



IMPLEMENTATION OF 3D GESTURE DETECTION SYSTEM USING MATLAB

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ABSTRACT: Gestures could originate from any bodily motion or state but commonly originate from face or hand. Current focuses in field include emotion recognition from face & hand gesture recognition. Many approaches have been made using cameras & computer vision algorithms to interpret sign language. However, identification & recognition of posture, gait, proxemics, & human behaviours is also subject of gesture recognition techniques. Gesture recognition could be seen as a way for computers to begin to understand human body language, thus building a richer bridge between machines & humans than primitive text user interfaces or even GUIs (graphical user interfaces), which still limit majority of input to keyboard & mouse. During last year's there had been an increasing use of automatic personal recognition systems. Palm print based biometric approaches have been intensively developed over last 12 years because they possess several advantages over other systems.

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[I] Introduction

Gesture recognition is a topic in computer science & language technology within goal of interpreting human gestures via mathematical algorithms. Gestures could originate from any bodily motion or state but commonly originate from face or hand. Current focuses in field include emotion recognition from face & hand gesture recognition. Many approaches have been made using cameras & computer vision algorithms to interpret sign language. However, identification & recognition of posture, gait, proxemics, & human behaviours is also subject of gesture recognition techniques. Gesture recognition could be seen as a way for computers to begin to understand human body language, thus building a richer bridge between machines & humans than primitive text user interfaces or even GUIs (graphical user interfaces), which still limit majority of input to keyboard & mouse.



Fig 1 Gesture Recognition

Gesture recognition could be conducted within techniques from computer vision & image processing.

The literature includes ongoing work in computer vision field on capturing gestures or more general human pose & movements by cameras connected to a computer. Gesture recognition & pen computing: Pen computing reduces hardware impact of a system & also increases range of physical world objects usable



for control beyond traditional digital objects like keyboards & mice. Such implementations could enable a new range of hardware that does not require monitors. This idea might lead to creation of holographic display. The term gesture recognition had been used to refer more narrowly to non-text-input handwriting symbols, such as inking on a graphics tablet, multi-touch gestures, & mouse gesture recognition. This is computer interaction through drawing of symbols within a pointing device cursor.

[2] Literature Review

Joyeeta Singha¹, Karen Das² 2013 Hand Gesture Recognition Based on Karhunen-Loeve Transform

In this paper, we have proposed a system based on KL Transform to recognize different hand gestures. The system consists of five steps: skin filtering, palm cropping, edge detection, feature extraction, & classification. Firstly hand is detected using skin filtering & palm cropping was performed to extract out only palm portion of hand. The extracted image was then processed using Canny Edge Detection technique to extract outline images of palm.

Carl A. Pickering*, Keith J. Burnham†, Michael J. Richardson* in 2014 A Research Study of Hand Gesture Recognition Technologies & Applications for Human Vehicle Interaction

This paper describes primary & secondary driving task together with Human Machine Interface (HMI) trends & issues which are driving automotive user interface designers to consider hand gesture recognition as a realistic alternative for user controls. A number of hand gesture recognition technologies & applications for Human Vehicle Interaction (HVI) are also discussed including a summary of current automotive hand gesture recognition research.

1Rafiqul Zaman Khan & 2Noor Adnan Ibraheem 4, July 2012 HAND GESTURE RECOGNITION

Hand gesture recognition system received great attention in recent few years because of its manifoldness applications & ability to interact with machine efficiently through human computer interaction. In this paper a survey of recent hand gesture recognition systems is presented. Key issues of hand gesture recognition system are presented with

challenges of gesture system. Review methods of recent postures & gestures recognition system presented as well. Summary of research results of hand gesture methods, databases, & comparison between main gesture recognition phases are also given. Advantages & drawbacks of discussed systems are explained finally In this paper various methods are discussed for gesture recognition, these methods include from Neural Network, HMM, fuzzy c-means clustering, besides using orientation histogram for features representation.

[3] Tools & Technology

This Research Work is using MATLAB software environment for my proposed work in video steganography, MATLAB (matrix laboratory) is a numerical computing environment & fourth-generation programming language. Developed by Math Works, MATLAB allows matrix manipulations, plotting of functions & data, implementation of algorithms, creation of user interfaces, & interfacing with programs written in other languages, including C, C++, Java, & FORTRAN.

Syntax

The MATLAB application is built around the MATLAB language, and most use of MATLAB involves typing MATLAB code into the Command Window (as an interactive mathematical shell), or executing text files containing MATLAB code, including scripts and/or functions.

Variables

Variables are defined using the assignment operator, =. MATLAB is a weakly typed programming language because types are implicitly converted. It is an inferred typed language because variables can be assigned without declaring their type, except if they are to be treated as symbolic objects, and that their type can change. Values can come from constants, from computation involving values of other variables, or from the output of a function. For example:

```
>> x = 17
```

```
x =
```

```
17
```



```
>> x = 'hat'
x =
hat

>> y = x + 0
y =
    104    97    116

>> x = [3*4, pi/2]
x =
    12.0000    1.5708

>> y = 3*sin(x)
y =
   -1.6097    3.0000
```

[4] Propose Work

Gesture recognition technology using a standard 2D camera that could detect robust hand gestures could be used to capture multiple 2D captures & make multidimensional security system. It will increase accuracy but takes lot of time on rendered images. So we have extract only useful part of biometric object such as pattern of gestures in multidimensional form. Such system would be useful in banking security systems as well as criminal identification system.

Flowchart

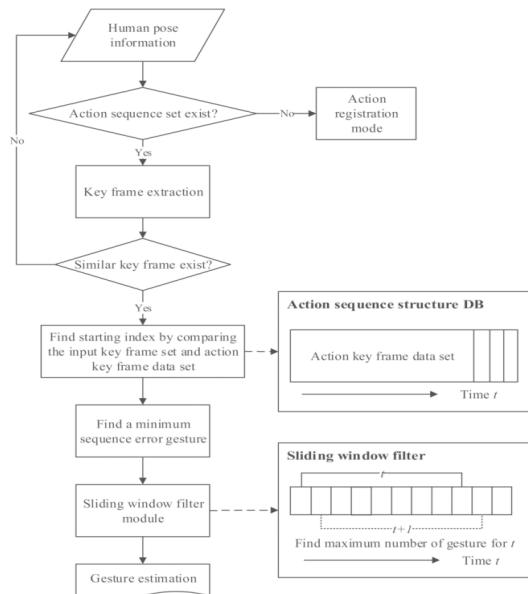


Fig 2 Flow Chart

[5] Implementation

Existing image

```
im=imread('1.jpg');
imagesc(im);
```

Applying Sobel Operator Based Matlab code on image

```
im=imread('1.jpg');
img=rgb2gray(im);
sob_im = edge(img,'sobel');
figure(2);
imagesc(sob_im);
axis('square');
colormap('gray');

imshow(sob_im);
```

Existing image

```
im=imread('2.jpg');
imagesc(im);
```

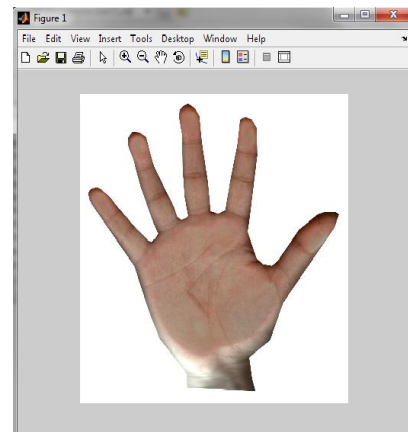


Fig 3 Existing gesture

Applying Sobel Operator Based Matlab code on image

```
im=imread('2.jpg');
img=rgb2gray(im);
```



```
sob_im = edge(img,'sobel');
figure(2);
imagesc(sob_im);
axis('square');
colormap('gray');
imshow(sob_im);
```

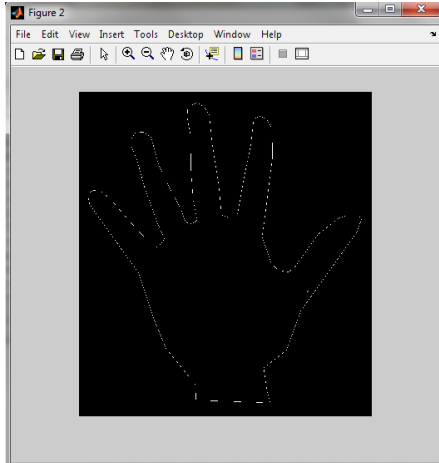


Fig 3 Existing image

Existing image

```
im=imread('3.jpg');
imagesc(im);
```

Applying Sobel Operator Based Matlab code on image

```
im=imread('3.jpg');
img=rgb2gray(im);
sob_im = edge(img,'sobel');
figure(2);
imagesc(sob_im);
axis('square');
colormap('gray');
```

```
imshow(sob_im);
```

3-D Gesture recognition implementation

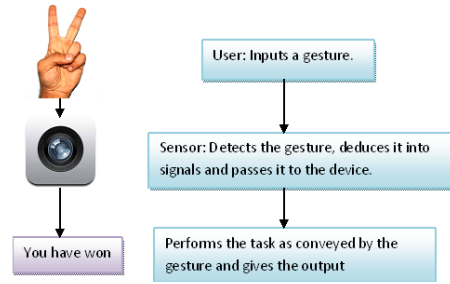


Fig 4 Acquisition image

Step 1: Acquisition of image: Scan image of Gesture from multiple dimensionsl or take it by digital camera

Step2: Before comparison we crop images



Fig 5 Image before crop

Step 2

After cropping images edge are detected using canny algorithm

Step 3

Store image as matrix in i

```
>>i=imread('1.jpg')
```

Step 4

apply canny to i matrix & store in ii

```
>> ii=canny(i,1,1,1)
```

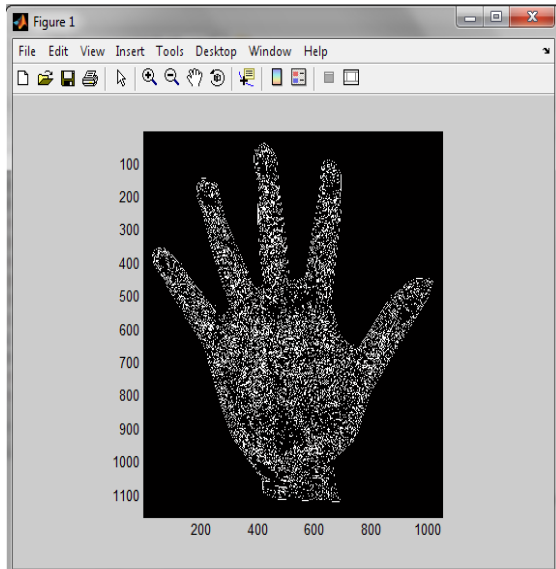


Fig 6 crop Image

Step 5

Create histogram using surf command

```
>>surf(ii)
```

Step 6: In same way we may take different gesture image then crop it & store its matrix in different

Step 7: Now find edge of cropped gesture

Step 8: Take histogram from matrix of edge based gesture & compare both histogram using isequal command

```
>> isequal(ii,iii)
```

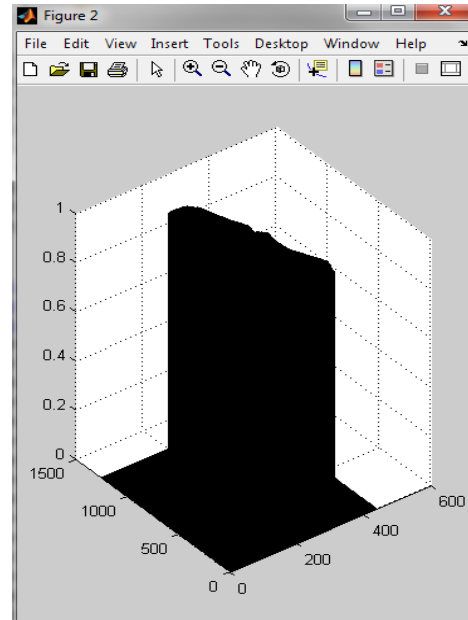


Fig 7 histogram from matrix of edge based gesture

[6] Conclusion

During the course of this thesis we have described in detail the inspiration and motivation behind our research and its possible applications. A thorough exploration of both current and previous efforts in Gesture recognition was revealed. Once this prelude was given we then offered a thorough description of our system and the technologies incorporated. During the design and implementation an importance was made to keep the system modular. This is to allow future enhancement and will alleviate the complexity of modifying or upgrading the system. Individual components can simply be switched as long they interface with the main system in a similar fashion. While developing this, an effort was made to evaluate each of the individual segments of the system before appraising the whole system.

During this instance of time, several different glitches related to gesture recognition have been addressed. Furthermost of studies has been done in palm print recognition due to its stability, reliability & exclusivity. Furthermore it has been used for law enforcement, civil applications & access control applications.

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