fall detection is used by using the smartphone by using the 3G networks. When the fall detection, the incident takes place the global positioning system (GPS) or the assisted position GPS the user position is acquired and sent to rescue center so that they may get help from the medical side. In this paper, the proposed cascaded classification architecture because of thus the computational burden on the smartphone can reduce. This method is better than the previous researches.

J. Chua [7] Fall detection is one of the most serious things to take the measures decision against it. Thus, this updated propose of fall detection, which is done usinga camera. This fall detection method of the human shape

analysis and human head detection to detect the normal daily activities. To detect the fall detection the tow novel head shape model is proposed to detect the head of the person. The proposed method result is able to achieve high detection accuracy.

C. LAN [8] The proportion of the senior citizen is more among the global population. Fall is often the cause of the death of old people. In real time fall can occur in four directions that is forward, backward, rightward or leftward. But only there is a difference in the accuracy rate of falling that will detect it serious fall which is serious that can cause death or it is a daily activity. This real-time fall will also contain the home server and the GSM which will send the full alert for emergency help.

A. Poonsri [9] As per the report of the Central of disease and Prevention there is adult fall down in every second.The fall detection method is nothing but detecting the fall accident and informs the elderly person for help via message. There are three methods used in this first Methi is Gaussian distribution it is used background subtraction, then it compared with an average filter model to implement the subtraction results, then secondly feature extraction is used as an aspect ratio and area ratio is calculated by using principal component Analysis. Lastly is majority voting the results of finallyperformed.

W. Shieh [10] The population of youth is growing very fast nowadays. This fall event may occur in on staircases or in the long corridor if there is not a proper time as early possible there will a very serious injury. There is traditional video surveillance that only records the video this proposed method will add the additional methodology to detect the fall detection, which will take the care of staff and of elder. The result of this show improvement by every above ninety percent every time.

Y. Angal [11] As fall detection is one of the major issues among in old adults. It may cause the major fractures in the weak parts of the body or it may even cause death. There is a sensor called a Kinect sensor developed by Microsoft. Basically, this software has two parts the first one is to detect the fall and the second one is send the message for help. The ground segmentation is used to detect the moving object activities by using the feature extraction and event classification.After the fall detection initially the message will be sent to a registered number for help.

Bhavya. KR [12] This paper presents the fall detection approach by using the motion vector and the accumulated image map. It consists of some steps human is an object region of extraction based on the background subtraction method. The k nearest neighbor is used to find him fallen detection of the paper with an estimated motion vector. The results of this showthat this experiment is successfully implemented.

III. CONCLUSION AND FUTURESCOPE

The proposed model for the Fall detection using the video surveillance needs to be implemented in the constrained environment of a web camera of a laptop, which is having around 1.3 Mega pixels of depth. The model is designed for the lonely person who is staying in the home, when a sudden fall occurred and on not getting immediate help this may lead to serious injuries or it may be fatal too. The model keeps a vigil on the person by normalizing the frames which are collected in the time slice of1second. These normalized frames are subject to the temporal effect using the CNN to detect the fall. On detection of the fall the proposed model sends a text message on the stored number of the relatives, Hospital and neighbors for the immediate help to save a life. This model is defined through the analysis of the previous work to achieve our approach which is stipulated in the earlier section of this survey article. The approach will be well-defined in the future editions of this research.

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