Gesture Recognition: A Survey of Gesture Recognition Techniques using Neural Networks

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Abstract

Understanding human motions can be posed as a pattern recognition problem. In order to convey visual messages to a receiver, a human expresses motion patterns. Loosely called gestures, these patterns are variable but distinct and have an associated meaning. The Pattern recognition by any computer or machine can be implemented via various methods such as Hidden Harkov Models, Linear Programming and Neural Networks.Each method has its own advantages and disadvantages, which will be studied separately later on. This paper reviews why using ANNs in particular is better suited for analyzing human motions patterns.

Index terms— gesture recognition, artificial neural networks, pattern recognition.

1 Introduction

gesture is a form of non-verbal communication in which visible bodily actions communicate particular mess-ages, either in place of speech or together and in parallel with words. Gestures include movement of the hands, face, or other parts of the body. The wave gesture is variable because even the same person's hand position may be several inches away from the position in a previous wave. It is distinct because it can be readily distinguished from a different gesture, such as a beckoning or a shrug. finally, it has the agreed meaning of "hello." a) Using ANNs in Human Gesture Recognition An arti ficial neural network, often just called a neural network, is a mathematical model inspired by biological neural networks. A neural network consists of an interconnected group of artificial neurons, and it processes information using a connections. In most cases a neural network is an adaptive system that changes its structure during a learning phase.

The Pattern recognition by any computer or machine can be implemented via various methods such as HMM (Hidden Harkov Model), Linear Programming and Neural Networks. Each method has its own advantages and disadvantages, which will be studied separately later on.

Author ? ? : Department of Computer Science & Engineering., Kurukshetra University DIET, Karnal, Haryana, India. E-mails : sharma99.itengg@gmail.com, ramachawla27@gmail.com human Patterns, because gestures have motion vectors or Varying Directions associated with weight function. As motions direction can change the ANN must be able to sense the change in the pattern.

2 II.

3 Related Work

Richard Watson. "A Survey of Gesture Recognition Techniques Technical Report " [1] , Processing speeds have increased dramatically bitmapped displays allow graphics to be rendered and updated at increasing rates and in general computers have advanced to the point where they can assist humans in complex tasks.

Yet input technologies seem to cause the major bottleneck in performing these tasks under utilizing the available resources and restricting the expressiveness of application use. A recognition technique under development at TCD (Trinity College, Dublin) project was introduced in this survey paper. It remains to be discovered what exactly the context of gestures is undoubtedly this will depend on the application. The context of sign language

for example would be syntactic and semantic information in the signed sentence along with facial expression and body movement.

William T. Freeman and Michal Roth. "Orientation Histograms for Hand Gesture Recognition" [2].

The Authors present a method to recognize hand gestures, based on a pattern recognition technique developed by McConnell employing histograms of local orientation.

The Authors use the orientation histogram as a feature vector for gesture classification and interpolation. This method is simple and fast to compute, and others some robustness to scene illumination changes.

The Authors have implemented a real-time version, which can distinguish a small vocabulary of about 10 different hand gestures. All the computation occurs on a workstation; special hardware is used only to digitize the image.

A user can operate a computer graphic crane under hand gesture control, or play a game. They discussed limitations of this method. For moving or dynamic gestures", the histogram of the spatiotemporal gradients of image intensity form the analogous feature vector and may be useful for dynamic gesture recognition.

4 Conclusion

Human gestures provide the most important means for non-verbal interaction among people. At present, arti ficial neural networks are emerging as the technology of choice for many applications, such as pattern recognition, gesture recognition, prediction, system identification, and control.

ANN provides good and powerful solution for gesture recognition and as described earlier Arti ficial Neural networks are applicable to multivariate non-linear problems. It has a fast computational ability. The ability of neural nets to generalize makes them a natural for gesture recognition.

IV.

5 Future Scope

We have discussed in this paper about work that has been done in the field of gesture recognition and use of ANNs in Gesture recognition problem in General There are various other methods that can be useful in detecting Human Motion patterns, however due to lack of Application platforms and exhaustive requirements of both CPU and Memory they are not suitable for use in current development Environments.

In our future work we would like to develop especially modified feed forward back propagating neural networks in this problem domain, The work will be carried out by collecting a large hand or computer pointer coordinates and processing them for patterns using ANNs. SANJAY MEENA ., A Study on Hand Gesture Recognition Technique". Department of Electronics and Communication Engineering, The Authors describe that and gesture recognition system can be used for interfacing between computer and human using hand gesture. Their work presents a technique for a human computer interface through hand gesture recognition that is able to recognize 25 static gestures from the American Sign Language hand alphabet. The objective of this thesis is to develop an algorithm for recognition of hand gestures with reasonable accuracy.

The segmentation of gray scale image of a hand gesture was performed using Otsu thresholding algorithm. Otsu algorithm treats any segmentation problem as classification problem. Total image level was divided into two classes one was hand and other was background. The optimal threshold value was determined by computing the ratio between class variance and total class variance. A morphological filtering method was used to effectively remove background and object noise in the segmented image. Morphological method consists of dilation, erosion, opening, and closing operation.

Canny edge detection technique was used to find the boundary of hand gesture in image. A contour tracking algorithm was then applied to track the contour in clockwise direction. Contour of a gesture is represented by a Localized Contour Sequence (L.C.S) whose samples are the perpendicular distances between the contour pixels and the chord connecting the end-points of a window centered on the contour pixels.

These extracted features are applied as input to classifier. Linear classifier discriminates the images based on dissimilarity between two images. Multi Class Support Vector Machine (MCSVM) and Least Square Support Vector Machine (LSSVM) was also implemented for the classification purpose. Experimental result shows that 94.2% recognition accuracy was achieved by using linear classifier and 98.6% recognition accuracy is achieved using Multiclass Support Vector machine classifier. Least Square Support Vector Machine (LSSVM) classifier was also used for classification purpose and shows 99.2% recognition accuracy.

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Figure 1: D

5 FUTURE SCOPE

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