TOPIC: A GESTURE BASED TOOL FOR STERILE BROWSING OF RADIOLOGY IMAGES

TITLE	AUTHOR NAME	YEAR OF PUBLICATION	JOURNAL NAME	DESCRIPTION
A Gesture-based Tool for Sterile Browsing of Radiology Images	Juan P. Wachs, Phd, Helman I. Stern, Phd, Yael Edan, Phd, Michael Gillam, Md, Jon Handler, Md, Craig Feied, Md, Phd, Mark Smith, Md	2008	Journal of the American Medical Informatics Association, Volume 15, Issue 3	The use of doctor-computer interaction devices in the operation room (OR) requires new modalities that support medical imaging manipulation while allowing doctors' hands to remain sterile, supporting their focus of attention, and providing fast response times. This paper presents "Gestix," a vision-based hand gesture capture and recognition system that interprets in real-time the user's gestures for navigation and manipulation of images in an electronic medical record (EMR) database. This paper presents a video-based hand gesture capture and recognition system used to manipulate magnetic resonance images (MRI) within a graphical user interface

Hand Movement Recognition by Using a Touchless Sensor for Controlling Images in Operating Room.	Phataratah Sa-nguannarm , Wongwit Senavongse , Theekapun Charoenpong, Kraiyot Kiatsoontorn	2019	IEEE Xplore, International Electrical Engineering Congress	To operate under sterilization condition in operating room help to reduce infection rate in patient. Therefore, surgeons cannot control computer by using mouse, or keyboard. In this paper, we proposed a method to controlling images in operating room by using a touchless sensor. This method consists of four step. First, hand motion is sensed by a touchless sensor as Leap motion. Second, hand position is detected. Third, hand gesture is recognized by using movement direction. Finally, image is shown and processed relating with hand gesture command. To test the performance of the proposed method, twenty subjects used this device to control an images. This method controls images with two gestures and eight commands: waiting, selection, searching left image, searching right image, increasing brightness, reducing brightness, zooming in and out, and left or right rotation commends. Accuracy rate of commands interpretation is 87.67%. The performance of the proposed method is effective for real-world applications. This is an alternative method for controlling image in an operation room.

Hand gesture recognition using a dedicated geometric descriptor	Jean-Franc¸ois Collumeau , Remy Leconge , Bruno Emile and Hel´ene Laurent	2012	IEEE Xplore, 3rd International Conference on Image Processing Theory.	A high proportion of hospital-acquired diseases are transmitted nowadays during surgery despite existing asepsis preservation measures. These are quite drastic, prohibiting surgeons from interacting directly with non-sterile equipment. Indirect control is presently achieved through an assistant or a nurse. Gesture-based Human-Computer Interfaces constitue a promising approach for giving direct control over such equipment to surgeons. This paper introduces a novel hand descriptor based on measurements extracted from hand contour convex and concave extrema. Using a 9750-picture database created especially for this purpose, it is compared with three state-ofthe-art description methods, namely Hu moments, and both SIFT and HOG features. Effects of large amounts of hand rotation are also studied on each rotation axis independently. Obtained results give HOG features as best in recognizing hands from our database, closely followed by the proposed descriptor. Performance comparison when facing rotated hands shows our descriptor as the most robust to rotations, outperforming the other descriptors by a wide margin.

Hand Gesture Recognition using Image Processing and Feature Extraction Techniques	Ashish Sharmaa , Anmol Mittala , Savitoj Singha , Vasudev Awatramani	2020	International Conference On Smart Sustainable Intelligent Computing And Applications	that proper distinctions between such techniques should be interpreted and they should be analyzed. Standard American Sign Language (ASL) images of a person's hand photographed under several different environmental conditions are taken as the dataset. The main aim is to recognize and classify such hand gestures to their correct meaning with the maximum accuracy possible. A novel approach for the same has been proposed and some other widely popular models have compared with it. The different preprocessing techniques used are Histogram of Gradients, Principal Component Analysis, Local Binary Patterns. The model is made using canny edge detection, ORB and bag of word technique. The preprocessed data is passed through several classifiers (Random Forests, Support Vector Machines, Naïve Bayes, Logistic Regression, K-Nearest Neighbours, Multilayer Perceptron) to draw effective results. The accuracy of the new models has been found significantly higher than the existing model

An Efficient Approach for the Recognition of Hand Gestures from Very Low Resolution Images	D.K. Vishwakarma, Rockey Maheshwari, Rajiv Kapoor	2015	IEEE Xplore, Fifth International Conference on Communication Systems and Network Technologies	In this paper, a simple and effective approach for the recognition of hand gestures from very low resolution images is proposed. Enhancement of the low resolution images has always been the key focus in the processing of the digital images. Images with resolution as low as [50×50 pixels] are also considered for recognition. The gestures under consideration here are the number of fingers (one, two, three, four or five) raised by the person. The low resolution gesture image captured from web camera, mobile phone, or low cost cameras is processed systematically to output the number of fingers raised. Simple concepts of the geometry of the hand have been used for the recognition of hand gesture from the input low resolution images. The proposed method extracts the hand gesture directly from the low resolution image without the need of reconstruction to a high resolution image or use of any classifier. The proposed method is based on the generation of a mask for the image which is critical in the recognition of the hand gesture.

Hand-gesture-based Touchless Exploration of Medical Images with Leap Motion Controller	Safa Ameur, Anouar Ben Khalifa, Med Salim Bouhlel	2021	IEEE Xplore, 17th International Multi-Conference on Systems, Signals & Devices	Hand gesture recognition has become one of the most interesting means of contactless human-computer interaction. There is significant importance for commanding medical images during surgical procedures by the mean of touchless hand gestures for reducing the time of surgery and the risk of contamination. In this work, we used the Leap Motion Controller as an acquisition device, with different classification methods, to recognize 11 hand gestures dedicated to manipulating medical images through a touchless graphical user interface. This framework was trained and tested on a benchmark dataset called LeapGestureDB.
Hand-gesture-based sterile interface for the operating room using contextual cues for the navigation of radiological images	Mithun George Jacob, Juan Pablo Wachs, Rebecca A Packer	2012	National Centre for Biotechnology Information	This paper presents a method to improve the navigation and manipulation of radiological images through a sterile hand gesture recognition interface based on attentional contextual cues. Computer vision algorithms were developed to extract intention and attention cues from the surgeon's behavior and combine them with sensory data from a commodity depth camera. The developed interface was tested in a usability experiment to assess the effectiveness of the new interface. An image navigation and manipulation task was performed, and the gesture recognition accuracy, false positives and task completion times were computed to evaluate system performance.

An Improved Hand Gesture Recognition With Two-Stage Convolution Neural Networks Using A Hand Color Image And Its Pseudo-Depth Image	Jiaqing Liu , Kotaro Furusawa , Tomoko Tateyama , Yutaro Iwamoto , Yen-Wei Chen.	2019	IEEE Xplore, IEEE International Conference on Image Processing	In this paper, we propose a two-stage deep convolutional neural network (CNN) architecture for accurate color-based hand gesture recognition. The first stage performs generation of pseudodepth hand images from color images and the second stage recognizes hand gesture classes using both the color image and its pseudo-depth hand image. The generation stage architecture is based on an image-to-image translation network. In the recognition stage, a two-stream CNN architecture with color image and its pseudo depth image is proposed to improve the color image-based recognition performance. We also propose two strategies in two-stream fusion: feature fusion and committee fusion. To validate our approach, we construct a new dataset called MaHG-RGBD dataset,
A Gesture Recognition Algorithm for Hand-Assisted Laparoscopic Surgery	Carmen López-Casado , Enrique Bauzano , Irene Rivas-Blanco , Carlos J. Pérez-del-Pulgar and Víctor F. Muñoz	2019	National Centre for Biotechnology Information	Minimally invasive surgery (MIS) techniques are growing in quantity and complexity to cover a wider range of interventions. More specifically, hand-assisted laparoscopic surgery (HALS) involves the use of one surgeon's hand inside the patient whereas the other one manages a single laparoscopic tool. In this scenario, those surgical procedures performed with an additional tool require the aid of an assistant. Furthermore, in the case of a human–robot assistant pairing a fluid communication is mandatory. This human–

				machine interaction must combine both explicit orders and implicit information from the surgical gestures. In this context, this paper focuses on the development of a hand gesture recognition system for HALS. The recognition is based on a hidden Markov model (HMM) algorithm with an improved automated training step, which can also learn during the online surgical procedure by means of a reinforcement learning process.
Enhancement of Gesture Recognition for Contactless Interface Using a Personalized Classifier in the Operating Room	Yongwon Cho, Areum Lee, Jongha Park, Bemseok Ko, and Namkug Kim.	2018	Computer methods and programs in biomedicine, Volume 161	Contactless operating room (OR) interfaces are important for computer-aided surgery, and have been developed to decrease the risk of contamination during surgical procedures. Methods: In this study, we used Leap Motion™, with a personalized automated classifier, to enhance the accuracy of gesture recognition for contactless interfaces. This software was trained and tested on a personal basis that means the training of gesture per a user. We used 30 features including finger and hand data, which were computed, selected, and fed into a multiclass support vector machine (SVM), and Naïve Bayes classifiers and to predict and train five types of gestures including hover, grab, click, one peak and two peaks