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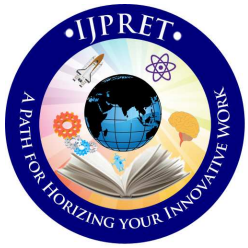

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A PATH FOR HORIZING YOUR INNOVATIVE WORK

MOUSE NAVIGATION CONTROL USING HAND GESTURE WITH NEURAL NETWORK

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Abstract

Hand gesture recognition system can be used for interfacing between computer and human using hand gesture. This work presents a technique for a human computer interface through hand gesture recognition that is able to recognize some static gestures from the American Sign Language hand alphabet or numbers. The objective of this research is to develop a feed forward algorithm for recognition of hand gestures. The use of hand gestures provides an attractive alternative to interface devices for human-computer interaction (HCI). The ability to interact with computers in more natural and intuitive ways. The hand can be used to communicate much more information by itself compared to computer mice, joysticks, etc. allowing a greater number of possibilities for computer interaction. This research produced a working prototype of a robust hand tracking and gesture recognition system that can be used in numerous applications.

INTRODUCTION

Computer is used by many people either at their work or in their spare-time. Special input and output devices have been designed over the years with the purpose of easing the communication between computers and humans, the two most known are the keyboard and mouse. Every new device can be seen as an attempt to make the computer more intelligent and making humans able to perform more complicated communication with the computer. This has been possible due to the result oriented efforts made by computer professionals for creating successful human computer interfaces [1]. Thus in recent years the field of computer vision has devoted considerable research effort to the detection and recognition of faces and hand gestures. Hand gestures are an appealing way to interact with such systems as they are already a natural part of how we communicate, and they don't require the user to hold or physically manipulate special hardware [2]. Recognizing gestures is a complex task which involves many aspects such as motion modeling, motion analysis, pattern recognition and machine learning, even psycholinguistic studies [3] generally; gestures can be classified into static gestures and dynamic gestures. Static gestures are usually described in terms of hand shapes, and dynamic gestures are generally described according to hand movements [4].The gesture recognition system we have proposed is a step toward developing a more sophisticated recognition system to enable such varied uses as menu-driven interaction, augmented reality, or even recognition of Sign Language. Freeman and Roth **[**5] introduced a method to recognize hand gestures, based on pattern recognitiontechnique developed by McConnell employing histograms of local orientation. Naidoo and Glaser[6] developed a system that is recognized static hand gesture against complex backgrounds based on South African Sign Triesch and Malsburg[7] employed the Elastic-Graph Matching technique to classify hand postures against complex backgrounds. Just proposed to apply to the hand posture classification and recognition tasks an approach that has been successfully used for face recognition [8], the feature based

on the local non-paramedic pixel operator. The idea is to make computers understand human language and develop a user friendly human computer interfaces (HCI). Making a computer understand speech, facial expressions and human gestures are some steps towards it. The project aims to determine human gestures by creating an HCI. An overview of gesture recognition system is given to gain knowledge.

MOUSE REPLACEMENT

This paper brings out an innovative idea called as mouse for handless human (MHH) to use the camera as an alternative to the mouse. The mouse operations are controlled by the hand gesture captured by the camera Gesture Recognition Technology for Games Poised for Breakthrough on the website of Venture Bet (http://venturebeat.com)[9].In the near future, for example, users will likely be able to control objects on the screen with empty hands, as shown in Figure 1.

If the hand signals fell in a predetermined set, and the camera views a close-up of the hand [10], we may use an example-basedapproach, combined with a simple method top analyze hand signals called orientation histograms [11].

Figure 1: Controlling mouse with Gesture

The user shows the system one or more examples of a specific hand shape. The computer forms and stores the corresponding orientation histograms. In the run phase, the computer compares the orientation histogram of the current image with each of the stored templates and selects the category of the closest match, or interpolates between templates, as appropriate. This method should be robust against small differences in the size of the hand but probably would be sensitive to changes in hand orientation.

AMERICANSIGN LANGUAGE

American Sign Language is the language of choice for most deaf people in the United States. It is part of the “deaf culture” and includes its own system of puns, inside jokes, etc. However, ASL is one of the many

sign languages of the world [12]. As an English speaker would have trouble understanding someone speaking Japanese, a speaker of ASL would have trouble understanding the Sign Language of Sweden. ASL also has its own grammar that is different from English. ASL consists of approximately 6000 gestures of common words with finger spelling used to communicate obscure words or proper nouns. Finger spelling uses one hand and 26 gestures to communicate the 26 letters of the alphabet. Another interesting characteristic that will be ignored by this project is the ability that ASL offers to describe a person, place or thing and then point to a place in space to temporarily store for later reference. ASL uses facial expressions to distinguish between statements, questions and directives. The eyebrows are raised for a question, held normal for a statement, and furrowed for a directive. This would be feasible in a full real-time ASL dictionary. Some of the signs can be seen in figure 2below.

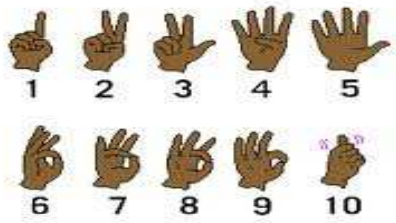

Figure 2: ASL examples

Full ASL recognition systems (words, phrases) incorporate data gloves. Takashi and Kishinodiscuss a Data glove-based system that could recognize 34 of the 46 Japanesegestures (user dependent) using a joint angle and hand orientation coding technique. A separate test was created from five iterations of the alphabet by the user, with each gesture well separated in time. While these systems are technically interesting, they suffer from a lack of training.

ARTIFICIALNEURAL NETWORK

An Artificial neural network is an information processing system that has certain performance characteristics in common with biological neural networks. Artificial neural networks have been developed as generalizations of mathematical models of human cognition

or neural biology, based on the assumptions that [13]:

1. Information processing occurs at many simple elements called neurons.

2. Signals are passed between neurons over connection links.

Each neuron applies an activation function (usually nonlinear) to its net input [14]. Figure 3 shows a simple artificial neuron. Neural network has been used in various fields such as identification speech, recognition vision, classification & control system. Medical field, Breast cancer cell analysis, EEG and ECG analysis.

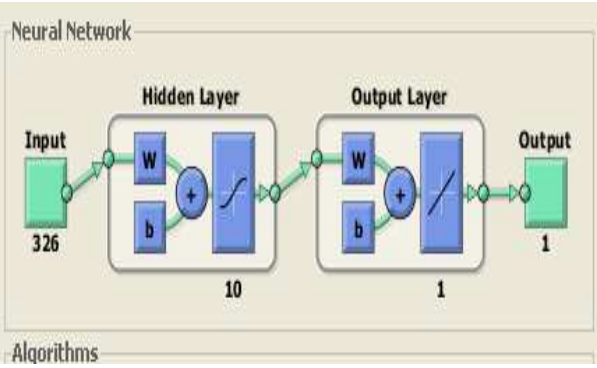

Figure 3: A simple Artificial Neuron

Today neural networks can be trained to solve problems that are difficult for conventional computers or human beings. The supervised training methods are commonly used, but other networks can be obtained from unsupervised trainingtechniques or from direct design methods.

PROPOSED SYSTEM

In this paper, a new approach for the static hand gesture recognition is proposed. The presented system is based on one powerful hand feature in combination [15].

The hand gesture area is separated from the background by using the well-known segmentation method of skin color that used in face recognition , then a contour of hand image is used as a feature that describe the hand shape. As such, the general process of the proposed method is composed of three main parts:-

1.A preprocessing stepto focus on the gesture.

2. A feature extraction stepthat use the hand contour of the gesture image, it is based on an algorithm proposed by Joshi, and Sivaswamy [16]. The hand contour will act as the feature of the gesture.

3. A classification stepthe unknown gesture's feature will be produced and entered to the neural network.

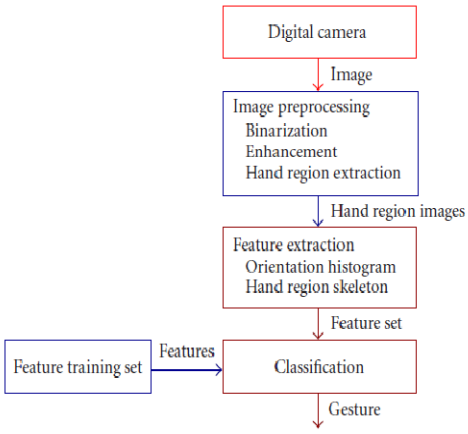

Figure 4: Block diagram of the recognition system

The gesture recognition process diagram is illustrated in figure 4, the hand region obtained after the preprocessing stage and it will be used as the primary input data for the feature extraction step of the gesture recognition algorithm.

FEATURE EXTRACTION

The feature extraction aspect of image analysis seeks to identify inherent characteristics, these characteristics are used to describe the object, or attribute of the object. Feature extraction operates on two-dimensional image arraysbut produces a listof descriptions, or a ' feature vector [17]. For posture recognition, (static hand gestures) features such as fingertips, finger directions and hand's contours can be extracted. Features are thus selected implicitly and automatically by the recognizer [18]. Following fig. 5 shows feature extraction of image analysis. In this paper we select the hand contour as a good feature to describe the hand gesture shape.

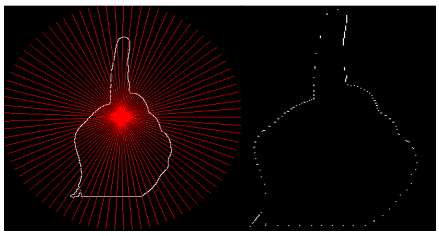

Figure 5: The feature extraction aspect of image analysis

EXPECTED RESULT

Many attempts to recognize static hand gestures shapes from images [19] achieved fairly good results, but this is mainly due to either very high computation or the use of specialized devices. The aim of this system is to achieve relatively good results but at the same time a trade off must be considered between time and accuracy. However we will aim to achieve very good accuracies.

CONCLUSIONS

In this paper we propose a method of classifying static hand gestures using hand image contour where the only features are that of low-level computation. This method robust against similar static gestures. The major goal of this research is to develop a system that will aid in the interaction between human and computer through the use of hand gestures as a control commands.

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