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# AUTOMATIC BED POSTIONING SYSTEM USING IMAGE PROCESSING

#Koushik V, #Rishi Prakash R, *Vijaya Kumar R

# Student, * Assistant Professor (Sr.G)
Department of Computer Science and Engineering
Sri Ramakrishna Engineering College, Coimbatore-641 022

***Abstract* - In recent years, society is facing many sociological and financial challenges so some problem arise during taking care of elderly or physically challenged people. A full time caretaker may be required to continuously monitor which is not always possible due to social or financial constraints. To overcome this difficult, by using hand gesture as a source of communication people can interact with the computer.**

***Index Terms* - Hand gestures, Deep learning, segmentation by colour, Inclination level.**

## 1. INTRODUCTION

Deep Learning is the derived concept of machine learning with algorithms inspired from the human neuron structure called the artificial neural networks. Deep learning (deep structured learning or hierarchical learning) algorithms are useful for the classification and prediction problems and capable of interpretation of content with understanding and reasoning and also able to transfer and apply the obtained results from the learning model to a newer scenario.

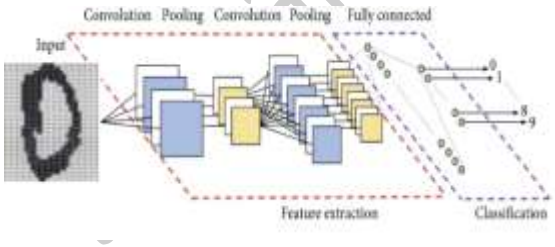


Fig 1 Deep Learning Model

Gestures are powerful means of communication among humans. In fact, gesturing is so deeply rooted in our communication that people often continue gesturing for some actions to be performed. It also provide a way for a person to express their idea. The hand gesture are dynamic movement which can be used to represent different actions that represent the real world.

The main idea is to make the hand gestures understandable for the system so it can act as intermediate for the real time world interaction also that it can help to improve the comfort of the patients.

## 2. DRAWBACKS OF EXISTING SYSTEM MODEL

The drawback of the existing system is cannot adapt to different tone colour of the people.

## 3. OBJECTIVE

To develop a hand gesture detection model system to act as intermediate for the people to communicate the need (change the position of the bed). So they not depend on others for their needs.

## 4. METHODOLOGY

The proposed methodology can be visualized in the flow chart of diagram. The images are obtained from the database. Then, the images go through an image processing stage, in which the following operations occur: color segmentation using an MLP network, morphological operations of erosion and closing, contour generation, and polygonal approximation, to remove image noise.

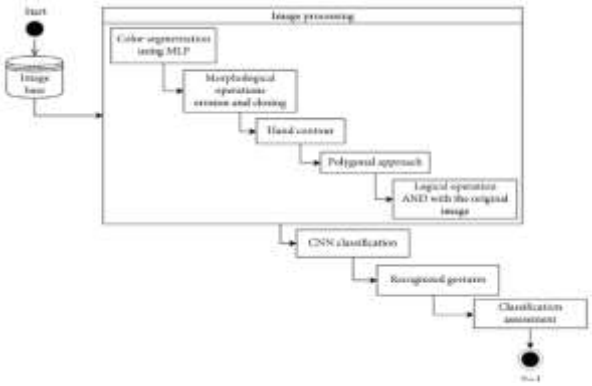

Fig 2. Methodology flow chart

### 4.1 SEGMENTATION BY COLOR

Segmentation subdivides an image into regions, so that it is possible to highlight regions that contain characteristics of interest. Therefore, segmentation algorithms can be implemented to separate colors, textures, points, lines, discontinuities, borders, among others. The segmentation process varies according to the problem.

In the case of gesture recognition, the entire background region of the image is not of interest, so only the set of pixels with the presence of the human hand must be maintained. One method for this segmentation is the implementation of background removal, where image samples are collected from the environment and then objects are added to the scene. In this way, the pixels of the new images are compared with the images of the scenario. The regions that show large amount of pixel differences, possibly containing the hand and gesture, are considered foreground. Although it is a good method, this type of segmentation is quite susceptible to variations in lighting.

An alternative is the color-segmentation technique, where it is possible to divide the images into regions that have previously defined color tones. In the case of the presented problem, the color tones to be segmented are similar to human skin tones. To solve this, we can train an MLP network that learns the skin color tones and then classifies which pixels in the image belong to the skin color sets. This method is more robust because it only depends on the correct learning of color sets.

## 5. DATASET

The dataset contains different kind of data for hand gesture for e.g. like image of hand gesture showing zero (0) sign etc. The below dataset image show the data used for training.

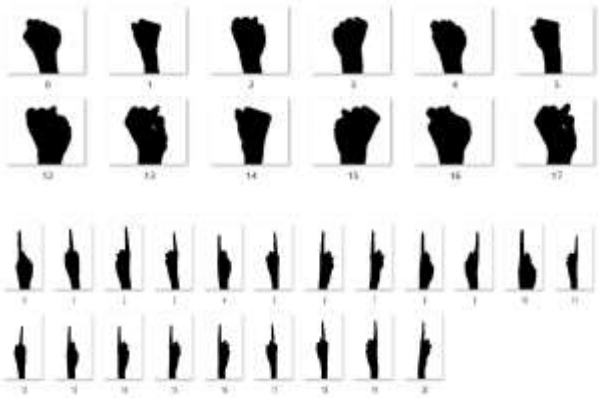

Fig 3. Dataset

## 6. PROJECT MODULES

### 6.1 DATA COLLECTION

The first basis for the experiment to work properly is gathering of information which is known as data collection in programming point of view. We have collected some existing data from github. Since the data is not enough we have generated our own hand gesture data. We generated data using webcam which captures the image and saves the equivalent threshold image in that particular file destination.

We made a data collection python model by which we can capture and save the data in a single press of a button. We collected 600 train image and 30 test image from github. We generated 700 train image and 90 test image.

### 6.2 MODEL DEVELOPMENT

In this we have used a convolution neural network model. We had tried with a two layer neural network which gave a good result. We also tried various activation functions like ReLU, TanH, Sigmoid, Softmax in which ReLU and Sigmoid was working fine for our model.

We also tried different loss functions such as Cross-Entropy loss, Mean Squared error Loss in which categorical_crossentropy loss function gave best out of it. We trained the data for 15 epochs we found it is enough to avoid over fitting problem.

We save our trained model in json format for example “model1.json” and also the weights generated as .h5 file.

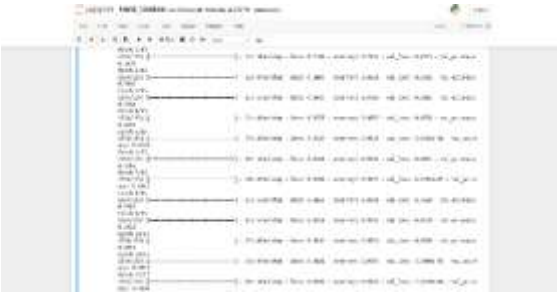

Fig 4. Epoch

## 7. RESULTS

The experimental result are computed using the trained data for changing the position of the hospital bed despite the color tone of the people it will

accurately detect the hand gesture made by the people.

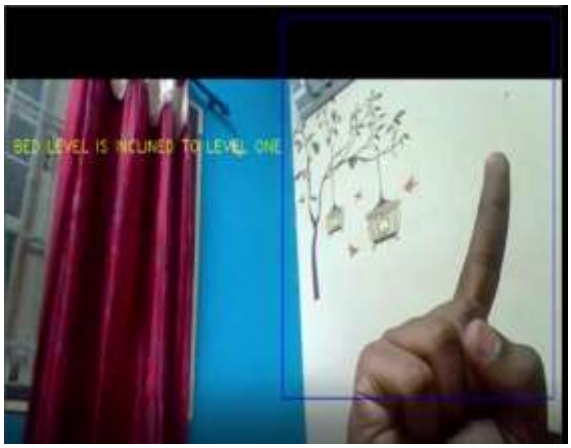


Fig 5. Hand gesture-1


Fig 6. Hand gesture-2

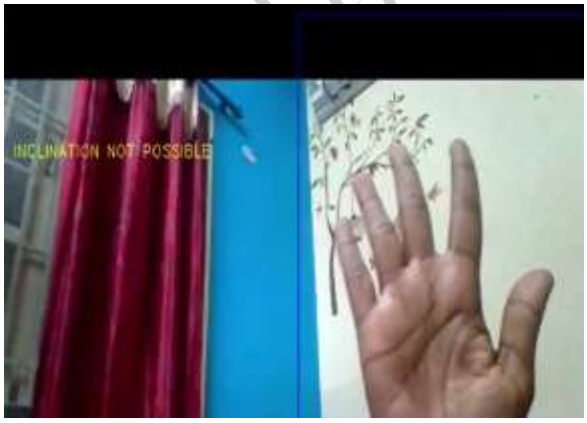


Fig 7. Hand gesture-3

From the above images if the elevation position is available the after the hand gesture is shown with the degree of the bed position the bed is elevated message is shown as in Fig 5 and Fig 6 if not possible the message no inclination as in Fig 7 is shown.

## 8. CONCLUSION

The proposed system will gather the input from patients (user) as format of hand gestures and change the position of the hospital bed according to the patient's desired degree.

With this system we perform this hand gesture information collecting task for any tone of the skin despite of the background so the patients in the hospital need not to depend on others for their needs.

This proposed system can then enhanced with voice recognition system so it will make the process little much faster and simpler for the patients.

## 9. REFERENCES

[1.] Adjustment of Bed for a Patient through Gesture Recognition: An Image Processing Approach

-Sajida Fayayz, Rubab Bukhsh

[2.] An Introduction to digital Image Processing

-Fredric Patin

[3.] Robust classification of hand postures against complex background

-Jochen Trisech, Christoph Von Der Malsburg.

[4.] Vision Based Hand Gesture Recognition (2009). Pragati Garg, Naveen Aggarwal and Sanjeev Sofat Vol 3

[5.] Robust classification of hand postures against complex backgrounds
J. Triesch, C. von der Malsburg IEEE

[6.] Y. Cui and J. Weng, "Learning-based hand sign recognition", Int. Workshop on Automatic Face-and Gesture-Recognition, 1995-June-26-28.

[7.] T. S. Huang and V. I. Pavlović, "Hand gesture modeling analysis and synthesis", Int. Workshop on Automatic Face-and Gesture-Recognition, 1995-June-26-28.

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