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DEPTH MEASUREMENT OF HUMANS USING WEB CAM

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Abstract

Artificial Intelligence has gradually become the mainstream in the detection algorithms because of its powerful feature extraction ability and adaptive ability. However, how to guarantee the accuracy and speed is still a huge challenge in the field of depth measurement. We implement face mesh from media pipe (module) which is developed by google. Media Pipe Face Mesh is a face geometry solution that estimates 468 3D face landmarks in real-time even on mobile devices. It employs machine learning (ML) to infer the 3D surface geometry, requiring a single camera input without the need for a dedicated depth sensor. Using face mesh, we take points from face and depth is measured. This makes project more accurate and speed. In our project we measure real time 3D depth, using these we make our text flexible with depth measured from webcam. When we move closer to our webcam text size reduces, and when we go far from webcam, text size is enhanced, which is accordance to the convenience to our end users. When we implement this in real life, end users can see the captions comfortably from any place they are watching the screen only.

Keywords**:** OpenCV, Mediapipe , FaceMesh, Windows, Python.

I. INTRODUCTION

Nowadays, Algorithms are becoming smarter than the previous algorithms thanks to computational power that we have today. It is bit complex to get the distance from a live camera than the lidar sensor which is bit expensive or from the laser light. Our objective is to make use of camera and detect the distance more accurate as the lidar. The scope of the project is to accommodate various applications using the depth measurement in real life. In this application we calculated depth measurement and according to the depth our text can be viewed by the user. It's convenient for the users to use this model and see variable length captions in real life according to where they are standing right now.

II.BACKGROUND OF THE STUDY

A depth image is acquired using Kinect camera frame-by-frame and then each frame is updated. After this, the output is further processed by using depth image smoothing algorithms and edge detection techniques. They have used the method of 'Median Filtering' for edge preservation and performed morphological operations like erosion and dilation for edge detection.

This system aims at detecting edges of the depth image and helps in the areas of object detection and object segmentation. the face distance can be estimated by using a single camera. A method based on monocular vision was proposed. The proposed system consisted of three major steps: feature regions were extracted and located in the face; pixel area of the characteristic triangle was calculated; and in the last step, the measurement formula was constructed using the pinhole camera calibration and area mapping.

The depth between the front camera of modern devices and the user can be determined by using the monocular cameras possessed by such devices. Modern mobile devices like phones and tablets having front cameras facing the user and rear stereo cameras were considered for the proposed system. The depth thus calculated, was then used to calculate the factor for zooming the content on the display for better viewing or reading experience. A supervised learning algorithm was proposed to find the distance information using the facial landmark values obtained from the front camera of the device. This also reduced the error due to relative motion between the user and the device. The new user's face was registered via the rear stereo cameras and then, the depth analysis was done by the front camera using the trained Back Propagation Neural Network.

The stereo vision systems can be improved using optimized 3D measuring techniques. Stereo vision involves the use of two cameras, each viewing from a different angle and capturing images. The stereo pair images were used to detect the corner feature points which are then triangulated based on stereo correspondences. Analysis of object shapes, measurement of distances and angles, etc. can be done accurately using the 3D scanners along with the stereo vision technique. The proposed system focused on enhancing the stereo vision system by implementing the intensity pattern match method for distance measurement in real-time applications. The existing systems are previously, we had laser-based face distance detector.

Drawbacks:

- There are some algorithms which are not accurate so far.
- And they doesn't support 3d face, so it is not performed in the real-time environments
- It cannot be used to measure the longer distance.

III. SYSTEM ARCHITECTURE

This module's system architecture is designed in a way that, it takes live video input from camera device. Now Calculate the depth based on focal length and distance formula by using trial and error method with the help of a Measuring Tape we can get more accuracy. The distance that can be measure in Centi-meter(cm). If the person is close to the screen (webcam), text should become smaller. If the person is far to the screen, then the text should become bigger.

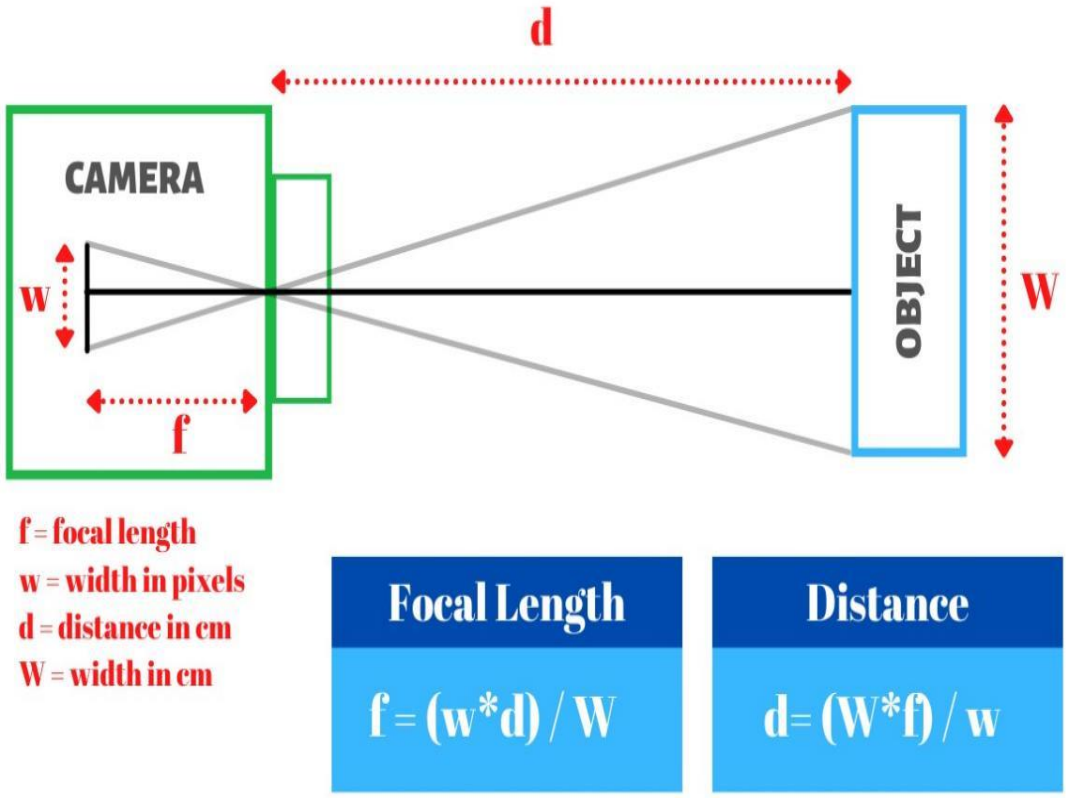

Fig 1: Object Measurement Flow Process

The process is explained below:

- Capturing video from the webcam.
- Calculating the depth based on focal length and distance formula.
- The distance that can be measure in Centi-meter (cm).
- If the person is close to the screen (webcam), text should become smaller.
- If the person is far to the screen, then the text should become bigger.

IV. MODULES AND ITS DESCRIPTION

- **Open CV**

  Open CV (Open-Source Computer Vision Library) is a library of programming functions mainly aimed at real-time computer vision. Originally developed by Intel, it was later supported by Willow Garage then Itseez (which was later acquired by Intel). The library is cross-platform and free for use under the open-source Apache 2 license. Starting with 2011, OpenCV features GPU acceleration for real-time operations

- **Media pipe**

  Media Pipe offers cross-platform, customizable ML solutions for live and streaming media. See also Media Pipe Models and Model Cards for ML models released in Media Pipe.To start using Media Pipe solutions with only a few lines code, see example code and demos in Media Pipe in Python and Media Pipe in JavaScript.

- **Face Mesh**

  Media Pipe Face Detection is an ultrafast face detection solution that comes with 6 landmarks and multi-face support. It is based on Blaze Face, a lightweight and well-performing face detector tailored for mobile GPU inference.

V. IMPLEMENTATION AND ALGORITHM TECHNIQUES

- We will take the input from webcam from cctv camera in the real time.
- With the use of Media pipe Face Mesh which was developed by Google.
- We can detect the face(s) in the 3D Perspective.
- By using Focal length and distance formulas and by changing the Focal length values by trial-and-error method with the help of a Measuring Tape we can get more accuracy.

Algorithm:

Step 1 – Start the program.

Step 2 – Take Camera feed from the Real-Time webcam as input.

Step 3 – If any face is detected, the depth is measured by using depth formula

Step 4 – According to that, depth can be calculated.

Step 5 – Display the output according to the depth measured in the new window

Step 6 – End the program.

VI. TESTING AND METHODOLOGIES

Code-Based Testing:

Code-Based Testing corresponds to the testing that is carried out on code development, code inspection. Here, we remove the redundant code and to keep the code clean

Compatibility testing:

This testing methodology ensures that our application is compatible. Compatibility testing takes place at three levels which are operating system compatibility, webcam compatibility, and device compatibility

Usability testing:

This testing type focuses on how user experiences while using our application. Efforts are put in to ensure that the application is according to user needs. This testing method makes it a point to see that a user is able to easily navigate through the application. The content that is displayed is clearly visible.

VII.RESULTS

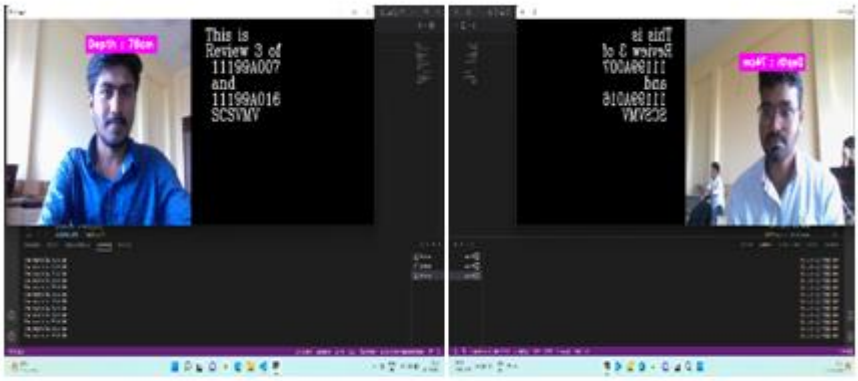

Fig. 2. Output of depth measurement-1,2

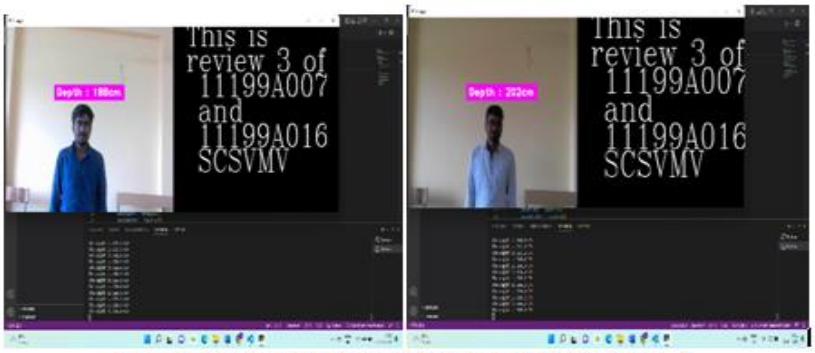

Fig.3. Output of depth measurement-3,4

VIII.CONCLUSION

In this Python project, we have successfully performed 3D-depth measurement form the webcam and distance is accurate. This is user-friendly application and convenient to use. This can be used in day-to-day life to enhance performance of various features. Using depth measurement, we can apply this depth and create various cool applications when user is moving from time-to-time. since our model is adoptable to the place user is using and functions according to it. We used open cv to detect the face. and we are using the face mesh landmarks to recognize the face. With the help of that we are getting the depth measurement. In depth measurement the distance is calculated by the human. In this project, we are going to find the distance between a face and a normal webcam. We will use some basic mathematics along with some AI techniques to achieve decent accuracy. The concept we will use it in an example project, where the size of the text increases if the person is far away from the screen. The goal of the project is used to help others to read it easily.

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