CALISTHENICS AGILITY USING MEDIA PIPE

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Abstract : Obesity is exacerbated by inactivity, which affects people all around the world. Fitness is an important component of a healthy lifestyle and an indicator of health-related quality of life. However, accessing a fitness trainer can be costly and difficult in some situations. Furthermore, exercising alone might be hazardous because users may perform exercises incorrectly and experience major injuries. Trainer, our project, intends to address these issues by developing an application that recognize users' exercise posture and delivers personalized advice to help them improve their form. With social distancing measures in effect during the COVID-19 pandemic, many training centers were shuttered, forcing people to exercise at home without the supervision of a trainer. A lack of expert assistance can result in serious injuries. Our concept provides customers with a personalized trainer, training plan, and nutrition plan to assist them accomplish their fitness goals. We also match users with individuals who have similar fitness goals, because working out with a companion can boost motivation. Our programme use Open CV and Media Pipe to recognize users' posture, analyse the angles and geometry of their poses, and deliver real-time feedback to help them improve their form

IndexTerms **- Artificial Intelligence(AI) ,Machine Learning(ML), Detection, Feature Selection, Regression, Classification, Clustering, Density Estimation , Media Pipe, Open CV, NumPy.**

I. INTRODUCTION

All are aware of how important exercise is to our overall health. Additionally, it is crucial to exercise correctly. Exercising too frequently can result in major damage to the body, including muscle tears, and can even reduce muscular hypertrophy. Nowadays, home workouts are more popular. Additionally, it saves time and is quite convenient. Also at that time of the pandemic, we understood how important is fitness and how such situations can let us work out in our homes. Physical fitness is to the human body what fine tuning is to an engine. It enables us to perform up to our potential. Fitness can be described as a condition that helps us look, feel and do our best.Physical fitness involves the performance of the heart and lungs, and the muscles of the body. And, since what we do with our bodies also affects what we can do with our minds, fitness influences to some degree qualities such as mental alertness and emotional stability.We're all aware of how vital exercise is to maintaining good health. It's also important to exercise properly. Overexercising can cause severe harm to the body, including muscle tears, and can even inhibit the growth of muscles.

Currently, home Exercise is more often used. It is also quite convenient and saves time. At the time of the epidemic, we also realized how vital fitness is and how such circumstances allow us to exercise in our homes. What fine tuning is to an engine, physical fitness is to the human body. It helps us to work to the best of our abilities. We might think of fitness as a state that enables us to feel, look, and perform at our best.The health of the heart and lungs is a component of physical fitness.Some people struggle to pay for a gym membership and are reluctant to use weights in a gym setting. On the other side, there are occasions when people can afford a gym and a trainer but are unable to devote time to their bodies and fitness due to a lack of free time or inconsistent schedules. AI personal trainers then started to appear.

The term "AI personal trainer" is no longer novel because there are already so many digital fitness programmers and trainers. For those who are new, let's start by defining an AI personal trainer: "AI personal trainers are artificial intelligence-powered virtual coaches who help you reach your fitness goals. You might receive personalized exercise and dietary plans from the computerized personal trainer.after compiling some information, like physical measurements, current level of fitness, fitness goals, and more. These days, everyone requires a personalized workout plan, which costs time and money to create. Therefore, artificial intelligence technology can be employed to quicken the customizing process by figuring out the ideal exercise plan for a particular student's needs or preferences. As a result, we want to develop an AI-based trainer that will make it possible for everyone to exercise more efficiently while enjoying their own homes.The goal of this project is to create an AI that will help you work out by estimating your pose to calculate the number and quality of repetitions.

The purpose of this project is to make training more enjoyable and simple by improving human posture and fostering relationships with others who share the same fitness aspirations.Physical fitness refers to a person's overall health and well-being as well as their capacity for participating in certain sports, jobs, and daily activities. In general, healthy eating, moderate to strenuous exercise, physical activity, and adequate rest are required to develop physical fitness. Fitness was once understood to be the ability to complete the day's tasks without becoming excessively exhausted. Physical fitness is becoming more important than ever thanks to automation and changes in lifestyle.considered an indicator of the body's capacity to perform tasks efficiently and effectively, to maintain good health, to fend off diseases that cause hypo kinetic states, and to handle emergency situations.

Being physically fit has been shown to lower blood pressure because it strengthens the heart. Being physically fit also keeps you busy and out of the house. Systolic and diastolic blood pressure are primarily controlled by the heart. Blood pressure will increase during physical activity; however, once the activity is done, blood pressure will return to normal.This process grows simpler the more physical exercise a person does, making them more 'fit'. Blood pressure of 120/80 or less is regarded as "normal". Regular physical activity makes the heart work less to raise blood pressure, which reduces the strain on the arteries and lowers overall blood pressure. Based on user-submitted attributes, this study gave an objective discussion of the application of AI technology to choose a suitable virtual fitness trainer.

II. LITERATURE REVIEW

Human pose estimation becomes a popular project today in the field of computer vision. The human pose estimation can be developed using Artificial Intelligence or Machine learning in which the system is fed with sample data or trained models and hence can localize joints in the human body over a video or an image. Now once the joints of the human body are localized we can use it for wide applications such as getting the gait cycle of a person walking or tracking down the movements of a professional athlete in order to understand the physical techniques and strategies involved to achieve his/her success. Thus one of the applications of Human pose estimation could be developing a smart gym trainer software, that could help struggling bodybuilders to achieve their goals. [1]

User engagement can be sustained and injuries avoided by being able to reconstruct 3d human pose and motion, relate it to good training practices, identify errors, and provide early, real-time feedback. In this paper we introduce the first automatic system, AIFit, that performs 3d human sensing for fitness training. The system can be used at home, outdoors, or at the gym. AIFit is able to reconstruct 3d human pose, shape, and motion, reliably segment exercise repetitions, and identify in real-time the deviations between standards learn from trainers, and the execution of a trainee. As a result, localized, quantitative feedback for correct execution of exercises, reduced risk of injury, and continuous improvement is possible. To support research and evaluation, we introduce the first large scale datasets, Fit3D, containing over 3 million images and corresponding 3d human shape and motion capture ground truth configurations, with over 37 repeated exercises, covering all the major muscle groups, performed by instructors and trainees. [2]

The fitness-dependent optimizer (FDO), a newly proposed swarm intelligent algorithm, is focused on the reproductive mechanism of bee swarming and collective decision-making. To optimize the performance, FDO calculates velocity (pace) differently. FDO calculates weight using the fitness function values to update the search agent position during the exploration and exploitation phases. However, the FDO encounters slow convergence and unbalanced exploitation and exploration. Hence, this study proposes a novel hybrid of the sine cosine algorithm and fitness-dependent optimizer (SC-FDO) for updating the velocity (pace) using the sine cosine scheme. This proposed algorithm, SC-FDO, has been tested over 19 classical and 10 IEEE Congress of Evolutionary Computation (CEC-C06 2019) benchmark test functions. The findings revealed that SC-FDO achieved better performances in most cases than the original FDO and well-known optimization algorithms. The proposed SC-FDO improved the original FDO by achieving a better exploit-explore tradeoff with a faster convergence speed. The SC-FDO was applied to the missing data estimation cases and refined the missingness as optimization problems.[3]

Sports are full of people's lives, and regular exercise has become an indicator of people's health. Due to the high price, most people who exercise at home will not hire fitness trainers, but learn about fitness through media communities. This is likely to lead to the wrong posture of fitness, which can lead to injury. A cheap, simple, and accurate fitness recognition system could increase fitness awareness. This paper proposes a deep transfer learning method that uses Yolov4 to classify fitness movements, which can instantly recognize fitness movements with only one network camera. We built a database, which contains 20 users and online fitness photos, a total of 16302 images, including 12 kinds of fitness movements. 10 user and online photos are used to train Yolov4, and another 10 user photos are used for testing. In the experiment based on Yolov4 to detect fitness, mAP is 99.71%, Precision is 97.9%, Recall is 98.56%, and F1-score is 98.23%. The results show that fitness movements can be detected accurately and quickly using this method.[4]

COVID19 has taken longer than expected in all aspects. Third wave of COVID19 has affected many perspectives in all countries. Many people have started to put on weight. Even after getting cured from this disease, many death cases are noted due to other health problems. It is essential for all to get serious about their health. A genuine effort is made by developing a mobile application which will guide and help all such affected people in maintaining their health. COVIFIT is a mobile application which can be useful to people of all ages. Various aspects like timely workout, diets and trainer help are covered. Various exercises related to abs, chest and cardio are explained for people according to their age.

The COVIFIT mobile application is designed to help users maintain their fitness and overall health during the Covid19 pandemic. With social distancing guidelines in place, many people are unable to go to the gym or participate in group fitness classes. The COVIFIT app provides users with customized fitness plans based on their individual fitness level and goals, video demonstrations of exercises, tracking and progress monitoring features, and a community for support and encouragement. The app is designed to be accessible and convenient for users to use at home, with minimal equipment required. By helping users stay active and healthy, the COVIFIT app aims to improve overall wellbeing during this challenging time [5].

Exercising is the most important thing to live a healthy life. To be free from injuries and getting the most from our workout proper form of exercise is important. Doing too much repetition and over training can cause muscle soreness. Unendingly doing exercise incorrectly could eventually cause severe future injuries. The rest between the sets should be optimum depending on the repetition of the exercise, what muscle group is being trained and the load that is being put in the muscle. Maximum Muscle hypertrophy is achieved with the correct form of exercise. The goal of the project is to build an exercise repetition counter and form corrector in a way so the optimum growth can be achieved with the help of cutting edge technology. The whole project is written in python. Simple easy to use tkinter GUI is used, Computer vision for live video input, media pipe for building machine learning solutions and numpy for mathematical calculations. Our system is built on the most recent advancements in deep learning for build cause estimation. We tend to the area units that are able to observe and find errors in user's activity (pose) by effectively supporting some threshold deviation between the limb angles. If a person is doing exercises with the help of this system, the user\'s form is checked (corrections in form also will be given if any) repetition's status and count is displayed. Along with this the AI dietitian calculates the maintenance calories, BMR, etc. This will increase muscle hypertrophy and reduce the risk of injury.[6]

Health and Fitness play a vital role in our day-today life. This can be attained in many ways of which exercising is one. Performing exercise can help us maintain very good health, only if carried out properly and in a defined manner, else the repercussions may have adverse effects on our body. To tackle this issue, we have created a system that keeps track of body movements and provides us with the number of repetitions performed, if performed within the foundation of the model. Our system also provides audio instruction to the user when performing the exercise inappropriately, and with the assistance of the user's physical measurements and his/her diet, the system is able to keep track of the user's calorie intake and recommends a certain amount of calorie intake to be followed in order to achieve normal Body Mass Index in order to stay fit. The proposed system uses Mediapipe Pose Estimation Model to track body moments while performing the exercise[7].

Adversarial attacks on deep neural networks (DNNs) have become a significant concern in recent years. Adversarial training has been proposed as a robust defense mechanism against these attacks. However, most existing adversarial training methods focus on a single strength of adversarial perturbations, which may not be sufficient to provide robustness against all possible attack strengths. In this paper, we propose a multi-strength adversarial training (MAT) method that trains a DNN with adversarial examples of different strengths. We introduce a strength selection algorithm that chooses the appropriate strength of adversarial examples during the training process. The proposed MAT method achieves state-of-the-art performance on both white-box and black-box attacks across different threat models and datasets. Furthermore, we demonstrate that the MAT method can improve the robustness of pre-trained models without retraining them. Our experiments show that the MAT method provides significant improvements in adversarial robustness compared to existing methods [8].

Nowadays, because of busy schedules, people have no time to go to the gym, and even if they manage to find a gym nearby having a gym trainer besides all the time to correct postures while doing exercise is impossible unless people do not opt for a personal trainer. Even if they assist a personal trainer for them, they would have to adjust their time accordingly, and both of these methods are quite costly, and not everyone can afford it; also, during this global pandemic, people are stuck at home and have no access to go to the gym or can't even take a risk of getting in contact with a personal trainer. Performing exercises let it be exercise or doing Yoga proper body posture is important; if not performed properly, it can lead to crucial problems such as poor joint alignment, increased shear forces on the spine, compression of disks and joints, less space for nerves to course through the body due to compression, and reduced blood flow to prevent such injuries and pains, and to track gym exercises repetitions, we came up with a system called Fitness Freaks. Fitness Freaks is an AI fitness tracker. It tracks users' body movements using human pose estimation. This in turn keeps track of repetitions of gym exercises and detection of wrong body posture while doing Yoga[9].

This project aims to develop an exercise repetition detection and feedback system for home workouts using MediaPipe, an open-source cross-platform framework for building multimodal machine learning applications. The system will utilize MediaPipe's pose estimation module to track the user's body movements and detect repetitions of specific exercises. The system will also provide real-time feedback to the user on their exercise form, suggesting corrections and adjustments to help optimize their workout. The proposed system offers a cost-effective and convenient solution for individuals who want to monitor their home workouts and receive personalized feedback without the need for a personal trainer. This project has the potential to improve the quality and effectiveness of home workouts, leading to better health outcomes and improved overall fitness.[10]

[11] suggested a few optimization techniques such as Particle Swarm Optimization (PSO), Discrete Particle Swarm Optimization (DPSO), and Fractional OrderDiscrete Particle Swarm Optimization (FODPSO) Techniques based on which optimum features are selected. The region of interest can be captured and the same region can be inspected thoroughly in terms of pixel values, evaluating the degree of the noise present, analyzing the position of boundaries to study the region of interest, analyze the fluctuating intensities across the tongue region and study the texture to determine the abnormality.[12]

III. IMPLEMENTATION

Media Pipe is an open-source framework for developing cross-platform, real-time computer vision applications. The capacity to recognize and monitor human body landmarks in real-time using machine learning models is one of its most important capabilities. This technology can be used in gym training programme to detect and analyse users' positions during workouts, as well as to provide personalized feedback on their technique.

The project's implementation level is:

1.Define the problem: Begin by identifying the problem that your project will attempt to tackle. For example, you could create a system that tracks customers' workouts and provides comments on form and development.

2.Collect data: Gather information that will be utilized to train and evaluate your machine learning models.This might incorporate video of individuals performing exercises, as well as labels emphasizing proper form and technique.

3.Select a model: Choose which Media Pipe model or models will be used for your project. For example, you may utilize the posture estimation module to follow the motions of your clients, or the gesture recognition module to detect specific workouts or movements.

4.Train the model: Using machine learning techniques, train your chosen model(s). This could include dividing your data into training and validation sets, optimizing hyper parameters, and tracking performance indicators.

5.Test the model: Evaluate the performance of your model on a different test set to check that it generalises effectively to new data.

6.Integrate the model: Once you are satisfied with the performance of your model, incorporate it into your project. This could entail creating a user interface or incorporating it into an existing system.

7.Test the project: Thoroughly test your project to confirm that it works as planned. You might also solicit user input to discover areas for improvement.

8.Refine and enhance: Use testing input to refine and improve your project. This could include gathering more data, retraining your model, or making modifications to the user interface.

9.Deploy and maintain: Finally, deploy and maintain your project throughout time. This may entail updating the model as new data becomes available, resolving bugs or difficulties, and adding new features or capabilities.

Overall, the applications of Media Pipe in a gym training scenario are nearly limitless. Its sophisticated computer vision and machine learning skills may be able to assist you in providing a more interesting, effective, and personalized training experience for your clients.

The coordinates to which Media pipe refers during human live captioning is given below:

MediaPipe, coordinates typically refer to the position of a detected object or feature within an image or video frame. These coordinates are usually represented as (x, y) pairs that indicate the horizontal and vertical positions of the object or feature within the frame. Depending on the specific MediaPipe component being used, the coordinate system used may vary.

It's always recommended to consult the documentation and examples provided with the specific MediaPipe component being used for more information on how coordinates are represented and used.

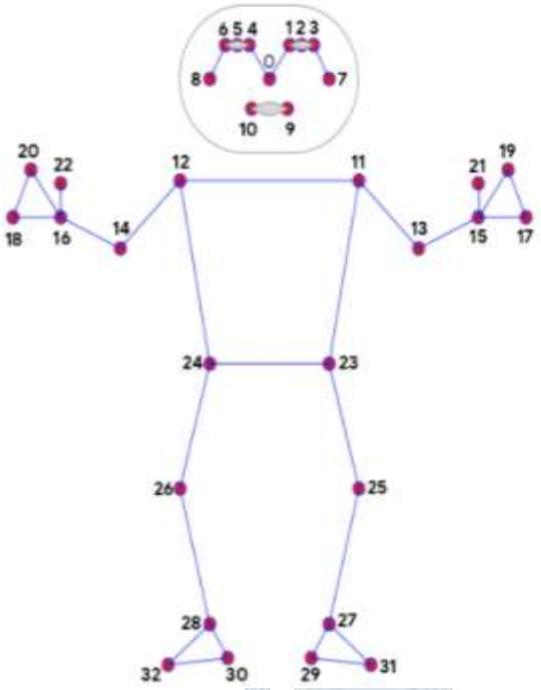

Figure 1 MediaPipe Diagram

One potential use case for MediaPipe in gym training is to build a system that can analyze video of a person performing exercises and provide real-time feedback on their form and technique. For example, the system could track the user's body movements and provide feedback if they are not using the correct posture or if they are not moving in the correct range of motion. MediaPipe could also be used to build a system that can automatically count the number of repetitions performed by a user during a particular exercise. By analyzing the video of the user performing the exercise, the system could detect when a repetition is completed and keep track of the total number of repetitions performed. Overall, MediaPipe has the potential to revolutionize the way that gym training is performed by providing real-time feedback and analysis of the user's movements. As the technology continues to develop, we can expect to see more and more applications of MediaPipe in the fitness industry.

IV. HARDWARE REQUIREMENTS

The system in question is a Pentium IV with a clock speed of 2.4 GHz. While this was a popular CPU model in its time, it is now considered outdated and not suitable for modern computing tasks. The system also has a hard disk with a capacity of 40 GB, which is quite small by today's standards but was sufficient for most basic computing tasks at the time of its release.

The system is equipped with a floppy drive that can read and write 1.44 MB floppy disks. This technology is also outdated and is no longer used in modern computers. Additionally, the system has a 15-inch VGA colour monitor that was common in its time. VGA was the standard display technology at the time and allowed for a maximum resolution of 640x480 pixels.

A Logitech mouse is included with the system, which was a popular brand at the time and is still widely used today. The system has 512 MB of RAM, which was considered a decent amount at the time of its release. However, this amount of memory would not be sufficient for most modern computing tasks and would severely limit the system's performance.

Overall, while the system was suitable for basic computing tasks at the time of its release, it is now severely outdated and would not be suitable for modern computing needs.

V. SOFTWARE REQUIREMENTS

The operating system of the system in question is Windows 10, which is one of the most popular operating systems in use today. It is known for its modern user interface and ease of use, as well as its compatibility with a wide range of software applications. The integrated development environment (IDE) being used is Anaconda Navigator. This is a popular IDE among data scientists and developers who work with Python, as it provides a streamlined interface for managing packages, creating virtual environments, and running code. Anaconda Navigator also includes many pre-installed packages that are commonly used in data science, such as NumPy, Pandas, and Matplotlib. The coding language being used is Python, which is a high-level programming language that is easy to read and write. Python is widely used in data science and machine learning due to its simplicity and the availability of many powerful libraries and frameworks, such as TensorFlow and PyTorch. Python is also a popular language for web development, scientific computing, and automation. Overall, the combination of Windows 10, Anaconda Navigator, and Python provides a powerful and flexible environment for data scientists and developers. The ease of use of Windows 10, combined with the streamlined interface of Anaconda Navigator and the flexibility of Python, make this combination a popular choice for many data science and development projects.

VI. PROPOSED SYSTEM

Fitness Gym Management System is a computer-based management system that stores all records concerning Members, Machinery, Expenses, Transactions, and Salaries in an efficient and easily accessible database. This technology assists the owner and administrator in maintaining vast amounts of data about users and their daily transactions in the gymnasium. The system assists in the creation of reports, the management of salaries, expenses, and the recording of machinery. Based on the information presented above, we can conclude that AI can be utilized to develop an excellent personal trainer since AI can not only recommend workouts but also correct the person's posture every time he displays a bad posture.Past performance, as well as how they performed on previously advised exercises by the instructor.

This memory, which saves data derived from user interactions, is created using a relational database called POSTGRESQL using objective-PYTHON code. The model is unchangeable. If the beginning capacity is overly exaggerated, the coach may never

be able to make up for it. offered a set of Python bindings to address difficulties in computer vision. This library employs NumPy, and all array structures can be readily converted between NumPy arrays and other formats. This indicates that integrating it with other Python libraries like as SciPy and Matplotlib will be simple. (NumPy is used in these).

They used the CPU's posture assessment to determine the correct locations and appropriate angles. A range of actions, such as the number of biceps curls, are then discovered based on these angles. They were able to determine the angles between any three locations using only one line of code. However, some posture estimate techniques that conduct 2D detection's are insufficiently accurate. Following on from the previous models, Harshvardhan Pradesh et al. tracked the number of users who conducted workouts and identified problems in the yoga stance by using Open CV, important points for the human body, and integrating the COCO datasets.

The basic CNN network, the Open Pose Python library, and the COCO datasets were used. This model performed admirably in terms of accuracy and performance, but there are no differences between them.

There are categories for males, women, and children based on their age. Yejin Kwon et al. recently published a programme that calculates the posture of real-time images to direct the content of the training (squats, push-ups), the number of workouts, and Open CV and Media Pipe. Media Pipe simulates real-time analysis, and this model produced good accuracy and performance. The main drawback to this model is that there is no real-time help for customers who have questions, and there is also a potential that the user lacks motivation of working out alone.

As a result, we propose a method that solves the significant disadvantage of not being able to exercise at home and at any time without supervision. The method allows us to work out anywhere, at any time, with direction, allowing us to execute productive workouts. Specifically, this system addresses the drawback of a lack of real-time help to answer their questions, as well as connecting users with similar training goals so that they can work out together, which boosts their motivation. As a result, our System employs computer vision technology to carry out our system's functions. curl, we would require the joints of the shoulder, elbow, and wrist which are 12, 14, and 16 respectively as referred to in the figure 1. To calculate the angle between joints first, We obtain the three joints' coordinates, which are necessary to calculate the angle. Then, using NumPy, we can determine the slopes of the joints. Angles are measured in radians and can be translated into degrees.

These illustrate the many joints in the position. For example, if we wish to calculate the angle for our right hand's bicep curl, we would need the shoulder, elbow, and wrist joints, which are 12, 14, and 16 respectively, as shown in the image below. To compute the angle between joints, we must first collect the coordinates of the three joints, which are required to calculate the angle. The slopes of the joints can then be calculated using NumPy. Angles are measured in radians, which can be converted to degrees. Design is a multi- step that focuses on data structure software architecture, procedural

Details, procedure and interface among modules. The system architecture is shown in figure 2.

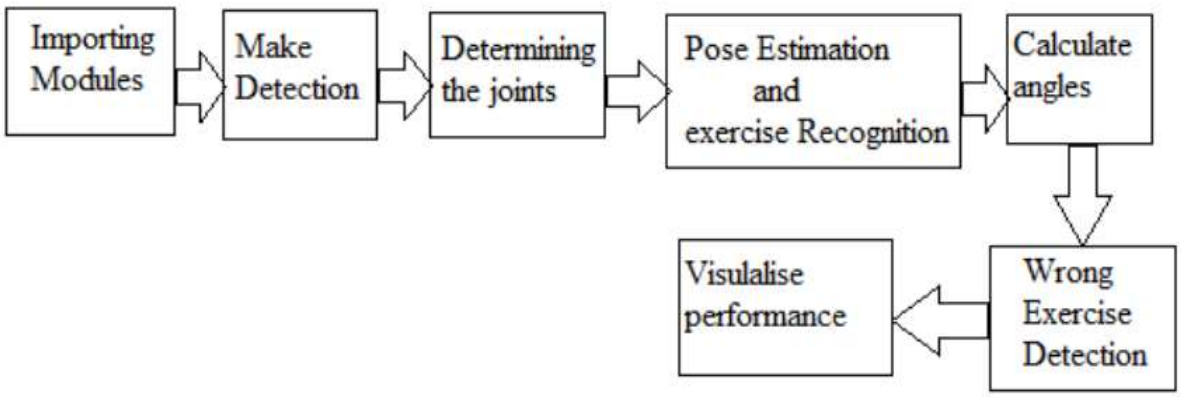

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Figure 2 System Architecture

IMPORTING MODULES:

Modules such as Numpy, Media Pipe, Open CV are imported in the system.This block represents the part of the system that has. It includes the display screen, keypad, and other input/output devices used to communicate with the user. The user interface block also includes the software layer responsible for processing user inputs and providing appropriate outputs.

MAKE DETECTIONS:

This block represents the part of the system that make detections. This component adds annotations to the media data, such as object detection, facial recognition. This block also includes the open pose library file responsible for processing detection.

DETERNINING THE JOINTS:

This block represents the part of the system that controls the joints(coordinates) using media pipe library file. It detects the joints and also identifies the coordinates and calculate them. The control block is mainly responsible for determining the joints and calculating the coordinates accordingly.

POSE ESTIMATION AND EXERCISE RECOGNITION:

This block represents the part of the system that processes and analyzes data from the Open CV and estimates the pose and recognize the exercise. This component handles the input of media data, such as images, video, and audio. Also includes the algorithms and software used to analyze the input collected from the Open CV and provide feedback to the user. This block uses media pipe algorithm to optimize the user's workout.

CALCULATE ANGLES:

This block represents the part of the system that calculates the angle and detects whether it's a wrong exersice. It includes modules such as Open CV and Open pose library file. it calculates the angle and detects the workout accordingly

WRONG EXERCISE DETECTION:

If the user crosses the threshold degree while doing the workout it detects as wrong exercise. it calculates the angle using media pipe library file and Open CV . there's a fixed degree 160 for all the three exercise so when the user crosses the threshold degree(160) system detect it as wrong exercise.

VISUALIZE PERFORMANCE:

The visualized performance of the entire exercise. after detecting the pose and detecting the wrong exercise it enables the user to complete all the 3 exercises and a each exercise contains a count of 4 so when the user extends above count This block represents the part of the system that provides power to all other blocks. It includes 4 system detects it and displays please stop workout. and visualizes the performance**.**

VII RESULT

Successfully implemented detection of human pose landmarks using media-pipe. Able to extract the pose landmarks to cartesian coordinates for analysis and Implemented a simple yet effective mathematical technique to find the angles between three joints. Applied simple heuristic approach to figure out a way to recognize the states of exercises. Integrated a simple User Interface to display exercise count and state information

VIII CONCLUSION & FUTURE SCOPE

We conducted extensive research for this paper on AI Personal Trainer, looking at a wide range of research publications on Personal trainer at home. We learned that most of the models were not able to provide the real-time interactions with the user. We understood that there is no such platform where users can interact with others who have similar workout goals which can improve the efficiency and motivation of the user. Additionally, we have learned about several proposed and existing systems through research publications, which has helped us develop a new model that would make translation much more efficient.

The future gym concept is based on the technologies now involved in the fitness sector. Health and fitness will remain a priority as the working environment is changing with the automation processes. Work from homemade fitness is worse nowadays, all courtesy to the covid pandemic. Workout is the only solution to this problem.Gyms are the first and foremost place to trim down body fat and reshape the body. Current gyms are doing it for people, but most of the tasks are manual such as data tracking, fitness plans, and diets. In the future, most manual tasks will be replaced by modern science and technology.One benefit of the future gym is that it becomes more personalised to each individual. For example, if someone is trying to lose weight, the gym will be able to track their progress and give them customised workout and diet plans.

That is proven successful for people with similar body types and goals. MediaPipe could be integrated with other health monitoring technologies, such as wearable devices or smart scales . MediaPipe could be used to facilitate group workouts, either in-person or remotely. This would allow users to work out together, share progress, and provide support and motivation to one another. Thus Future enhancements for gym training using MediaPipe could include virtual coaching, gamification, health monitoring, personalization, and group workouts.

Successfully implemented detection of human pose landmarks using media-pipe. After implementing the source code using open cv and media pipe it calculates the joint and the coordinates accordingly and also detects if the exercise is wrong. Media Pipe is a popular open-source framework for building cross-platform computer vision and machine learning applications. It provides a variety of pre-built solutions for different use cases, including hand tracking, face detection, and pose estimation.

In the context of gym training, Mediapipe can be used to track and analyze the movements of a person as they perform various exercises, such as squats, lunges, and push-ups. By using a camera to capture video footage of the person's movements, Mediapipe can identify key points on their body, such as their joints and limbs, and track these points over time to create a detailed 3D model of the person's pose.

REFERENCES

[1] W. Shi, Y. Gongin(2016)"Improving CNN performance with min-max objective", Proc. 25th Int. Joint Conf. Artif. Intell., 2016, pp. 2004–2010.

[2] C. Song et alin Proc.(2018) “MAT: A multi-strength adversarial training method to mitigate adversarial attacks,” IEEE Comput.Soc. Annu. Symp. VLSI, 2018, pp. 476–481.

[3] Han and Q. Dai,(2018) “Batch-normalized Mlpconv-wise supervised pre-training network in network,” Appl. Intell., vol. 48, no. 1,pp. 142–155, 2018.

[4] S. Li, W. Song, H. Qin, (2018) Deep variance network: An iterative, improved CNN framework for unbalanced training datasets,”Pattern Recognit., vol. 81, pp. 294–308, 2018.

[5] D. Tan, W. Zhong, X. Peng, Q. Wang.(2014) "Accurate and fast deep evolutionary networks structured representation through activating and freezing dense networks,” IEEE Trans. Cogn. Devel. Syst., to be published, doi: 10.1109/TCDS.2020.3017100

[6] B. Bilalli, A. Abello, and T. Aluja-Banet.(2017) “On the predictive power of metafeatures in openml,” Int. J. Appl. Math. Comput. Sci.,vol. 27, no. 4, pp. 697–712, 2017

[7] A. Torralba, R. Fergus, and W. T. Freeman,(2008) “80 million tiny images: A large data set for nonparametric object and scene recognition,” IEEE Trans. Pattern Anal. Mach. Intell., vol. 30, no. 11,pp. 1958–1970.

[8] L. N. Darlow, “Cinic-10 is not imagenet or cifar-10,”(2018) arXiv:1810.03505

[9] S. S. Althoff, E. L. Körmer, N. B. Greaves, T. E. de Araujo, and J. E. Burke(2017),Using machine learning to predict physical activity level from wearable sensor data IEEE Journal of Biomedical and Health Informatics,vol. 21, no. 1, 216-224

[10] E. H. Coles, J. J. Hasselquist, and B. R. Umberger,(2017)"A machine learning approach to predicting muscle activity during functional movements", vol. 89, pp. 19-28

[11] D. G. Behm and J. R. Sale,(1993)"Intended rather than actual movement velocity determines velocity-specific training response", vol. 74, no. 1, pp. 359-368.

[12] A. Torralba, R. Fergus, and W. T. Freeman(2008), "80 million tiny images: A large data set for nonparametric object and scene recognition," IEEE Trans. Pattern Anal. Mach. Intell., vol. 30, no. 11,pp. 1958–1970