ISSN: 2321-7782 (Online)
Volume 2, Issue 10, October 2014
International Journal of Advance Research in Computer Science and Management Studies
Research Article / Survey Paper / Case Study
Available online at: www.ijarcsms.com

Face and Hand Gesture Recognition for Physical Impairment Peoples

Dr.K.Swathi[1]
Professor and Head,
Department of Computer science &Engineering
Cauvery College of Engineering & Technology
Trichy (TN) – India

K.Saranya[2]
Scholar,
Department of Computer science &Engineering
Cauvery College of Engineering & Technology
Trichy (TN) – India

R. Vijayanathan[3]
Senior Librarian and Head,
Department of Library and Information Science
Cauvery College of Engineering & Technology,
Trichy (TN) – India

Abstract: **With the ever increasing role of computerized machines in society, Human Computer Interaction (HCI) system has become an increasingly important part of our everyday subsist. HCI decide the efficient use of the available information flow of the, display, communication and computing technologies. Gesture recognition pertains to recognizing meaningful expressions of action by a human, concerning the hands, arms, face, head, and/or body. It is of extreme significance in designing an intelligent and efficient human–computer interface. Applications involving hidden Markov models, particle filtering and concentration, finite-state machines, visual flow, skin color, and connectionist models are discussed in detail. Hidden Markov models (HMMs) and related models have become standard in statistics during the last 15-20 years, with applications in varied areas similar to speech and other statistical signal processing, financial statistics, bioinformatics and econometrics, hydrology etc. Markov chain Monte Carlo (MCMC) is great stuff. MCMC revived Bayesian inference and regular inference regarding difficult reliance.**

Keywords: ***gesture recognition, particle filtering, HCI***

I. INTRODUCTION

Pervasive and ubiquitous computing integrates computation into everyday surroundings. The scientific development of the last decade has enabled computerized spaces equipped with multiple sensor arrays, like, multiple human–computer interaction devices and microphones or cameras. The expansion of knowledge relying on high usability principles oppressed new communicational channels, such as puff, sip, hand gestures, voice and, eye blinking and electromyogram as efficient control modalities. The utilize of hand gestures supply a smart substitute to these cumbersome interface devices for human-computer interaction (HCI). Users usually utilize hand gestures for appearance of their feelings and notifications of their view. In exacting, visual understanding of hand gestures can help in achieving the ease and naturalness chosen for HCI. HAND gesture recognition presents an rational, usual, and suitable method of human–computer interaction (HCI). Sign language recognition (SLR) and gesture-based control are two main applications for hand gesture detection technologies. SLR plan to understand sign languages mechanically by a computer in order to help the deaf communicate with hearing society suitably. Since sign language is a type of highly prepared and largely symbolic human gesture set, SLR also provide as a fine basic for the development of general gesture-based HCI. Elegant situation have ease the computer observation of human (inter)action within the situation. The study of (inter)actions of two and more individuals is here of particular interest as it provides information about social context and relations and it further enables computer systems to follow and anticipate human (inter)action SLR are based on hidden Markov models (HMMs) which are employed as effective tools for the recognition of signals changing over time. Among all these interaction channels, hand sign is a precious option since it does not require the user to be tethered through cables or sensors, and it simply need learning a few modified gestures for a given task. On the other hand, gesture-based control translates gestures performed by human subjects into controlling commands as the input of fatal devices, which absolute the interface methods by offer audio, visual, or other comment to human subjects.

Figure 1: Hand gesture image

II. Related Work

Andrew G. Brooks, Matthew Berlin, Jesse Gray et al [1] socially interactive game playing can be used as a mechanism for imparting knowledge and skills to both the robot and the human player. A simultaneous advance in untethered sensing of human activity has widened the scope for inclusion of natural physical movement in these games. In particular, this places certain human health applications within the purview of entertainment robots. Socially responsive automata equipped with the ability to physically monitor unencumbered humans can help to motivate them to perform suitable repetitions of exercise and physical therapy tasks. We demonstrate this concept with two untethered playful interactions: arm exercise mediated by play with a physical robot, and facial exercise mediated by expression-based operation of a popular video game console.

Ming-Chun Huang, Wenyao Xu, Yi Su et al[2] This paper presents a quantitative assessment solution for an upper extremities rehabilitative gaming application. This assessment solution consists of a set of stand-alone hardware, including SmartGlove and Kinect, a depth capturing sensor made by Microsoft. SmartGlove is a specially designed motion and finger angle extraction device which is packaged in an easy-to-wear and adjustable manner for a patient with upper extremity impairment. Sensor data extraction, alignment, and visualization algorithms were designed for integrating hand-mounted sensors data streams into skeleton coordinates captured by the Kinect. This enhanced skeleton information can be summarized and replayed as upper extremity joint coordinate animations which can be used for physical therapists to quantify rehabilitation progress. In addition, to serve as an assessment tool, enhanced skeleton information can be used to extend the capability of the Kinect vision system, such as providing motion capture of the upper extremities, even when the testing subject is out of camera scope or one's upper extremities are occluded by the body.

Paula Alexandra Rego, and Pedro Miguel Moreira, Luís Paulo Reis, et al [3] Serious Games is a field of research that has been growing substantially with valuable contributions to many application areas. In health rehabilitation, in particular, traditional approaches are often considered repetitive and boring by the patients, resulting in difficulties to maintain their interest and to assure the completion of the treatment program. The use of serious games in rehabilitation offers a considerable potential to increase patients motivation during the therapy sessions. Additionally, due to patient's deficiencies, the way they interact with the game system should be made in a simple and intuitive way and with alternate forms of interaction. This paper presents an overview of major natural and multimodal user interfaces that are present in most serious games for health rehabilitation, focusing the main input devices involved, and examples of serious games that use the modalities described.

III. 3D PARTICLE ARTICLE FILTERING

Particle filters offer a probabilistic framework for dynamic state estimation. They allow computing the posterior density $p(s_t|z_{1:t})$ of the current object state s_t conditioned on all observations $z_{1:t}$ up to time t. The process density $p(s_t|s_{t-1})$ and the observation density $p(z_t|s_t)$ are not required to be Gaussian which makes them particularly smart. Furthermore, by modeling indecision, they offer a tough tracking structure in case of clutter and occlusion.

Figure 2: particle filtering based color and depth analysis

Hidden Markov Models (HMM)

HMM is a doubly stochastic model and is appropriate for coping with the stochastic properties in gesture recognition. Instead of using geometric features, gestures are converted into sequential symbols. HMMs are employed to represent the gestures, and their parameters are learned from the training data. Based on the most likely performance criterion, the gestures can be recognized by evaluating the trained HMMs. We have developed a system to demonstrate the proposed method. We defined several digits as gestures and used a mouse as the gesture input device. We then employed HMM to learn and recognize these gestures. HMM has been successfully applied to speech recognition. The concept of HMM can be used in solving three basic problems: the evaluation problem, the decoding problem, and the learning problem. In the learning problem, we provide model parameters in such a way that the model possesses **a** high probability of generating the observation for a given model and a set of observations. Therefore, the learning process is to establish gesture models according to the training data. In the evaluation problem we can score the match between a model and an observation sequence, which could be used for isolated gesture recognition. In the decoding problem we can find the best state sequence given an observation sequence, which could be used for continuous gesture recognition. The HMM approach to gesture recognition is motivated by the successful application of hidden Markov modeling techniques to speech recognition problems. The similarities between speech and gesture suggest that techniques effective for one problem may be effective for the other as well. First, gestures, like spoken languages, vary according to location, time, and social factors. Second, body movements, like speech sounds, carry certain meanings. Third, regularities in gesture performances while speaking are similar to syntactic rules. Therefore, linguistic methods may be used in gesture recognition. On the other hand, gesture recognition has its own characteristics and problems. To develop a gesture interface, some criteria are needed to evaluate its performance such as meaningful gestures, suitable sensors, efficient training algorithms, and accurate, efficient, on-line/real-time recognition. Meaningful gestures may be very complex, containing simultaneous motions of a number of points. However, these complex gestures should be easily specifiable. In general, gestures can be specified either by example or by description. In the former, each application has a training session in which examples of different gestures are collected for training the models. The trained models are the representations of all gestures that the system must recognize. In the latter method of specification, a description of each gesture is written in a gesture description language, which is a formal language in which the syntax of each gesture is specified. Obviously, the example method has more flexibility than the description method. One potential drawback of specification by example is the difficulty in specifying the allowable variation between gestures of a given class. This problem would be avoided if the model parameters were determined by the most likely performance criterion. Because gesture is an expressive motion, it is natural to describe such a motion through a sequential model. Based on these considerations, HMM is appropriate for gesture recognition. A multi-dimensional HMM is able to deal with multi-path gestures which are general cases of gesture recognition.

IV. MARKOV CHAIN MONTE CARLO

The readership of the Proceedings with a class of simulation techniques known as Markov chain Monte Carlo (MCMC) methods. These methods permit a practitioner to simulate a dependent sequence of random draws from very complicated stochastic models. The main emphasis will be placed on one MCMC method known as the Gibbs sampler. It is not an understatement to say that several hundred papers relating to the Gibbs sampling methodology have appeared in the statistical literature since 1990. Yet, the Gibbs sampler has made only a handful of appearances within the actuarial literature to date. Markov Chain Monte Carlo (MCMC) methods are often the method of choice in AI and machine vision. Our goal in this paper is to explore the prospects for rational process models of perceptual inference based on MCMC. MCMC refers to a family of algorithms that sample from the joint posterior distribution in a high dimensional model by gradually drifting through the hypothesis space of complete interpretations, following a Markov chain that asymptotically spends time at each point in the hypothesis space proportional to its posterior probability. MCMC algorithms are quite flexible, suitable for a wide range of approximate inference problems that arise in cognition, but with a particularly long history of application in visual inference problems. The chains of hypotheses generated by MCMC shows characteristic dynamics distinct from other sampling algorithms: the hypotheses will be temporally correlated and as the chain drifts through hypothesis space, it will tend to move from regions of low posterior probability to regions of high probability; hence hypotheses will tend to cluster around the modes. Here we show that the characteristic dynamics of MCMC inference in high-dimensional, sparsely coupled spatial models correspond to several well-known phenomena in visual perception, specifically the dynamics of multistable percepts. Our goal here is a simpler analysis that comes closer to the standard MCMC approaches used for approximate inference in Bayesian AI and machine vision, and establishing a clearer link between the mechanisms of perception in the brain and rational approximate inference algorithms on the engineering side. Several authors have recently proposed that humans approximate complex probabilistic inferences by sampling, constructing Monte Carlo estimates similar to those used in Bayesian statistics and AI. A variety of psychological phenomena have natural interpretations in terms of Monte Carlo methods, such as resource limitations, stochastic responding and order effects. The Monte Carlo methods that have received most attention to date as rational process models are importance sampling and particle filtering, which are traditionally seen as best suited to certain classes of inference problems: static low dimensional models and models with explicit sequential structure, respectively.

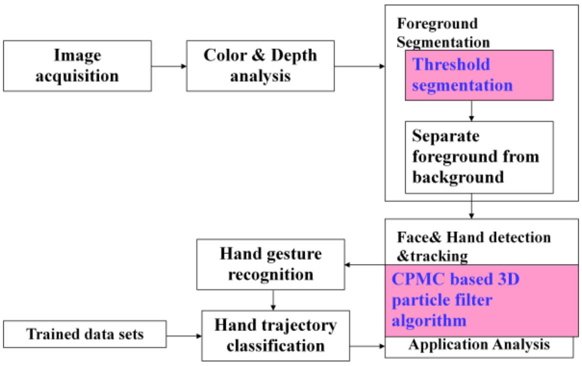

Figure 3: System Architecture

Experimental Results:

In the experimental results the existing system is compared to the proposed system then the comparison result is produced that the proposed system is better than the existing system by the result of tracking rate.

Method	Tracking Rate
Existing	62%
Proposed	95%

Table 1: Comparison Table

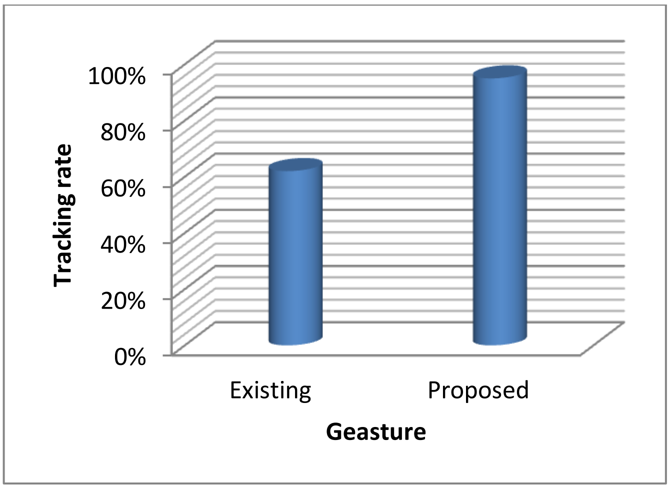

Figure 4: Comparison graph

V. CONCLUSION

The significance of gesture recognition lies in building capable human–machine communication. Its request variety from sign language detection through medical analysis to virtual reality. Moreover, it was normal that clients will be situated inside the working separation to go determined by the Kinect sensor. A connection model was joined into the shade based molecule channel schema for hand following. At the point when there was no communication between the face and hands, various autonomous molecule channels followed the clients' developments. At the point when cooperation was available, the various free molecule channel trackers were joined with a collaboration model to comprehend false fusing and false naming issues. Results demonstrated that MCMC-based recognition systems may convey comparable results to our strategy. Consequently, higher recognition could be attained by utilizing trajectories order based strategy.

References

1. M. R. Ahsan, "EMG signal classification for human computer interaction: A review," Eur. J. Sci. Res., vol. 33, no. 3, pp. 480–501, 2009.
2. J. A. Jacko, "Human–computer interaction design and development approaches," in Proc. 14th HCI Int. Conf., 2011, pp. 169–180.
3. I. H. Moon, M. Lee, J. C. Ryu, and M. Mun, "Intelligent robotic wheelchair with EMG-, gesture-, and voice-based interface," Intell. Robots Syst., vol. 4, pp. 3453–3458, 2003.
4. M. Walters, S. Marcos, D. S. Syrdal, and K. Dautenhahn, "An interactive game with a robot: People's perceptions of robot faces and a gesturebased user interface," in Proc. 6th Int. Conf. Adv. Computer–Human Interactions, 2013, pp. 123–128.
5. O. Brdiczka, M. Langet, J. Maisonnasse, and J. L. Crowley, "Detection human behavior models from multimodal observation in a smart home," IEEE Trans. Autom. Sci. Eng., vol. 6, no. 4, pp. 588–597, Oct. 2009.
6. M. A. Cook and J. M. Polgar, Cook & Hussey's Assistive Technologies: Principles and Practice, 3rd ed. Maryland Heights, MO, USA: Mosby Elsevier, 2008, pp. 3–33.
7. G. R. S. Murthy, and R. S. Jadon, "A review of vision based hand gesture recognition," Int. J. Inform. Technol. Knowl. Manage., vol. 2, no. 2, pp. 405–410, 2009.
8. D. Debuse, C. Gibb, and C. Chandler, "Effects of hippotherapy on people with cerebral palsy from the users' perspective: A qualitative study," Physiotherapy Theory Practice, vol. 25, no. 3, pp. 174–192, 2009.
9. J. A. Sterba, B. T. Rogers, A. P. France, and D. A. Vokes, "Horseback riding in children with cerebral palsy: Effect on gross motor function," Develop. Med. Child Neurology, vol. 44, no. 5, pp. 301–308, 2002.
10. K. L. Kitto, "Development of a low-cost sip and puff mouse," in Proc. 16th Annu Conf. RESNA, 1993, pp. 452–454.

AUTHOR(S) PROFILE

Dr.K.Swathi obtained her under-graduation in B.E., (Computer Science & Engineering) from Bharathidasan University, Trichy in 1999. She obtained her M.E. degree in Computer and Communication Engineering from Anna University, Chennai in 2004.She obtained Ph.D degree in Faculty of Information & Communication Engineering from Anna University, Chennai in 2014. Presently, she is working as Associate Professor in Computer Science & Engineering, Cauvery College of Engineering and Technology, Trichy in 2008. She has 14 years teaching experience and also she had attended many workshops, seminars and conferences on Research issues in Image processing. She has published papers in international journals and presented papers in various Conferences. She is the life member of Indian Society for Technical Education (ISTE). Her areas of interest include Image processing, Data mining, network security and Software engineering.

K.Saranya, received her B.Tech in Information Technology from Anna University, Dr.Navalar Nedunchezhiyan College of Engineering, Thozhudur in 2010 and doing her M.E in Computer Science Engineering in Cauvery College of Engineering and Technology, Trichy. Her area of interest includes Image Processing and Networks.

Vijayanathan.R. received his Master of philosophy Library and Information Science from Annamalai University in 1999 Also he obtained his post-graduate degree in Master of Economics in Bharathidasan University in 1996.He is working as a Sr. Librarian, Department of library and Information Science in Cauvery College of Engineering and technology, Trichy from 2009.

He has published 19 research papers in National and International journals. His areas of interested are networking; Cloud computing, IC Technologies, Environmental study, Library Automation, Webometric study, Scientometric study, Bibliometric analysis, and citation study.