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A Proposed Model for Fainting People Detection Using Media Pipe Technology

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Abstract:- Nowadays, falls put patients' safety and health in danger in hospitals and assisted living facilities, especially at night. The camera system used in this study is the suggested model; it records video footage and, in real time, analyzes patterns using Media Pipe algorithms to detect fainting or falls. An instant alert is generated and sent to a mobile app connected to the camera system if such an event is detected. The caretakers, nurses, or security officers entrusted with providing assistance can communicate with each other using the smartphone application. They follow the message to a specific location. Lastly, the system aims to improve the quality of care and support for the senior population by accelerating the response to instances of fainting and falling through the use of computer vision technologies and real-time notifications.

***Keywords**:- Falling People, Human Detection, Media Pipe Fainting People, Elder Care.*

I. INTRODUCTION

Elderly people, patients, and pregnant women are prone to fainting, which can lead to both physical and emotional health problems. When someone falls and hits their head on the floor or another hard surface, they usually faint. Reaction and rescue time are critical components of emergency medical therapy for fainting patients. Therefore, it is essential to identify these cases as soon as possible in order to treat this population quickly.

A number of methods have been put out to identify fall motion. Using a press button on a wearable is one such technique. This enables the person who has fallen to press the button and request help. This strategy, however, is useless if the victim passes out right away. Additionally, an alarm is automatically transmitted by a wearable feeble motion sensor that detects motion using the tilt and acceleration sensors [1].

Around the world, human pose estimation technology is being actively researched in a variety of fields, including sports, entertainment, home senior care, gesture control, surveillance, job monitoring, and even metaverse avatars. Human pose estimation techniques are generally divided into two categories: 2D and 3D coordinate estimation techniques[2-6].

The suggested model integrates a camera system with Google's Media Pipe technology[7] and a mobile application interface that is easy to use in order to improve patient safety in healthcare institutions.

The suggested model operates by analyzing the frame as the camera system records the senior citizens' movements in order to identify the fainting event as soon as it happens. Next, begin alerting the appropriate parties so they can take the required steps to assist the individual who is fainting.

The suggested solution comes with a smartphone application that makes it easier for the camera system and the accountable parties to communicate via an internal network.

This work's remaining portions are arranged as follows. The related work is discussed in Section 2. The methodology and suggested algorithm for the faint detection model are explained in Section 3. The experimental findings and the comments are included in Section 4. Section 5 concludes the study and discusses future research.

II. RELATED WORK

The breadth and applications of these human detection and position-related initiatives can vary greatly, and they frequently make use of a variety of technologies, including sensor-based systems, computer vision, and machine learning. Each of these domains embodies unique technological applications, utilizing methods and instruments such as computer vision, deep learning, and sensor-based systems to tackle diverse issues related to human identification, tracking, and engagement in a range of sectors and domains.

Target identification and tracking are important issues for wireless sensor networks and are vital to public safety. For the elderly, patients, and even expectant mothers, faint detection is a critical concern. It is widely used in contemporary society. A technique for obtaining data on the location and behavior of faint events in the sensing environment was made possible by this work. This method uses the Kalman filter in conjunction with the Camshift tracking algorithm to locate and follow faint persons. Trials showed that the method performs well in difficult circumstances for both tracking and detection[8].

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For usage in a thermal imaging camera to track fainting incidents, a different straightforward faint detection technique was presented. Moreover, this method makes it possible to start therapy right away in order to save a person's life when they faint. The suggested surveillance system can identify human faint events with a high accuracy of 96.15% in dimly lit areas and 86.19% inside, according to experimental results on sample images[9].

In a different study, they present a novel real-time human detection method based on CNN with unified detection and AGMM for visual surveillance employing omni-directional cameras. contrasted with state-of-the-art CNN-based object detection techniques. Although it is not as accurate, the YOLO model-based object identification method is quite quick. With additional foreground contextual information obtained from pre-stage AGMM, the proposed technique improves the unified detecting CNN of the YOLO model. The speed-up benefit obtained from using 2-D input data consisting of grey-level image data and foreground context information instead of 3-D color input data offsets the increased computing time caused by additional AGMM processing [10].

III. METHODOLOGY

The open-source, cross-platform MediaPipe Pose (MPP) framework from Google is used in this study to estimate the 2D human joint coordinates in each frame of an image. MediaPipe Pose uses machine learning (ML) to design pipelines and manage cognitive data based on videos. Figure 1 illustrates how MPP extracts 2D landmarks from the human body using a BlazePose[11].

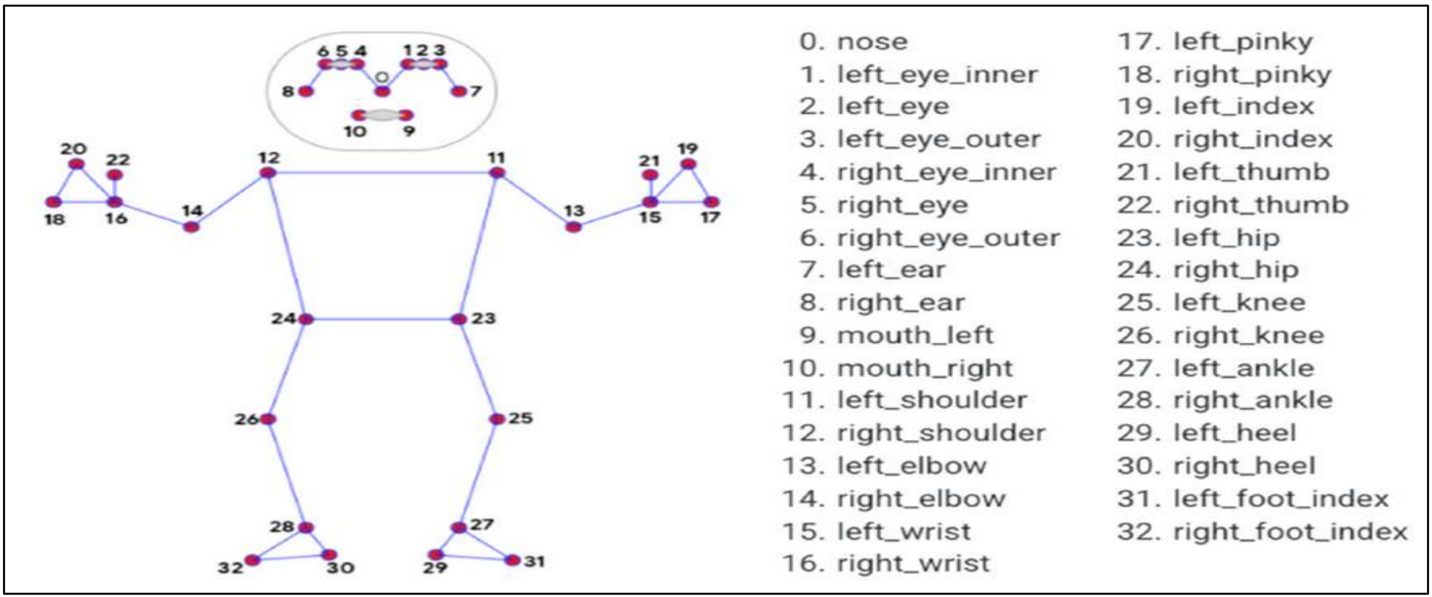

Fig 1: Definition of Landmarks in MediaPipe Pose[12]

BlazePose is a lightweight machine learning architecture that uses CPU inference to deliver real-time performance on PCs and mobile devices. To estimate a pose using normalized coordinates, multiply the inverse ratio by the values of the y-axis pixels. Utilizing indices 11, 12, 13, 14, 15, 16, 23, 24, 25, 26, 27, and 28, we calculated arbitrary postures and motions utilizing 12 of the estimated MPP landmarks, as seen in the Figure 1 below.

As seen in Figure 2, prompt alerts are generated and sent to healthcare professionals via alarms, emails, text messages, or notifications on an intuitive mobile application interface when a possible fall event is identified, enabling them to take the appropriate action.

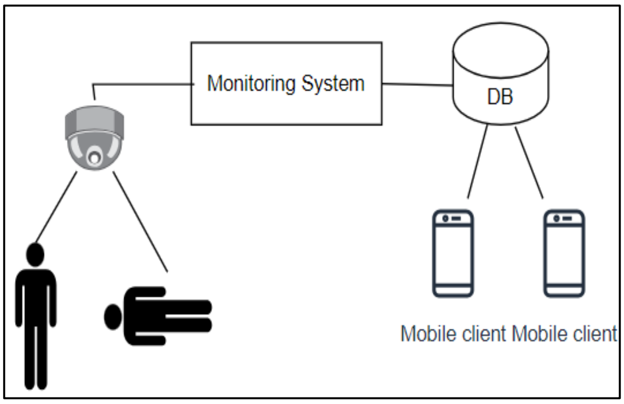

Fig 2: Proposed Model Architecture

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IV. EXPERIMENTS AND RESULTS

Python is used to build the experiment and test of the proposed model, and a high-resolution camera is used to accurately detect the human position.

As seen in two different images, our proposed model's correction procedure involves adjusting important points along straight lines in the image, starting with an initial estimated pose (left) and moving forward to the ground truth position y (right). The effectiveness of activity estimation was evaluated using a sudden fall motion estimation; Figure 3 shows the 2D posture estimation.

Fig 3: Results of 2D pose estimation obtained by MPP for a sequence of images in a Sudden[7]

And using MediaPipe Pose and camera images, the 3D stances were generated from the 2D stances. Figure 4 illustrates how the loss function, which reflects a number of parameters related to stable stances, makes the reconstructed humanoid models resemble the real 3D postures.

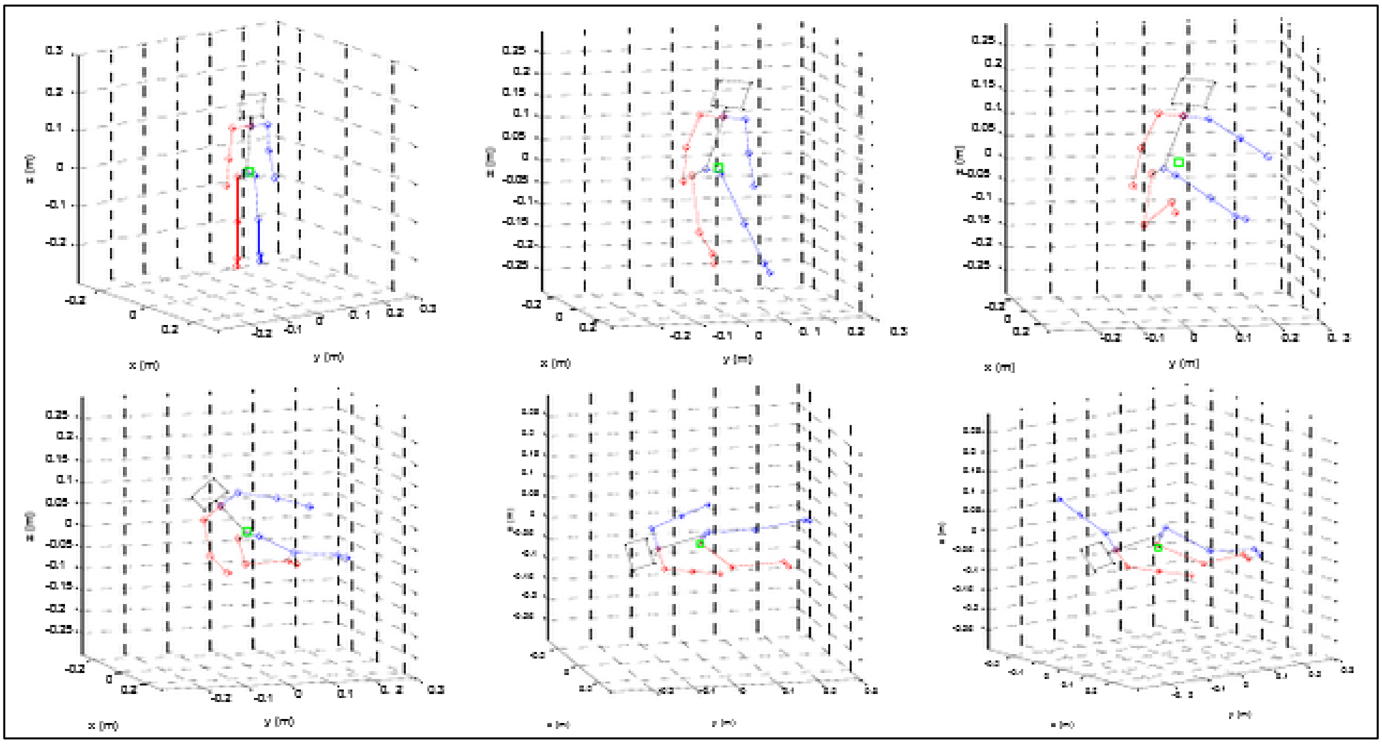

Fig 4: Results of the Reconstructed 3D Humanoid Poses [7]

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Because each key point requires a consistent set of corrections across images—the final correction being a scaled version—this method makes testing predictions easier. Similar to a control system, the model's feedback mechanisms allow it to detect when the solution is getting close to precision and minimize excessive movement of crucial points. To improve clarity and simplify the visuals, only a selection of the most important locations are shown with linear trajectories.

A smartphone application included with the suggested system makes it easier for the monitoring camera and the rescue teams to communicate and take appropriate action in the event that a fainting occurrence is identified.

V. DISCUSSION AND FUTURE WORK

This research presents a fainting detection model that uses Media Pipe technology to identify fainting individuals. The model also includes a mobile application as a component that helps with the falling event rescue process.

The model makes advantage of Google Technology's media pipe technology, which provides a good estimate of the human stance.

As a result, our suggested system will alert the relevant units to take appropriate action if many humans are identified on such an application site. However, the approach proposed in this study needs to be refined in order to be applicable in scenarios when a person who has fainted is ignored by those around them, such as in a homicide investigation. One way to find out if someone is conscious or unconscious is to follow them in a single picture. These topics will be explored in further work.

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