A SURVEY ON HUMAN POSE ESTIMATION USING MACHINE LEARNING TECHNIQUES

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ABSTRACT

Human posture assessment is a deeply rooted problem in computer vision that has implemented many challenges in the past. Analysis of video surveillance, biometric, human activitices in many fields such as home-assisted, health surveillance can be beneficial.In fast-moving life, people usually prefer exercising at home but they need a instructor to evaluate their exercise form.Human pose recognition can be used to use self-instructional training methods such as watching fitness vidoes, that allows people to learn and train properly. Today in developing countries faced many sensitive issues in public places, so monitoring is manditory. Human pose estimation application like video surveillance system is used for monitoring human activity in public areas like malls, hospitals, beach etc.Many researchers used different application for give best result in human pose technique, in this survey compare whichalgorithm gives best performance in human pose estimation

Keywords: Human pose estimation, Mechine Learning.

INTRODUCTION

The recognition of human activity becomes an area of popular research in health care, video surveillance and biometrics.Understanding human behaviour in pictures, numerous applications such as visual recognition and posture assessment provide useful informationfor a wide range of computer vision problems.There are different methods of functional recognition and each technique presents its advantages and drawbacks.This survey mainly focuses on various fields, one is which can be used for medical use rehabilitation of injured persons or gait analysis of neurologically ill persons. Next is the video surveillance system, which is based on detecting and tracking humans. Another one is Human pose estimation guarantee which is an important technology for real-time applications Advanced Driver Assistance Systems (ADAS) are groups of electronic technologies that help drivers navigate and park. With a secure human- machine interface, ADAS improves vehicle and road safety.ADAS uses automated technology, such as sensors and cameras, to detect and react to nearby obstacles or driving mistakes. The general use of human posture estimation is a vision-based computational technology that detects and analyses human posture.

The major component of human posture estimation is human body modelling.There are three of the most commonly used kinds of human body models: skeletal model, contour model and volume model.skeleton model is composed of a set of key points of joints such as ankles, knees, shoulders, elbows, wrists, and the orientations of the limbs that make up the skeletal structure of a human body. This model is utilized in both 2D and 3D human posture estimation techniques due to its flexibility,the following model is based on the contour and is composed of the contour and the coarse width of the torso and the limbs of the body,in which frame parts are offered with limitations and rectangles of someone's silhouette, and quantity-primarily based version consists of 3-D human body shapes and poses represented through quantity-based totally models with geometric meshes and shapes, generally captured with 3-D scans.There are various innovations in human pose estimated in today's technology for example, excercise like squats, deadlifts, and shoulder presses are good for health but if done incorrectly they are very dangerous. Lifting a heavy workout

can cause severe injuries to the muscles or muscle fibers. Many people perform these exercises regularly but do not do the right posture. This may be due to the reason of lack of proper training by classes or personal trainer.

So use of human pose estimation application is helpful for these situation for example video demonstration is helpful for doing excercise properly.In this application used to help athletes make the perfect posture for fitness by creating the perfect pose in sports use. This software application uses a combination of the latest advances in pose estimation and machine learning technique to detect the user's fitness level and provide useful feedback on the user's form. So the use of pose training application helps to prevent injuries and improve the quality of fitness of people with just a help of computer and webcam.In this survey focuse human pose estimation usingdifferent methods and techniques and identify this survey mainly which technique most of use[1,2]. This paper is structured as follows, section 2 explores the use of video surveillance system. Useful use of fitness and health care, research topics is given in section 3. Section 4 describes the virtual reality, computer and human interfaces. Finally, section 5 concludes the research work.

APPLICATIONS OF VIDEO SURVEILLANCE SYSTEM.

Video surveillance system based on human assessments, that are important technology for real time applications, including human detection, monitoring and human activity analysis. Many applications related to this technology have been demonstrated but estimates of some key features remains challenging.The challenge is how humans are diagnosed, i.e. According to body composition, skin colour, skeleton etc. This is complicated because every human being has a different human operating system, that varies in body size and shape. Challenges in the human tracking process, include difficulty in separating the human from the background of the inability to observe bone movement due to occlusion, clothing of body organs.

Pose estimation is challenging due to the complex relationships between people and the environment. clothing, complicates the skeletal structure and significantly increases the randomness of the individual human appearance. Some image related elements also increases to the challenges due to the limited image resolution, number of ambiguities, and the inability to easily distinguish between human parts occlusion or noisy background. Some of these challenges are solved with foreknowledge but some problems require intelligent mathematical and engineering solutions [3].

Abhay Gupta et al., undertook this proposed research work to enhance human characteristic from images through keeping apart bone intrgration records (pose) the use of OpenPose API and the use of this pose information to categorize activity with the assist of the supervised machine learning set of rules.They produced a dataset of five various functions specifically, sitting, standing, dancing, lying and running.It used five algorithms (Logistic Regression, SVM, KNN, Random Forest, and Decision Tree) to find best results for sample.From their experiment results, observed that Multiple Logistic Regression, SVM, and Random Forest are showing the highest accuracy of 80.72%, 80.43%, and 80.75%, respectively, and the other two algorithms KNN and Decision Tree, are did not performed good [4].

J. Palanimeera and K. Ponmozhi discussed a research paper entitled 'The Classification of yoga pose' using machine learning techniques' to classify the sun salutation yogasanas and classify machine learning model.The yoga pose is flawed which supports the angle extracted from the pose estimation algorithm. Machine learning models got accurate results through KNN and 96% of the results are available in the machine learning Model [5].

The [6] process of discriminating pose clusters by using SVMs in research work applies to train SVMs with non-human models and thereby identifying humans. Both SVMs and linear regressors are capable of pose-based feature selection, this method has been shown to be effective by quantitative tests performed in comparison with other recent methods.

PHYSICAL FITNESS AND HEALTH CARE.

Using of physical fitness and health care application is one of method of exercise. exercise is just physical activity and can take many forms, each form has special benefits for our overall health. Weightlifting training improves muscle grip itself and Yoga promotes flexibility and balance, at the same time aerobics increases the functional capacity of our cardiovascular system. Each type of exercise offers different benefits in its own method, and doing all three types is the way to increases the fitness. Good physicl health must function in conjunction with its mental health to improve a person's overall quality of life.Both excercise and yoga seem to have amazing benefits,this have been true as long as they are done properly but the consequences can be negative if done incorrectly. Everything we do physically is become change in neurological form.

When if a person took training in an improper form it hurts him/her. Bad form leads to unwanted strain and sprains on the muscles. Maintaining good form keeps one from getting injured.It cause constant tension in the target muscles and paves the way for better results. The right form directs our energy to the right muscles, so it helps to work very efficiently and get good results [7].

Arunnehru.j et al., carried out, performance of classification algorithm and use of sporst analysis and health care dataset, support vector machines (SVMs), k-nearest neighbor (KNN), and the decision tree were used in these classifiers.The main purpose of this learning process is to help the robot to train just like human functions.This function can be used in any learning and training practices to build the human-robotic system. A proper understanding of how each action occurs is learned in this process and the process is simplified by training any system with similar steps [8].

Mirco Möncks et al., represent, performance of analysis classification algorithms for sports and health care in human pose estimation for Multi-Modal Dataset. propose an efficient algorithm to analyzed six different ML algorithms selection in RGB-D sensor systems: decision trees, linear discriminant, cubic SVM, fine k-NN, bagged tree, and DNN [10].

Proposed by Satyam Porwal et al.,[11] to deal with the problem, different sensors like Gyroscope and Accelerometer are required, data should be categorized in the form of images using machine learning algorithms like SVM and CNN.This approach enables the implementation of real-time applicaions such as health monitoring, sports activity and safety monitoring. This paper discusses the limitations, benefits and the key approach to human activity recognition [12].

VIRTUAL REALITY AND COMPUTER, HUMAN INTERFACES.

This survey mainly focuses primarily on virtual reality, computer and human interface in video analysis and especially human behavior. Video surveilance video indexing It has attracted many researchers due to its basic applications in virtual reality, computer and human interfaces. One of the most challenging issues in computer vision is the automatic modeling and recognition of human behavior, for example the visual surveillance environment minimizes human intervention. Such a system would monitor a space and automatically detect and classify human behaviour, and human attention is required only when necessary. This type of approach seems to

be very attractive, as the number of cameras installed in many public places is increasing. Research in the field of behavioral understanding focuses on the development of methods for extracting and processing information about the behaviour of physical objects in a scene and visual data analysis. [13].

Vina Ayumi and Mohamad I. Fanany discussed the research paper entitled 'A Comparison of SVM and RVM for Human Action Recognition' and reviewed action authorization using SVM and RVM. Our experimental results showed that RVM had an accuracy rate compared with SVM. The RVM more accurate and stable than inclined SVM when the amount of data increased. RVM has excellent accuracy when the number of featureds is reduced. RVM took more training time but required less testing time than SVM.The RVM model was very robust because it had minimal basis functionality and was very generic. RVM has done a good performance of classifying authentication on large datasets [14].

N. C. Sri Harsha et al., entitled the research paper 'Performance Analysis of Machine Learning Algorithms for Smartphone-Based Human Activity Recognition [15] conducted with three different machine learning algorithms (Support Vector Machines (SVM), Decision tree, and random forest methods) based on smartphone sensors. Machine learning algorithms are capable of identifying and differentiating various human functions using mobile phone sensor data to focus mainly on analyzing algorithms performance in this research.

Yogameena b et al., [16] a Multi-class Relevance Vector Machine (RVM) classification algorithm, it classifies different human appearance from a single standard camera for video surveillance applications. The proposed Support Vector Machine (SVM) compared with multi-class support vector machine.Experimental results showed the effectiveness of this method. Conclusion: It is evident that RVM has better accuracy and less computational than SVM.

CONCLUSION

In human pose estimation domain there are a number of research carried out by many persons which are used to predict the human pose estimation and also give suggestions about the human behavior and other type of application in the same field. The main focus of this research was the various methods and explored them. It is not possible to find the best algorithm for predicting human posture estimation because a great deal of human posture estimation data is available in various repositories.Data mining techniques, such as classification algorithms are effectively used for the analysis of human posture estimation application and human behavior data. In particular, the role of SVM, random forest, CNN., decision tree and RVM classification algorithms are took for this analysis. Where the SVM algorithm plays a vital part in the prediction of human posture. Therefore, this document concludes that, among the different classification algorithms the SVM produce better classification results.

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