HUMAN FALL DETECTION IN HOUSE USING IMAGE PROCESSING FOR ACTVITY RECOGNITION

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ABSTRACT

Human fall detection is an active research area of the image processing and computer vision. It plays a significant due to an accidental fall at home. In this project propose method deployed the framework for recognizing the human fall. There are various steps have been followed to role to protect the elder people having age more than 70 years or children from the injury caused by fall incident also avoids the death of human beings due to the head injury just happened recognize the human fall incident in real-time. The project proposes method for human fall detection on furniture using scene analysis based on deep learning and activity characteristics. We investigate the design space of the flexible, textile capacitive image processing for application in human activity recognition. Precise recognition of human action is a key enabler for the development of many applications including autonomous robots for medical diagnosis and surveillance of elderly people in home environment and security purpose in secured places for example ATM room and smart room, interactive virtual reality systems. In this project we proposed an efficient human action recognition scheme, which takes advantages of superior discrimination capacity of Ada Boost algorithm.

INTRODUCTION

Nowadays, the trend in western countries is for populations to contain an increasing number of elderly people. the old-age dependency ratio (the number of people 65 and over relative to those between 15 and 64) in the European Union (EU) is projected to double to 54 percent by 2050, which means that the EU will move from having four persons of working age for every elderly citizen to only two. So, the topic of home care for elderly people is receiving more and more attention. Among such care, one important issue is to detect whether an elderly person has fallen or not. According to, falls are the leading cause of death due to injury among the elderly population and 87% of all fracturesin this group are caused by falls. Although many falls do not result in injuries, 47% of non-injured fallers cannot get up without assistance and this period of time spent immobile also affects their health. An efficient fall detection system is essential for monitoring an elderly person and can even save his life in some cases. When an elderly person falls, a fall detection system will detect the anomalous behavior and an alarm signal will be sent to certain caregivers (such as hospitals or health centers) or the elderly person's family members by a modern communication method. Different methods have been proposed for detecting falls and are mainly divided into two categories: non-computer vision based methods and computer vision based methods.

In the last 10 years, there have been many advances in computer vision and camera/video and image processing techniques that use real time movement of the subject, which opens up a new branch of methods for fall detection. For computer vision based fall detection methods, some re searchers have extracted information from the captured video and a simple threshold method has been applied to determine whether there is a fall or not; representative ones due to Rougier et al. are, In

these two papers, the head's velocity information and the shape change information were extracted and appropriate thresholds were set manually to differentiate fall and non-fall activities. However these two methods produce high false detection rates (such as when a fast sitting activity was misclassified as a fall activity and the performance was strongly related to the set threshold.. In three pattern recognition methods were compared (logistic regression, neural network and support vector machine) and the neural network achieved the best performance with a fall detection rate of 92% and a false detection rate of 5%.

OBJECTIVE

Human Fall Detection from Visual Surveillance is an dynamic research territory of the picture preparing and PC vision. It assumes a critical job to ensure the senior individuals having age over 70 years or youngsters from the damage brought about by fall episode; likewise keeps away from the passing of individuals because of the head damage simply occurred because of an unplanned fall at home.

LITERATURE SURVEY

[1] DESIGNING SENSITIVE WEARABLE CAPACITIVE SENSORS FOR ACTIVITY RECOGNITION

We investigate the design space of flexible, textile capacitive sensors for applications in human activity recognition. In a previous paper, we showed that conductive textile patches can be used to measure capacitance of the human body and could reveal information about a broad range of activities. In this paper, we systematically investigate how different design parameters such as electrode size, electric field frequency, and the concrete analog circuit design influence sensor performance. To this end, we combine FEM electric field simulations, circuit analysis, and measurements. We illustrate the

performance of sensor systems that implemented according to the design guidelines that we derived. Results from four typical activity recognition scenarios were considered, including heart rate and breathing rate monitoring, hand gesture recognition, swallowing monitoring, and gait analysis.

[2] POSTURE RECOGNITION BASED FALL DETECTION SYSTEM FOR MONITORING AN ELDERLY PERSON IN A SMART HOME ENVIRONMENT

We propose a novel computer vision based fall detection system for monitoring an elderly person in a home care application. Background subtraction is applied to extract the foreground human body and the result is improved by using certain post-processing. Information from ellipse fitting and a projection histogram along the axes of the ellipse are used as the features for distinguishing different postures of the human. These features are then fed into a directed acyclic graph support vector machine (DAGSVM) for posture classification, the result of which is then combined with derived floor information to detect a fall. From a dataset of 15 people, we show that our fall detection system can achieve a high fall detection rate (97.08%) and a very low false detection rate (0.8%) in a simulated home environment.

[3] POSTURE RECOGNITION BASED ON FUZZY LOGIC FOR HOME MONITORING OF THE ELDERLY

We propose in this paper a computer vision-based posture recognition method for home monitoring of the elderly. The proposed system performs human detection prior to the posture analysis; posture recognition is performed only on a human silhouette. The human detection approach has been designed t be robust to different environmental stimuli. Thus, posture is analyzed with simple and efficient features that are not designed to manage

constraints related to the environment but only designed to describe human silhouettes. The posture recognition method, based on fuzzy logic, identifies four static postures and is robust to variation in the distance between the camera and the person, and to the person's morphology. With an accuracy of 74.29% of satisfactory posture recognition, this approach can detect emergency situations such as a fall within a health smart home.

[4] HUMAN ACTIVITY RECOGNITION AND MONITORING FOR ELDERLY PEOPLE

Statistics show that the population in Europe is aging and in the near future human assistance for elderly persons will be prohibitive. This paper analyses the possibilities to implement a supervision system, which is capable of monitoring a person's activity in his/her home without violating intimacy. The main idea is to collect information from various sensors placed in house and on mobile devices and infer a most probable sequence of activities performed by the supervised person. A Hidden Markov chain method is adapted for the activity chain recognition.

[5]FALL DETECTION USING K-NEAREST NEIGHEOR CLASSIFICATION FOR PATIENT MONITORING

The incident of fall of elder people increases day by day. Falls are one of the greatest risks for seniors living alone. Sometimes people may get serious injury to the spinal cord and hip region. In such cases, an injured elder people may remain on the ground for several hours after a fall incident has occurred. So there is a need of fall detection system to avoid such incident. This paper propose a novel method to detect falls which combines four features, Orientation angle, ratio of fitted ellipse, Motion Coefficient, Silhouette threshold. These features act as inputs to K-Nearest Neighbor classifier which

recognizes fall events. This algorithm gives accuracy above 95% on stored video sequences of activities and real time environment.

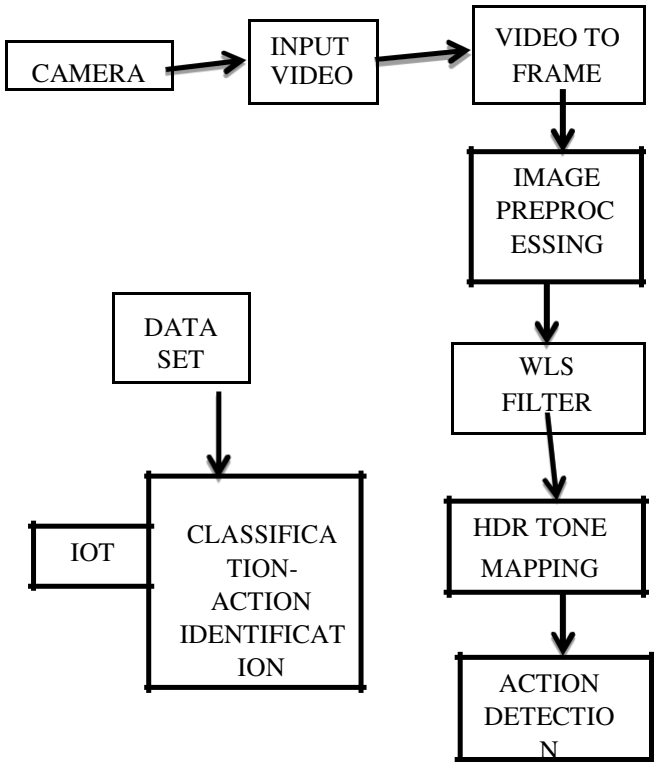
EXISTING SYSTEM

In existing system Gaussian mixture model templates to identify gestures. Another model proposed neural network and SVM classifiers for recognition based on both histograms of oriented gradients (HOG) and local binary pattern (LBP). Another method proposed a vision-based solution using convolutional neural networks to detect if a video sequence contains fall incidents.

PROPOSED SYSTEM

In this project we proposed an efficient human action recognition scheme, which takes advantages of superior discrimination capacity of AdaBoostalgorithm. Human actions are monitored using camera when abnormal activity detected then message alert send to IOT. Human actions monitored using MATLAB program to take decision for normal actions and abnormal actions. Based on the decisions the messages send to IOT. Working principle is based on computer vision, and control system where video camera interfaced with Matlab (for image processing), which analysis each frame in the real time video to monitor, detect criminal activities. The identified abnormal object find out then information passed alert messages to IOT.

ARCHITECTURE DIAGRAM



LIST OF MODULS

1.PREPROCESSING

2.SEGMENTATION

3. FEATURE EXTRACTION

4.CLASSIFICATION

5.UPDATION

PREPROCESSING

In computer science, digital image processing is the use of computer algorithms to perform image processing on digital images. ... It allows a much wider range of algorithms to be applied to the input data and can avoid problems such as the build-up of noise and signal distortion during processing.

WLS FILTER

Weighted Least Squares (WLS) optimization framework is utilized for weight map refinement. Computationally simple texture features (i.e., detail layer extracted with the help of edge preserving filter) and color saturation measure are preferred for quickly generating weight maps to control the contribution from an input set of multiexposure images.

HDR TONE MAPPING

The camera response function recovered from differently exposed images is used to create HDR image whose pixel values are equivalent to the true radiance value of a scene. success of HDR image capture has shown that it is possible to produce an image that exhibits details in poorly and brightly illuminated areas. Moreover, HDR formats have since found widespread applications in the computer graphics and HDR photography.

EDGE DETECTION

Edge detection is an image processing technique for finding the boundaries of objects within images. It works by detecting discontinuities in brightness. Edge detection is used for image segmentation and data extraction in areas such as image processing, computer vision, and machine vision.

FEATURE EXTRACTION

In the module we implement independent component analysis to detect the hue saturation value. In this module we find the state of the image. Feature extraction involves reducing the amount of resources required to describe a large set of data. The features extracted will be then classified.

CLASSIFICATION

A computer-based image processing algorithm is designed to automatically classify microscopic images of yeast cells in a microfluidic channel environment. The linear support vector machine, distance-based classification, and convolution neural network the classifiers used in this experiment.

CONVOLUTIONAL NEURAL NETWORK

In machine learning, a convolutional neural network (CNN, or ConvNet) is a class of deep, feed-forward artificial neural networks that has successfully been applied to analyzing visual imagery.

CNNs use a variation of multilayer perceptrons designed to require minimal preprocessing. They are also known as shift invariant or space invariant artificial neural networks (SIANN), based on their shared-weights architecture and translation in variance characteristics.

Convolutional networks were inspired by biological processes in that the connectivity pattern between neurons resembles the organization of the animal visual cortex. Individual cortical neurons respond to stimuli only in a restricted region of the visual field known as the receptive field. The receptive fields of different neurons partially overlap such that they cover the entire visual field.

CNNs use relatively little pre-processing compared to other image classification algorithms. This means that the network learns the filters that in traditional algorithms were hand-engineered. This independence from prior knowledge

and human effort in feature design is a major advantage.

A CNN consists of an input and an output layer, as well as multiple hidden layers. The hidden layers of a CNN typically consist of convolutional layers, pooling layers, fully connected layers and normalization layers

Description of the process as a convolution in neural networks is by convention. Mathematically it is a cross-correlation rather than a convolution. This only has significance for the indices in the matrix, and thus which weights are placed at which index.

CONVOLUTIONAL

Convolutional layers apply a convolution operation to the input, passing the result to the next layer. The convolution emulates the response of an individual neuron to visual stimuli. Each convolutional neuron processes data only for its receptive field.

Although fully connected feedforward neural networks can be used to learn features as well as classify data, it is not practical to apply this architecture to images. A very high number of neurons would be necessary, even in a shallow (opposite of deep) architecture, due to the very large input sizes associated with images, where each pixel is a relevant variable. For instance, a fully connected layer for a (small) image of size 100 x 100 has 10000 weights for each neuron in the second layer. The convolution operation brings a solution to this problem as it reduces the number of free parameters, allowing the network to be deeper with fewer parameters. For instance, regardless of image size, tiling regions of size 5 x 5, each with the same shared weights, requires only 25 learnable parameters. In this way, it resolves the vanishing or exploding gradients problem in training traditional multi-layer neural networks with many layers by using back propagation

POOLING

Convolutional networks may include local or global pooling layers which combine the outputs of neuron clusters at one layer into a single neuron in the next layer. For example, max pooling uses the maximum value from each of a cluster of neurons at the prior layer. Another example is average pooling, which uses the average value from each of a cluster of neurons at the prior layer.

FULLY CONNECTED

Fully connected layers connect every neuron in one layer to every neuron in another layer. It is in principle the same as the traditional multi-layer perceptron neural network (MLP).

CNNs share weights in convolutional layers, which means that the same filter (weights bank) is used for each receptive fieldin the layer; this reduces memory footprint and improves performance.

CONCLUSION

This paper developed a fall detection system based on a single image processing based wearable device. There is no special requirement of the device's mounting orientation because the algorithm does not claim the axes of accelerometer to be fixed strictly. hardware design and highly efficient algorithm which could extend the service time of the wearable device. Both the hardware and software designs are suitable for wearable and outdoor application.

As normal activity of resting also has similar rotation as falling, it may trigger fall detection when the body hits ground heavily. So the choice of is quite important to distinguish falling from heavily lying activity. Sufficient sample number collected from subjects with different age and gender will improve the reliability and robustness of the threshold. Beside these, technologies such as CNN and neural network are considerable to seek out a proper classification method based on the features used in this system.

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