

Hand gesture recognition system

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Abstract: In this paper, we introduce a hand gesture recognition system to recognize real time gesture in unconstrained environments. Many approaches to gesture recognition have been developed. Present an extensive review of existing technique for interpretation of hand gestures. A large variety of techniques have been used for modelling the hand. Building applications with OpenCV inside MS Visual Studio 2010. The main aim of the system is to use the most natural form i.e., hand gestures to interact with the computer system. These gestures would be implemented such that they are easy to perform, fast, efficient and ensuring an immediate response. Various UI controls and operating system applications like VLC Media Player and MS PowerPoint can be operated using the hand gestures. Extended implementation can include extending to other OS applications and/or web-based deployment. Some of the applications include automated homes, operating visual devices like television solely with gestures and also medical applications like that implemented at the Ben Gurion University which enables doctors to manipulate digital images during medical procedures using hand gestures instead of touch screens or keyboards owing to sterile human-machine interfaces.

Keywords: OpenCV, Visual Studio C++, Gesture, Recognition.

I. INTRODUCTION

In today's world, we require fast and easy interaction with complex systems that would ensure a faster response in turn. As a result, with increased advancement in the technology, response times and easy operation are the main concerns. Here is where Human Computer interaction comes into play. The main aim of the system is to use the most natural form i.e., hand gestures to interact with the computer system. These gestures would be implemented such that they are easy to perform, fast, efficient and ensuring an immediate response.

II. EXISTING SYSTEM

There are many systems in existence today that have implemented gesture recognition system of one or the other kind. Many of these systems have special requirements and working conditions and accuracy levels depending upon the technology used and the algorithms implemented to run the system. A brief comparison of the systems in existence and our proposed system can be seen as follows:

III. PROBLEM DEFINITION

various services can be provided to the user where he can add his own custom gestures, delete the existing gestures and modify operations mapping onto the gestures. Various UI controls and operating system applications like VLC Media Player and MS PowerPoint can be operated using the hand gestures. Extended implementation can include extending to other OS applications and/or web-based deployment.

IV. IMPLEMENTATION

Building applications with OpenCV inside MS Visual Studio 2010

To build an application with OpenCV we need to do two things:

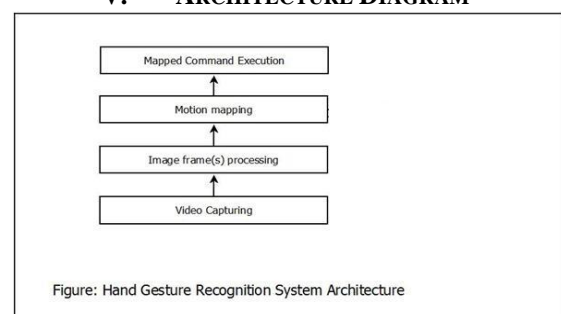
- Tell to the compiler how the OpenCV library looks. We do this by showing it the header files.

Table Comparison of Various Gesture Recognition Systems

Paper	Primary Method of Recognition	Background to Gesture Images	Additional Markers Required (Like Wrist Band)	Number of Training Images	Frame Rate
[Bauer & Hienz, 2000]	Hidden Markov Models	General	Multicoloured Gloves	7- Hour Signing	-
[Starnar Weaver & Pentland, 1998]	Hidden Markov Models	General	No	400 Training Sentences	10
[Bowden & Sarhad 2000]	Linear Approximation to Non Linear Point Distribution Models	Blue Screen	No	7441 Images	-
[Davis & Shah, 1994]	Finite State Machine/Model Machine	Static	Markers on Glove	10 Sequences of 200 Frames Each	10
This Project	Image Processing	Static	No	-	15 - 20

- Tell to the linker from where to get the functions or data structures of OpenCV, when they are needed.

V. ARCHITECTURE DIAGRAM



VI. PROCESS FLOW

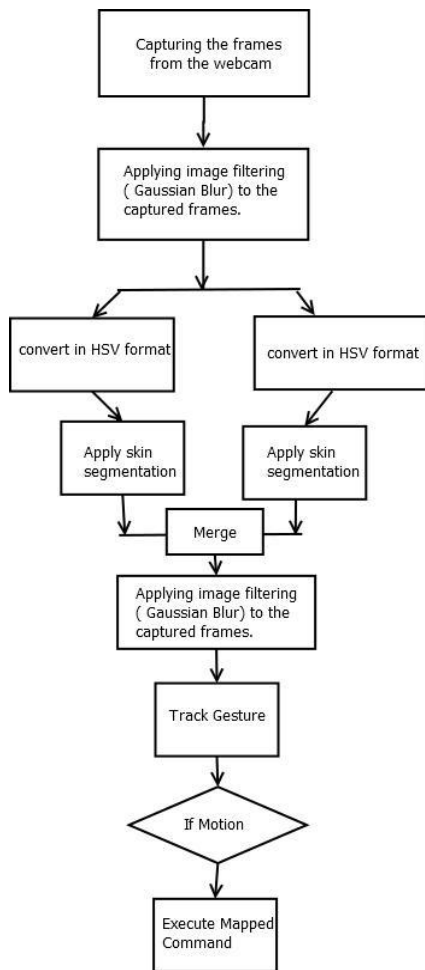


Fig. Process Flow Diagram for Hand Gesture Recognition System.

VII. SCREEN SHOTS



Fig. Hand recognised upon executing the program.

VIII. APPLICATIONS

The concept of gesture recognition has many applications in the field of computing. Some of the applications include automated homes, operating visual devices like television solely with gestures and also medical applications like that implemented at the Ben Gurion University which enables doctors to manipulate digital images during medical procedures using hand gestures instead of touch screens or keyboards owing to

sterile human- machine interfaces. Meanwhile, this project deals with controlling the user interface of the computer system using hand gestures and applications of the project include the following:

- Controlling the operation of MS PowerPoint presentation using hand gestures.
- Controlling the application of VLC Media Player using hand gestures.

IX. DETAILS OF SYSTEM REQUIREMENTS

Software Interface:

A set of instructions or program required to make hardware platform suitable for desired task is known as software. Software can also be defined as the utility programs that are required to drive hardware of computer.

- Operating system- Microsoft Windows 7 SP 1 or above
- Microsoft Visual Studio 2010
- MinGW and Visual C++ compilers (for Windows)
- Supporting Webcam Drivers

Hardware Interface:

All the physical equipment's i.e. input devices, processor, and output device & inter connecting processor of the computer s called as hardware.

- Hard Disk minimum of 40 GB.
- RAM minimum of 2 GB.
- Dual Core and up ,15" Monitor.
- Integrated webcam or external webcam (15 -20 fps).

X. CONCLUSION

In this project we have planned, designed and implemented the system for Hand gesture recognition system for controlling UI which is a standalone application for controlling the various user interface controls and/or programs like Microsoft PowerPoint.

In the analysis phase we gathered information regarding various gesture recognition systems existent today and the techniques and algorithms they employ and the success/failure rate of these systems. Accordingly, we made a detailed comparison of these systems and analyzed their efficiency.

In the design phase we designed the system architecture diagrams and also the data flow diagram of the system. We studied and analyzed the different phases involved and accordingly designed and studied the algorithms to be used for the same.

In the implementation phase, we coded the program for recognizing the hand gestures and accordingly mapping the identified gestures to specific system operations.

In the testing phase, we performed non functional testing for increasing the project performance. We didn't use the traditional database mapping thus increasing the system speed and efficiency.

XI. FUTURE SCOPE

The hand gesture recognition system can be used further to control the operation of other system applications like Explorer, Media Player etc.

To create a website which operates using hand gestures. JavaScript can be dynamically combined with the gesture recognition logic for the same.

To use the gesture recognition logic in sensitive areas of work like hospitals and nuclear power plants where sterility between machines and human is vital.

To create a battery free technology that enables the operation of mobile devices with hand gestures.

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BIOGRAPHIES



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