

Realtime Gym Ai

Bhushan Bari, Shital Khairnar, Anand Suryawanshi, Ankit Tamboli

Prof. Sunil M. Kale

Department of computer Engineering of Sandip Institute of Technology and research Centre, Nashik

ABSTRACT:

The posture detection received lots of attention in the fields of human sensing and artificial intelligence. Posture detection can be used for the monitoring health status of elderly remotely by identifying their postures such as standing, sitting and walking. Most of the current studies used traditional machine learning classifiers to identify the posture. However, these methods do not perform well to detect the postures accurately. Therefore, in this study, we proposed a novel hybrid approach based on machine learning classifiers. The proposed hybrid approach uses prediction of machine learning (ML) and deep learning (DL) to improve the performance of ML and DL algorithms.

Key Words: Posture detection, Machine Learning, Deep Learning.

INTRODUCTION:

The posture detection is used in different applications such as healthcare, surveillance, virtual environment, indoor and outdoor monitoring, the reality for animation and entertainment. In addition, the posture detection can be used in framework of home-human interface. With the increased number of elderly population and limited healthcare resources, it is important to propose a technology which can support the remote monitoring of elderly and vulnerable people to live more independently. Maintain the good posture is significant to lead the healthy life. The posture is about how the people hold their body and position the limbs.

PROBLEM DEFINITION:

People frequently find it challenging to join a gym because they don't have the time, money, or access to a trainer to deal with these issues. This automated posture detection model in the gym using machine learning to

recognize different human postures in real-time and help correct them

LITERATURE SURVEY:

Wu Wen, Yong Yang ,Jingyi Du ,Lixiang Liu,Jiahao [1] et al. have explored that Attitude detection can help the gymnast's posture movements correct. The general method is to extract the contour of the moving target in a video frame, but this method has poor real-time performance and low accuracy. To this end, this paper proposes a deep learning real-time attitude detection method to detect the posture of gymnasts. Input an image, extract features through the convolutional network, correctly link skeleton to detect the posture of the gymnast. The method has good real-time performance and accuracy high.

MATERIALS AND METHODS:

The system we are building includes a camera and a speaker. The camera will capture the user video which will be given as input to the Convolutional Neural Network which will predict the main key points of human body such as shoulders, elbow and knee joints, eyes, ears, etc. and will output the coordinates and confidence level of these key points. Using these key points we will get a body posture of the user, this posture will then be given as an input into the classification model which will be trained to classify posture into specific gym activities like pushups, squats, crunches, etc. and once the user posture is classified, then using the posture key points, model will determine if posture is correct or not.



Fig2: Posture Detection

Posture detection is used to extract essential features from static images and live feed where useful information will be gathered. An image is a two-dimensional figure where x and y spatial coordinates of function $f(x,y)$ are represented through a matrix with rows and columns in the form of pixels.

The steps for images processing are

1. Reading the image as input
2. Pre-process (Noisy removal and shaping) of the image
- 3.Extracting features on the input image (segmentation, description)
- 4.The result is an image classification after manipulation We have two types of image processing:
- 5.Analog image processing
- 6.Digital image processing (computer vision)

Some of the important techniques for image processing are preprocessing, enhancement and, information extraction. An image is converted into grayscale to perform a specific task whereas to display by converting into RGB (color) for user view.

EXISTING METHOD:

The general method is to extract the contour of the moving target in a video frame, but this method has poor real-time performance and low accuracy. To this end, this paper proposes a deep learning real-time attitude detection method to detect the posture of user. Input an image, extract features through the convolutional network, correctly link skeleton to detect the posture of the user. The method has good real-time performance and accuracy high.

Convolutional Neural Network (CNN)

The Convolution Neural Network (CNN) based approach provides a better way that is less sensitive to translation and hand poses. However, the CNN approach is complex and can increase computational time, which at the end reduce its effectiveness on a

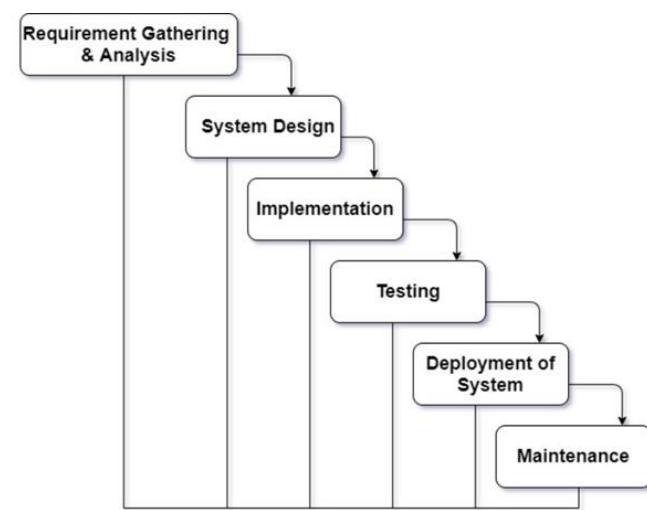
system where the speed is essential. In this study we propose a shallow CNN network which is fast, and insensitive to translation and hand poses. It is tested on two different domains of hand datasets, and performs in relatively comparable performance and faster than the other state-of-the art hand CNN-based hand detection method. Our evaluation shows that the proposed shallow CNN network performs at 93.9% accuracy and reaches much faster speed than its competitors.

PROPOSED METHODOLOGY:

Analysis Models: SDLC Model to be applied

1.Planning:

It is performed by the senior members of the team with inputs from the customer, the sales department, market surveys and domain experts. This information is then used to plan the basic project approach and to conduct product feasibility study in the economical, operational and technical areas. Planning for the quality assurance requirements and identification of the risks associated with the project is also done in the planning stage



2.Defining:

Next step is to clearly define and document the product requirements and get them approved from the customer or the market analysts.

3. Designing:

Based on the requirements specified in SRS, usually more than one design approach for the product architecture is proposed and documented. This is reviewed by all the important stakeholders and based on various parameters as risk assessment, product robustness, design modularity, budget and time constraints, the best design approach is selected for the product. A design approach clearly defines all the architectural modules of the product.

4. Building:

The actual development starts and the product is built. The programming code is generated. If the design is performed in a detailed and organized manner, code generation can be accomplished without much hassle. The programming language is chosen with respect to the type of software being developed.

5. Testing:

This stage is usually a subset of all the stages as in the modern SDLC models, the testing activities are mostly involved in all the stages of SDLC. However, this stage refers to the testing only stage of the product where product defects are reported, tracked, fixed and retested, until the product reaches the quality standards defined in the SRS.

6. Deployment:

Once the product is tested and ready to be deployed it is released formally.

APPLICATIONS:

- Solving fitness-related problems
- Enhancing the gyming experience
- Helping to be safe from the injuries
- Improving the quality and accuracy of the user's workout sessions using the web app

OUTCOMES:

The outcome of this project will be that any person will be able to do correct gym activities, which will lead to staying healthy, and prevent any injuries. While doing gym activities, the user's video will be continuously analysed and his posture will be detected and compared

using a classification model, which will also give voice feedback to the user.

CONCLUSION AND FUTURE WORK:

Conclusion: Aiming at the aesthetics of the limb movements of the existing gymnasts, only a method of visual observation is proposed, and a more scientific and rational real-time human posture detection method is proposed. Through the detection of the key points of the gymnastics athlete's posture in real time, their posture is made clearer and they play a good corrective role in the training process of the gymnasts. The experiment proves that the accuracy of prediction in each method is far higher than that of other methods.

Future work: 1) In the future, combining sports training such as gymnastics with deep learning is a new trend in the development of sports.

2) This application can be developed into a complete android/iOS application for easy use.

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