AI-Based Fitness Trainer

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Abstract- Predicting Virtual assistants are an essential part of modern life and are crucial to how we do our everyday business. About 27% of people utilize AI virtual assistants to complete daily chores, according to a 2019 Clutch survey report that was published. With our idea for an AI-based fitness trainer, we intend to investigate the rapidly developing field of artificial intelligence. Our research led us to create Fitcercise, a programmed that counts the repetitions of a particular exercise while detecting the user's workout stance and providing detailed, individualized suggestions on how the user can improve their form. Using AI-driven human pose estimation technology, the software recognizes a person's stance, analyses the geometry of the posture using data and real-time video, and then counts the number of repetitions of the specific exercise.

Keywords-Body Recognition, DeepLearning, and Image Processing.

1. INTRODUCTION

In this study, we introduce Fitcercise, a programmed that recognizes the user's exercise pose, tracks the number of repetitions of the prescribed exercise, and provides individualized, in-depth information about improving the user's body posture. The AI-based fitness coach will assist those who are ready to workout at home but lack access to a gym in keeping their bodies in shape and maintaining their physical appearance and fitness. to help them complete the exercises properly and prevent both short-term and long-term harm.

Most gyms have a variety of exercise machines and trainers that can show us how to do the exercise correctly. But the absence of the aforementioned equipment and trainers is one of the greatest obstacles to our exercising at home. We want to develop an AI-powered fitness trainer that will improve your at-home workouts. The main objective of the project is to build an AI system that will help you work out by selecting the quantity and caliber of repetitions, which is done using CPU-based posture estimation. The goal of this project is to make exercising simpler and more fun. A non-distortive user interface will be present. No gym isnecessary when using the greatest digital personal trainer through a fitness app.

2. PROBLEM STATEMENT

Despite the numerous benefits of regular exercise, many people struggle to maintaina consistent fitness routine due to various challenges such as lack of motivation, time constraints, and limited access to personalized guidance. Traditional gymmemberships or personal training can be costly, and finding a suitable fitness routinethat meets individual goals can beoverwhelming. Additionally, with the rise of the pandemic, people are now morehesitant to go to the gym and prefer to exercise at home.

An AI-based fitness trainer app can help address these challenges by providingpersonalized fitness guidance and motivation to users from the comfort of their homes. The app can leverage user data to create customized fitness routines that meet their goals and preferences. The app can also provide real-time feedback on form and technique, which can help prevent injuries and ensure that users get the most out of their workouts. Additionally, the app can provide users with an engaging and interactive experience through gamification, challenges, and rewards, increasing motivation and accountability. Overall, an AI-based fitness trainer app can help individuals achieve their fitness goals and improve their overall health and well- being.

3. LITERATURE REVIEW

Applications are widely accessible on the market that instruct users on the workouts they should complete.

However, using our application, we instruct the user on not just which exercise to execute but also the proper posture and repetition counting using computer vision. This programmed can be viewed as an exercise trainer because it offers real-time posture detection. The programmed can be utilized at gyms as smart trainers, minimizing the need for human interaction, in addition to being used by users at home with an expanded scope.

Review of Literature:

1. An analysis of software for personal fitness trainers powered by AI.

In this study, applications for personal fitness trainers based on AI were systematically reviewed. The analysis found a total of 15 studies that satisfied the inclusion requirements. The study's findings demonstrated the efficacy of AI-based personal fitness trainer programmed for enhancing physical fitness, boosting motivation, and enhancing exercise adherence.

2. creation of an AI-based fitness software aimed towards senior citizens.

For older persons, this study created an AI-based fitness software. The software analyzed the user's movement using machine learning algorithms and offered personalised exercise advice. The results of the study demonstrated how well the software worked to increase the user's muscle power and balance.

3. AI's capacity to personalize fitness instruction.

The potential of AI for individualized fitness training was investigated in this study. According to the study, AI-based fitness trainer applications could offer individualized and adaptive training regimens that are catered to the demands of the individual. The study also examined the prospects and pitfalls of AI-based fitness training.

4. A mobile app powered by artificial intelligence that encourages college students to move more.

An AI-based smartphone app was created as part of this project to encourage college students to move more. Personalized workout advice was given by the app based on the user's degree of physical activity, time limits, and fitness objectives. The study revealed that the app was successful in boosting pupils' physical activity levels.

5. An AI-based virtual personal trainer to encourage folks who are overweight or obese to move more.

This study created a virtual personal trainer powered by AI to encourage persons who are overweight or obese to move more. According to the study, the app helped overweight and obese adults increase their physical activity and lose weight.

4. PROPOSED METHODOLOGY

1. In this Data Gathering: The first stage is togather information about workout regimens, exercises, and the effects they have on the body. This information can be gathered from a variety of sources, including research papers, fitness professionals, athletes, and fitness fans.

2. Data cleaning and processing are necessary after data collection to make sure it is in a format that can be used. In this step, the data is cleaned up, missing values are filled in, and the data is organised in a way that the AI system can easily interpret.

3. The next phase is to construct an AI programmed that will use the data that has been processed to produce customized workout plans for each person. This algorithm should take into account the user's age, gender, level of fitness, and fitness objectives.

4. User Interface Development: The AI-based fitness trainer's user interface needs to be straightforward and user-friendly so that users can readily enter their data and get customized workout plans. Users should be able to receive feedback from the interface on their advancement, which will encourage them to keep up their workout regimen.

5. Testing and Evaluation: The AI- based fitness trainer should go through a thorough testing and evaluation process to make sure that the workout plans it generates are precise and tailored to the user. To find any problems or areas for development, this testing should use real-world data and user feedback.

6. Continuous Improvement: The AI- based fitness trainer should be updated depending on user input and fresh fitness-related research. This will guarantee that the trainer stays current with the most recent developments and gives clients the finest possible service.
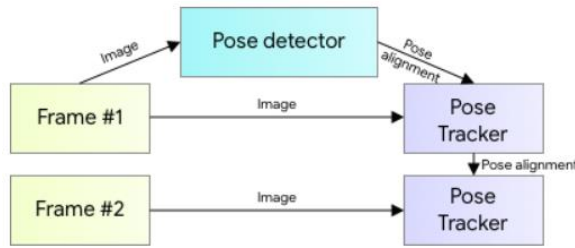
5. SYSTEM ARCHITECTURE

Data Collection: The initial step in the process entails gathering information on the user's level of fitness, health issues, medical background, fitness objectives, and preferred forms of exercise. This information can be gathered through the use of wearables, sensors, or user-inputteddata.

Data processing: After being collected, thedata is processed to remove pertinent features and make it ready for additional analysis. This entails transformation, feature extraction, feature normalization, and data cleaning.
Data collection is the first stage of the procedure, which involves learning about the user's level of fitness, health problems, medical history, fitness goals, and favoritetypes of exercise. Wearables, sensors, anduser-submitted data are all possible methods for gathering this data.

Data processing: After being gathered, thedata is prepared for further analysis by having the relevant features removed. Transformation, feature extraction, featurenormalization, and data cleaning are required for this.
The platform through which a user interacts with a system is known as the user interface. It should be created to offer the customer a seamless and customized experience, whether it is a chatbot, a web app, or a mobile app.

Feedback Loop: The feedback loop component is in charge of obtaining user feedback and utilizing it to enhance the customized exercise regimens. This entailsrecording the user's progress, keeping tabson their exercise history, and modifying the recommendations in response to their comments.

Integration: To provide a more comprehensive picture of the user's fitness journey, the system architecture should be created to integrate with various third- party platforms including fitness trackers, health monitoring equipment, and social networking platforms.

6. DIFFERENT TECHNOLOGIES

We have employed a variety of libraries, including Open CV and MediaPipe, a library that uses ML techniques in addition to several arithmetic and algorithms. To obtain the correct locations and the desired angles, we will make use of the CPU's posture estimate. Based on theseangles, a variety of actions are then found,such as the quantity of biceps curls. We'll be able to calculate angles between any three places with just one line of code.

Open CV
A programming library called OpenCV is primarily focused on real-time computer vision. After being developed by Intel, Willow Garage and It sees provided funding. The library is cross-platform and open-source under the BSD licensing.

Python
A high-level, interpreted programming language with many uses is called Python. Python has dynamic typing and is garbage-collected. It supports a range of programming paradigms, including functional, object-oriented, and structured programming (particularly procedural).Python programming includes a variety of frameworks and features that can be utilized in the creation of graphical user interfaces, machine learning, data analysis, and other applications. The Python programming language is frequently used by many enterprises for analyzing large datasets, data visualization, data analysis, and prototyping, despite the fact that it is not ideal for web application development.Python programming is becoming more popular among users for data science, despite being outdated as a web programming language.

Artificial intelligence
The study of intelligent machines that operate and behave like people is the goalof the computer science field of artificial intelligence (AI). The following jobs can be performed by computers with artificial

intelligence: With the aid of speech recognition technology, you can understand what someone is saying.

Media Pipe

Because Media Pipe enables quicker neural network inference on the device and synchronization of our result display with the video capture stream, it was quite easy to design our 3D human posture reconstruction demo app. The MediaPipe posture estimation tool employs a 33 key points approach, whereby it finds the key points, uses them appropriately, and then guesses the pose after reviewing the data set. Using the blazing pose tool, which uses machine learning to recognize poses, it tracks the pose from a real-time camera frame or RGB video. A two-step tracker machine learning pipeline, which is effective for media pipe solutions, is used in this method. The zone of interest of the action or posture is located in the real-time video by using the tracker. Then, given the input of the current video frame, it guesses the important locations in the area of interest. However, it should be emphasized that only at the start or whenever the model fails to recognize the body key points in the frame is the tracker activated.

7. CONCLUSION

Building computational models of intelligence is a new endeavor that is centered on AI. The fundamental premise is that intelligence, whether it be human or otherwise, can be expressed in terms of symbol structures and symbolic operations that can be programmed in a digital computer. Future implementations of this AI training project based on Python and OpenCV, such as their use in COVID 19, are numerous. Regardless of how business- friendly it may sound, adopting and integrating AI technologies is a roller- coaster journey. According to a Deloitte survey, around 94% of businesses could run into issues when integrating artificial intelligence. We need to be aware of both the benefits and the difficulties connected with adopting AI as consumers and developers of AI technology.

Our lives are getting busier today, and we scarcely have time in our schedules to stay healthy, active, and exercise every day. Numerous illnesses and health problems are results of this. Artificial intelligence can tackle a variety of issues in the fitness industry. Our lives are made easier by the health-related technologies and applications, which also facilitate our fitness path. People can utilize this application in their own workouts, which will increase their efficiency and decrease their likelihood of making mistakes. We gained knowledge about the OpenCV library and package as well as how machine learning applications might help humans during this process.

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