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HAND GESTURE DETECTION AND RECOGNITION

GROUP 63
REVIEW 1

UNDER THE GUIDANCE
OF Dr. Komarasamy G

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CONTENTS

- Hand gesture recognition is used enormously in the recent years for interact human and machine.

- There are many type of gestures such as arm, hand, face and many other but hand gestures give more meaningful information than other types of gestures.

- There are many techniques for hand gesture recognition, such as color marker approach, vision-based approach, glove-based approach and depth-based approach.

Problem Statement

- There are people who are deaf who uses hand sign to convey there message but normal people some time might know sign language
- Individuals who are using hand signs to communicate covertly or to trigger certain actions.
- Sometime it is difficult for audience and players to interpret hand signals used by coaches and players to communicate during games.

Solution

- Hand sign recognition could be used to assist people with disabilities,to convey there message to others without difficulty
- Hand sign recognition could be used in security and surveillance applications, such as to identify individuals who are using hand signs to communicate covertly or to trigger certain actions.
- Hand sign recognition could be used to enable people to communicate with computers or other devices using nonverbal gestures
- Hand sign recognition could be used to analyze the strategies and tactics of sports teams, such as by tracking the hand signals used by coaches and players to communicate during games.

Objective

1

The main purpose of gesture recognition system is to develop a useful system which can recognize human hand gestures and used them to control electronic devices.

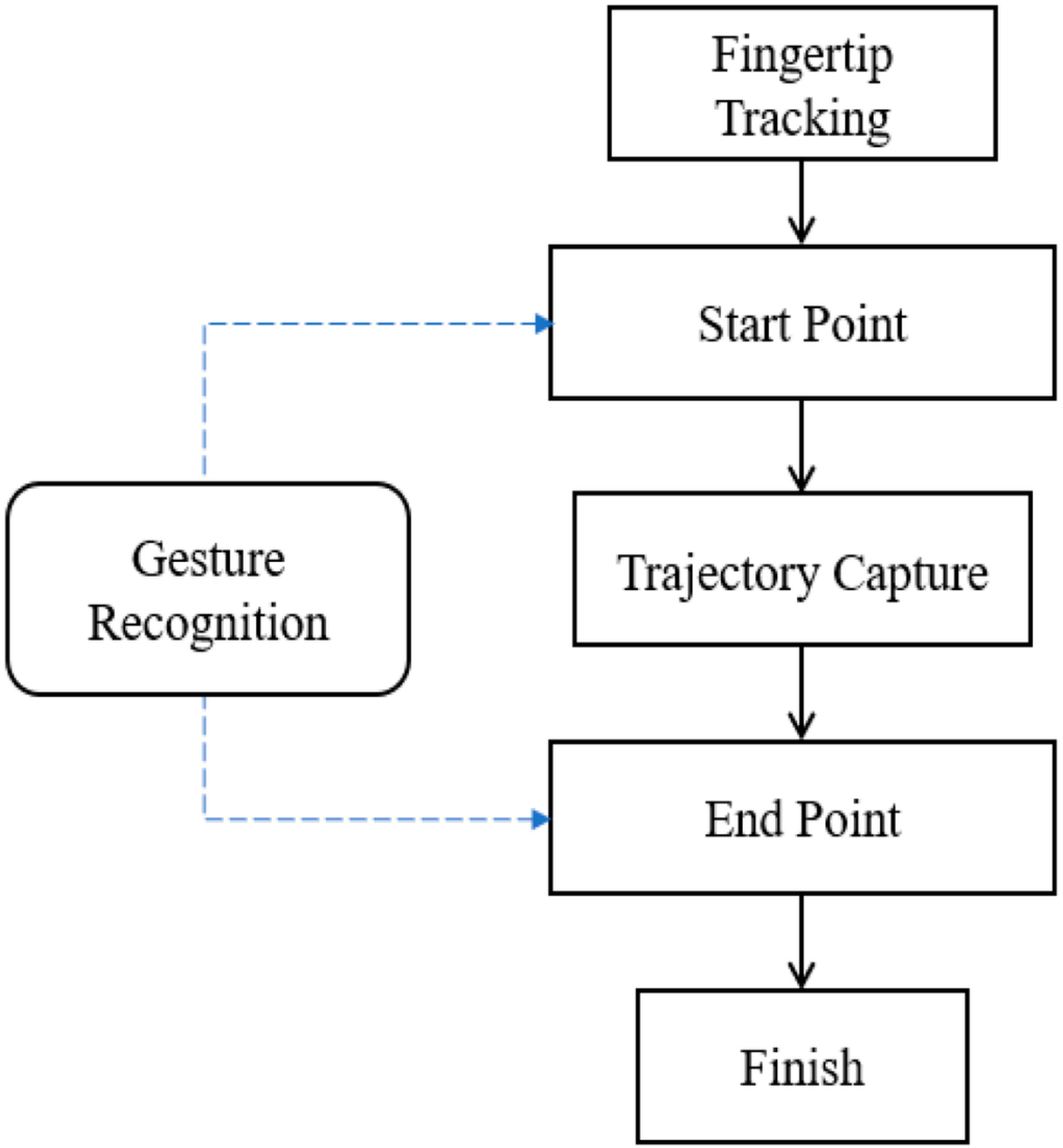
2

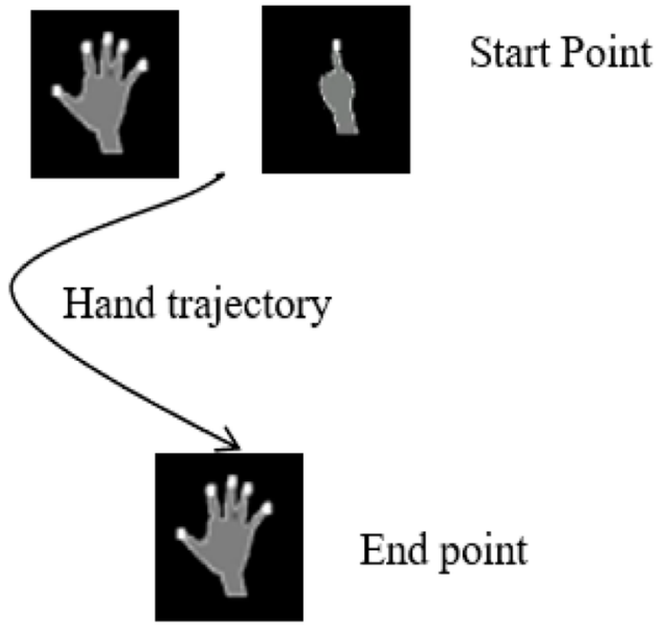
The system should be able to handle variations in hand gestures, such as changes in lighting conditions, hand orientation, and background clutter.

3

The system should be able to recognize a wide range of hand gestures and be able to adapt to new gestures over time.

System Flow Diagram





Literature Table

SL. NO.	Title Of Paper	Publishers Name,Year and Issue Number	Author Name	Problem Statement	Method/Technology Used	Author Contribution	Shortcoming/Deficiency
1	Real-Time Hand Gesture Recognition Based on Deep Learning YOLOv3 Model	MDPI , 2021 DOI:10.3390/app11094164	Abdullah Mujahid , Mazhar Javed Awan , Awais Yasin , Mazin Abed Mohammed ,Robertas Damaševi˘cius , Rytis Maskeli¯unas and Karrar Hameed Abdulkareem	Gesture Detection using YOLOv3 based methodology	You Only Look Once (YOLO) v3 and Single Shot Detector (SSD) algorithms	Conceptualization, A.M., M.J.A Methodology, A.M., M.J.A software, A.M., M.J.A. formal analysis, M.A.M	It can detect only count gestures

2	A wearable bio-sensing system with in-sensor adaptive machine learning for hand gesture	MDPI,2020 DOI- https://doi.org/10.1038/s41928-020-00510-8	Ali Moin & Andy Zhou	Wearable bio-sensing system for hand gesture	EMG -bio sensing system that uses hyper-dimensional (HD) computing to implement in-sensor adaptive learning and real-time inference for hand gesture classification.	A.Moin and A.Z. performed the experiments A.Moin,A.Z. and A.R. implemented algorithm	Incopo-ration of additional situational contexts i.e. larger variety of arm positions
3	Deep learning-based sign language recognition system for static sign	2020, DOI- https://doi.org/10.1007/s00521-019-04691-y	Ankita Wadhawan & Parteek Kumar	Sign language recognition system	data acquisition, image preprocessing, training and testing of the CNN classifier		There is a need to collect more datasets to refine the recognition method

4	Hand Gesture Recognition Based on Computer Vision	MDPI,2020, 10.3390/jimaging6080073	Munir Oudah, Ali Al-Naji, Javaan Chahl	Gesture Recognition Based on Computer Vision	Instrumented Glove Approach, Computer Vision Approach,Colour based Approach, OpenCV, OpenNI	Conceptualization, A.A.-N. & M.O funding acquisition, A.A.-N. & J.C.; methodology, M.O. & A.A.-N.	background issues, illumination variation, distance limit and multi-object or multi-gesture problems
5	Deep Learning-Based Approach for Sign Language Gesture Recognition With Efficient Hand Gesture Representation	IEEE,2020, 10.1109/ACCESS.2020.3032140	Muneer Al-Hammadi, Ghulam Muhammad, Wadood Abdul, Mansour Alsulaiman, Mohammed A. Bencherif,Tareq S. Alrayes, Hassan Mathkour, Mohamed Amine Mekhtiche	Deep Learning-Based Approach for Sign Language Gesture Recognition	a vision-based approach and a non-vision-based approach.	Funded by the Targeted Research Grant Program	training cost was maximized

6	Deep Learning Based Hand Gesture Recognition and UAV Flight Controls	Researchgate,2020, DOI-doi.org/10.1007/s11633-019-1194-7,	Bin Hu & Jiacun Wang	To train the system to recognize designed gestures, skeleton data collected from a Leap Motion Controller are converted to two different data models.	Python 2.6, Tensorflow 1.3.0, Dronekit 3.0, and Leapmotion SDK: 2.6.5.	____	**The 2- layer and 5-layer networks achieved 97% recognition rate on normalized input data, while the 8-layer network worked better with raw data input, at a recognition rate at 97%.**
7	Performance Evaluation of Convolutional Neural Network for Hand Gesture Recognition Using EMG	MDPI, 2020, DOI - doi.org/10.3390/s20061642	Ali Raza Asif, Asim Waris ,Syed Omer Gilani,Mohsin Jamil, Hassan Ashraf, Muhammad Shafique , Imran Khan Niazi	Convolutional Neural Network for Hand Gesture Recognition Using EMG	Electromyography (EMG)	Conceptualization, A.R.A., A.W., S.O.G. and M.J.; methodology, A.R.A., A.W., S.O.G. and H.A.	It preferred some motions on average across all tested cases rather than all motions of the hand

SOFTWARE REQUIREMENTS

Python
TensorFlow
Numpy
OpenCV
OS
Pandas
Matplotlib.pyplot

HARDWARE REQUIREMENTS

- Processor: i3, i5,i7
- RAM: 4GB,8GB
- Hard disk: 16GB
- Web Cam

Timeline/Process Flow

Review - 1

Searching for different ideas and finalizing the idea.

Review - 2

Implementation of the ML model of Hand Gesture detection and recognition

Review - 3

We will try to run the ML model and identify its final outcomes

End Of Project

Usability/Application

- **Talking to computer** - In future in which we can easily interact in virtual reality much as we do in actual reality, using our hands for small, sophisticated movements like picking up a tool, pushing a button or squeezing a soft object in front of us. This kind of technology is still evolving.

- **Medical Operation** - Simply hand gestures into doctor-computer interfaces, describing a computer-vision system that enables surgeons to perform standard mouse functions, including pointer movement and button presses, with hand gestures that satisfy the “intuitiveness” requirement.

- **Gesture-based Gaming control -** In games, computer-vision algorithms must be robust and efficient, as opposed to applications (such as inspection systems) with no real-time requirement, and where recognition performance is the highest priority. Research efforts should thus focus on tracking and gesture/posture recognition with high-frame-rate image processing**.**

- **Hand gesture to control the home appliances like MP3 player, TV etc. -** Most electronic devices focus on the hand gesture recognition algorithm and the corresponding user interface. Hand Gesture Based Remote is a device to replace all other remotes used in households and perform all their functions.

- **Gesture control car Driving -** Hand Gesture enable you to perform actions such as scrolling through a phone contact list, changing the destination on your Sat-Nav, returning to a previous song or increasing the temperature in the vehicle.

Contribution

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THANK YOU