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Human Gesture Recognitions Using Levenberg Perceptron Neural Network

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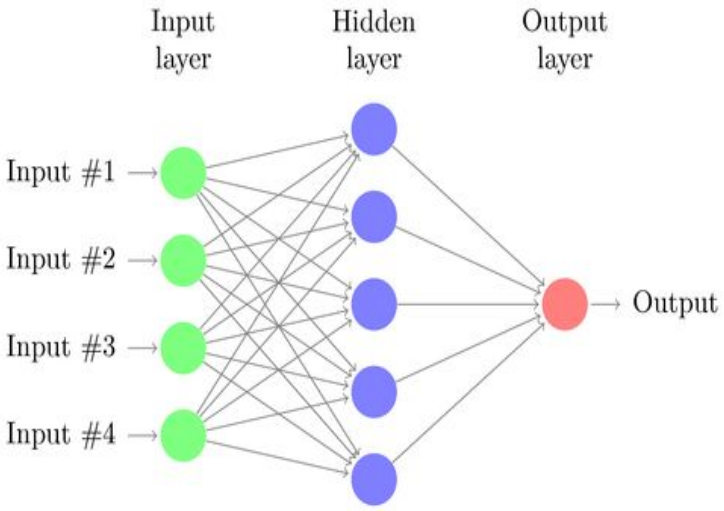
Abstract: ***Understanding human motions can be posed as a pattern recognition problem. In order to convey visual messages to a receiver, a human expresses motion patterns. Loosely called gestures, these patterns are variable but distinct and have an associated meaning. The Pattern recognition by any 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***

Keywords: ***Gesture Recognition, Artificial Neural Networks, Pattern Recognition.***

1. INTRODUCTION

A 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."



1.2 Using ANNs in Human Gesture Recognition

An artificial 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.

ANNs in particular are better suited for Understanding and analyzing human motions patterns, As discussed earlier ANNs came in various forms but back propagation ANNs are much suited for analyzing 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. RELATED WORK

Richard Watson et al"[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 et al"[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.

Sanjay Meena et al [3], 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.

Ibraheem, Noor Adnan,et.al[4] The aim of gesture recognition researches is to create system that can easily identify gestures, and use them for device control, or convey some formations. In this paper we are discussing researches done in the area of hand gesture recognition based on Artificial Neural Networks approaches. Several hand gesture recognition researches that use Neural Networks are discussed in this paper, comparisons between these methods were presented, advantages and drawbacks of the discussed methods also included, and implementation tools for each method were presented as well. In this paper we have presented an idea of hand gesture recognition and Neural Networks approaches. One of the most effective of software computing techniques is Artificial Neural Networks that has many applications on hand gesture recognition problem. Some researches that handle hand gesture recognition problem using different neural networks systems are discussed with detailed showing their advantages and disadvantages. Comparison was made between each of these methods, as seen different Neural Networks systems are used in different stages of recognition systems according to the problem nature, its complexity, and the environment available. The input for all the selected methods was either digitized image camera or using data glove system. Then some preprocessing was made on the input image like normalization, edge detection filter, or thresholding which are necessary for segmenting the hand gesture from the background.

Lekova, Anna K., et al[5] Human-robot interaction (HRI) by a vision-based gesture interface helps to personalize the

communication with humans in various contexts - from support of their daily life to social skills training of children with developmental problems. We are especially interested in vision-based hand gesture HRI and propose a hand gesture recognition system based on a novel online extraction and classification scheme, which is lightweight and can be used in a mobile robot. An online Lightweight Evolving Fuzzy Clustering Method is used to categorize the positional and HSV model of pixels for the edges of the gesture image. The result clusters consist of (x, y) coordinates and the averaged grayscale level at these locations. Then these clusters are processed to identify typical for the hand features brighter and darker pixel information. The database consists of averaged grayscale levels in HSV format for neighbor pixels that characterize different features. For feature recognition we use Tanimoto similarity measure for matching the current grayscale patterns to those in the database. Then the feature location is encoded in a binary format. For gesture recognition we use a formalism of Symbol Relation Grammars to describe a gesture, as well as simple and fast bitwise operations to find the position and orientation of the features in the gesture.

3. CONCLUSION

Human gestures provide the most important means for non-verbal interaction among people. At present, artificial 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 Artificial 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. 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.

REFERENCES

[1]. Richard Watson. “A Survey of Gesture Recognition Techniques Technical Report”. Department of Computer Science.

[2]. William T. Freeman and Michal Haitham Hasan, S. Abdul-Kareem. “Static hand gesture recognition using neural networks”. Artificial Intelligence Review. Science Direct journal. January 2012

[3]. Meena, Sanjay. "A study on hand gesture recognition technique." PhD diss., 2011.

[4]. Ibraheem, Noor Adnan, and Rafiqul Zaman Khan. "Survey on Various Gesture Recognition Technologies and Techniques." International Journal of Computer Applications 50 (2012).

[5]. Lekova, Anna K., and Maya I. Dimitrova. "Hand gestures recognition based on lightweight evolving fuzzy clustering

method." In Image Information Processing (ICIIP), 2013 IEEE Second International Conference on, pp. 505-510. IEEE, 2013.

[6]. B. Hussain and M. R. Kabuka, "A novel feature recognition neural network and its application to character recognition," IEEE Transaction on Pattern Analysis and Machine Intelligence.

[7]. Balakrishnan, P.V., Cooper, M.C., Jacob, V.S., and Lewis, P.A. (1994) "A study of the classification capabilities of neural networks using unsupervised learning: A comparison with k-means clustering", Psychometrika, 59, 509-525.

[8]. Bishop, C.M. (1995), Neural Networks for Pattern Recognition, Oxford: Oxford University Press.

[9]. Cheng, B. and Titterington, D.M. (1994), "Neural Networks: A Review from a Statistical Perspective", Statistical Science, 9, 2-54.