

Air Hand Writing Using Python

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ABSTRACT

Writing in air has been one of the most fascinating and challenging research areas in field of image processing and pattern recognition in the recent years. It contributes immensely to the advancement of an automation process and can improve the interface between man and machine in numerous applications. Several research works have been focusing on new techniques and methods that would reduce the processing time while providing higher recognition accuracy. Object tracking is considered as an important task within the field of Computer Vision. The invention of faster computers, availability of inexpensive and good quality video cameras and demands of automated video analysis has given popularity to object tracking techniques. Generally, video analysis procedure has three major steps: firstly, detecting of the object, secondly tracking its movement from frame to frame and lastly analysing the behaviour of that object. For object tracking, four different issues are taken into account; selection of suitable object representation, feature selection for tracking, object detection and object tracking. In real world, Object tracking algorithms are the primarily part of different applications such as: automatic surveillance, video indexing and vehicle navigation etc. The project takes advantage of this gap and focuses on developing a motion-to-text converter that can potentially serve as software for intelligent wearable devices for writing from the air. This project is a reporter of occasional gestures. It will use computer vision to trace the path of the finger. The generated text can also be used for various purposes, such as sending messages, emails, etc. It will be a powerful means of communication for the deaf. It is an effective communication method that reduces mobile and laptop usage by eliminating the need to write.

Keyword: - Air Writing, Character Recognition, Object Detection, Real-Time Gesture Control System, Smart Wearables, Computer Vision

1. INTRODUCTION

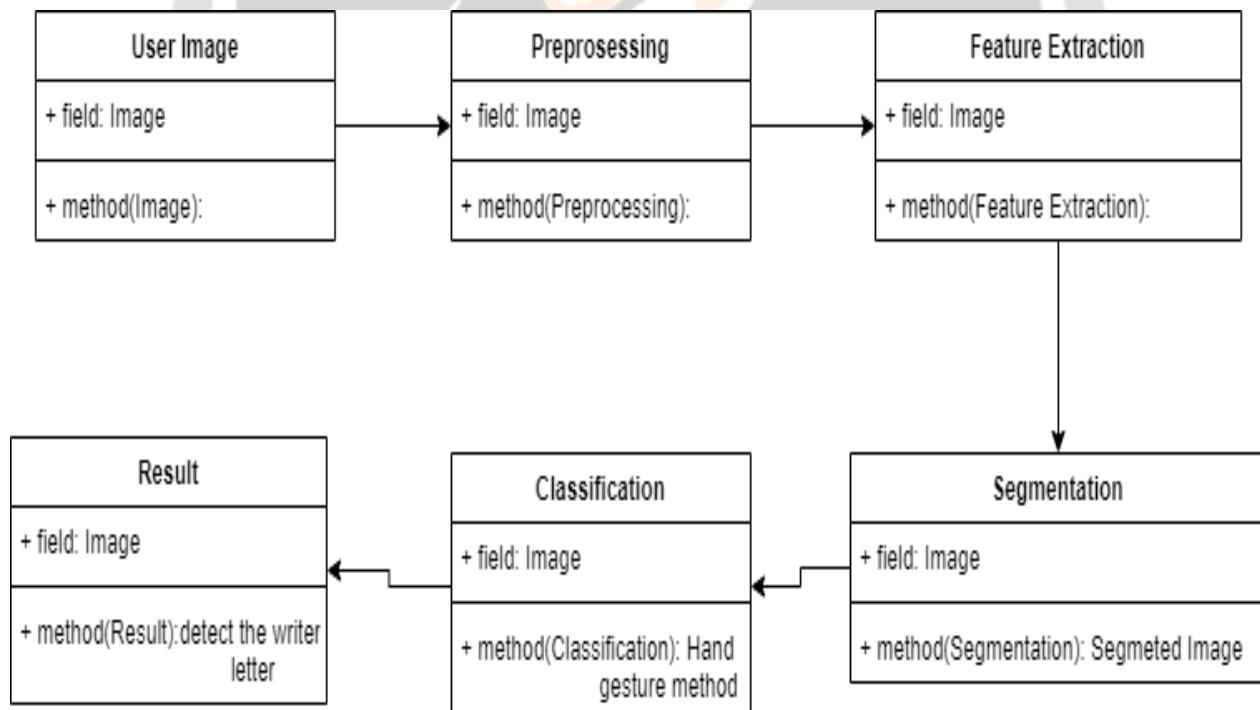
In the era of digital world, traditional art of writing is being replaced by digital art. Digital art refers to forms of expression and transmission of art form with digital form. Relying on modern science and technology is the distinctive characteristics of the digital manifestation. Traditional art refers to the art form which is created before the digital art. From the recipient to analyse, it can simply be divided into visual art, audio art, audio-visual art and audio-visual imaginary art, which includes literature, painting, sculpture, architecture, music, dance, drama and other works of art. Digital art and traditional art are interrelated and interdependent. Social development is not a people's will, but the needs of human life are the main driving force anyway. The same situation happens in art. In the present circumstances, digital art and traditional art are inclusive of the symbiotic state, so we need to systematically understand the basic knowledge of the form between digital art and traditional art.

2. LITERATURE REVIEW

A. Robust Hand Recognition with Kinect Sensor In [3], the system proposed used the depth and colour information from the Kinect sensor to detect the hand shape. As for gesture recognition, even with the Kinect sensor. It is still a very challenging problem. The resolution of this Kinect sensor is only 640×480. It works well to track a large object, e.g., the human body. But following a tiny thing like a finger is complex.

B. LED fitted finger movements Authors in [4] suggested a method in which an LED is mounted on the user's finger, and the web camera is used to track the finger. The character drawn is compared with that present in the database. It returns the alphabet that matches the pattern drawn. It requires a redcoloured LED pointed light source is attached to the finger. Also, it is assumed that there is no red-coloured object other than the LED light within the web camera's focus.

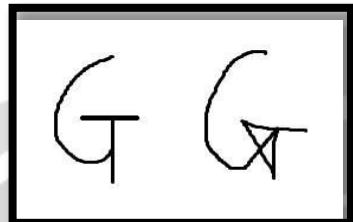
Fig -1: UML diagram of Use case Diagram



3 III. CHALLENGES IDENTIFIED

A. Fingertip detection The existing system only works with your fingers, and there are no highlighters, paints, or relatives. Identifying and characterizing an object such as a finger from an RGB image without a depth sensor is a great challenge.

B. Lack of pen up and pen down motion The system uses a single RGB camera to write from above. Since depth sensing is not possible, up and down pen movements cannot be followed. Therefore, the fingertip's entire trajectory is traced, and the resulting image would be absurd and not recognized by the model. The difference between hand written and air written 'G' is shown in Figure 1.



C. Controlling the real-time system Using real-time hand gestures to change the system from one state to another requires a lot of code care. Also, the user must know many movements to control his plan adequately.

5 V. SYSTEM METHODOLOGY



Figure 2: Workflow of the system

This system needs a dataset for the Fingertip Detection Model. The Fingertip Model's primary purpose is used to record the motion, i.e., the air character.

A. Fingertip Detection Model:

Air writing can be merely achieved using a stylus or airpens that have a unique colour [2]. The system, though, makes use of fingertip. We believe people should be able to write in the air without the pain of carrying a stylus. We have used Deep Learning algorithms to detect fingertip in every frame, generating a list of coordinates.

3.2 ADVANTAGES

- ▶ The child's recall of the word is strengthened by the physical act of air-writing the letters as well as by pronouncing and spelling the words.
- ▶ The activity also gives the kid some beneficial writing practise that will help them later in school.
- ▶ In order to prepare the arm and shoulder muscles for handwriting, air writing also aids in strengthening them.

4. ER DIAGRAM

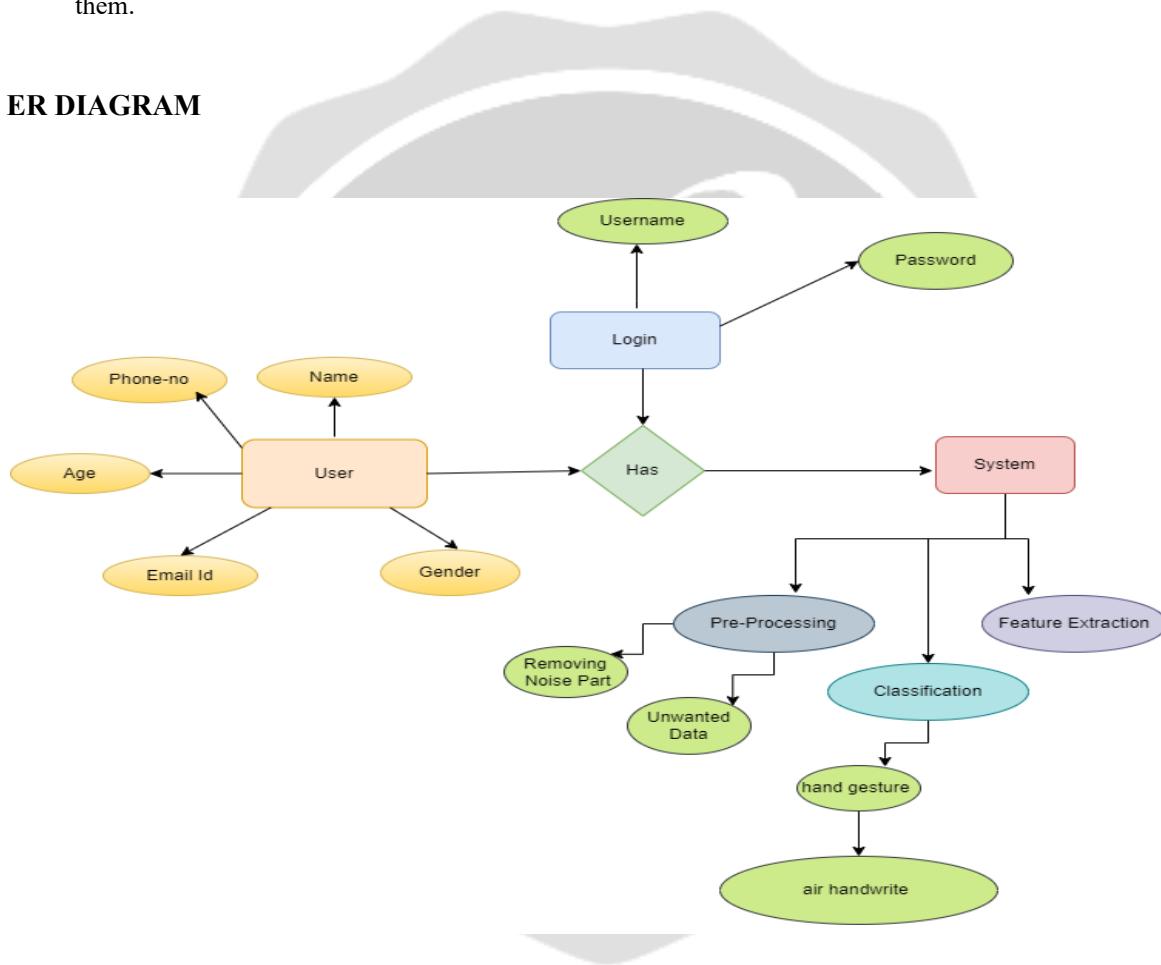


Figure -3:ER Diagram 1

4. CONCLUSIONS

The system has the potential to challenge traditional writing methods. It eradicates the need to carry a mobile phone in hand to jot down notes, providing a simple on-the-go way to do the same. It will also serve a great purpose in helping especially abled people communicate easily. Even senior citizens or people who find it difficult to use keyboards will be able to use the system effortlessly.

5. ACKNOWLEDGEMENT

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6. REFERENCES

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