Automated Exercise Trainer and Game Statistics Application (Health & Wellness Category)

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Abstract

- Exercise and Sports is an essential part of people's lives but because of the lack of infrastructure and proper guidance most people are devoid of the joy and benefits one can get out of them. The application will be built for both exercise and sports.
- The application which is focused towards Exercise is an automated exercise trainer app which takes the video of the person performing the exercise and which guides the doer in doing so.
- The application is also focused towards sports to provide some deep insights which are beneficial to the player and can act as an aid to the coach who is unable to grasp those technical details by their plain sight.

Project Description

- In the current time when exercise and sports are much needed to keep oneself healthy, fit and fine I started to make an automated exercise trainer application which works seamlessly on a mobile device. An application which is easy to install and which provides insights in real time using mobile camera and the mobile μprocessor.
- The application will provide various game statistics like the speed, angle, trajectory, bounce point and other metrics involved in the game to the user through a mobile application.
- The main advantage in using this application is that this application provides all these insights without using any sensors and just using the moderate resolution cameras of the mobile phones.
- The end product of this project is delivering a fitness application wherein the application can detect exercises using our pretrained model.

Process Flow - I

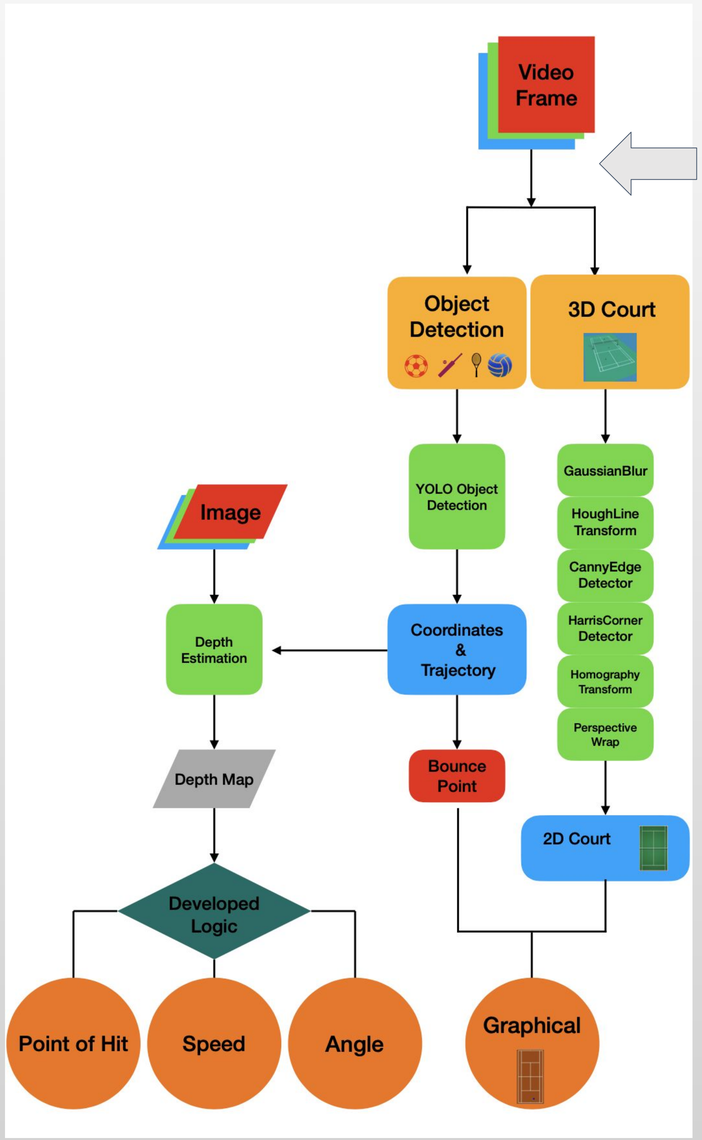

Figure-1 Game Statistics

Result - I

- Thus the combination of Computer Vision and Machine Learning has yielded the required parameters for the game statistics application using just a mobile phone camera.

Implementation - I

- Video is given as input which is converted into frames for processing.
- These frames are then passed into YOLO detection model and the coordinates are recorded into a csv file.
- These coordinates and the frames are passed into depth estimation model which gives the value of depth which is used to calculate speed, angle and point of hit.
- The frames are further processed using some functions and the image is court is extracted from the video and superimposed on a 2D court.
- The 2D court image so obtained is further merged with the bounce point on the court and it gives a graphical representation of the point of bounce on the court.

Implementation - II

- The first task of my project Automated Exercise Trainer is detection of keypoints on the body of the person who performs the exercises i.e Human Pose Estimation.
- Then, I will classify the dataset of videos into different exercises being performed in the videos. Also exercise nature will be detected whether the exercise performed is good or bad.
- Then, I will do scoring of each exercise and will provide proper feedback to improve the exercise being performed. Each exercise will be scored out of 10 i.e. in the range 0 to 10 (both included 0 and 10).
- Hence, I will perform classification, correction and scoring of exercises. After scoring each exercise and performing correction of each exercise, I will perform repetition count of each exercise.
- Then, I will implement my python code in Android Studio using Chaquopy Library for application development.

Process Flow - II

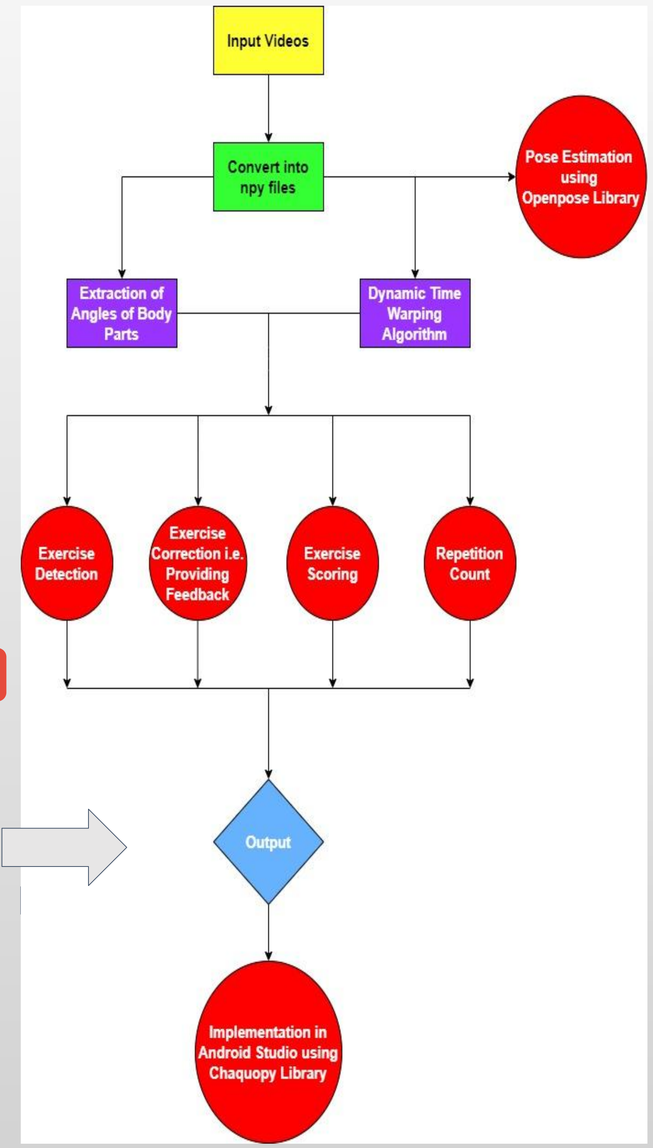

Figure-2 Automated Exercise Trainer

Result - II

- Thus, the combination of Computer Vision and Machine Learning has yielded the required parameters for the Automated Exercise Trainer application using just a mobile phone camera.