IMAGE AND SIGNAL PROCESSING

A Comparative Study of Secured Medical Images in Cloud Environment

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ABSTRACT

In recent years, health care organizations produce more number of medical images for processing and storing of medical records. With the advancement in medical field, security and confidentiality is of great concern as medical images are more sensitive. Also as medical images requires lot of space to be stored, an emerging technology known as cloud environment is mostly used for this purpose. Sharing of medical images in cloud helps the physicians to diagnose the problem from remote areas. As data are used among the cloud, medical images have to be protected to avoid illegal access of attackers. There are various techniques to solve the problem of securing such images. This paper makes a comparative analysis of various algorithms for providing security to medical images in cloud environment.

Keywords: medical images, cloud environment, security.

Rule Based Fuzzy Image Segmentation for the Detection of Breast Cancer from Ultrasound Image

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ABSTRACT

Early detection of breast cancer is the most important to reduce the number of deaths among women. Computer aided diagnosis plays a vital role in all clinical diagnosis and hence used in the proposed work for detection of breast cancer. To reduce the speckle noise in ultrasound image Median filter, Non Local Means filter and Lee filter was applied for preprocessing. The non-Local means filter had been used as it provides the highest PSNR values. Fuzzy clustering method is applied for the segmentation of the denoised image. After segmenting the image into set of clusters fuzzy level set algorithm is applied for more accurate detection of edges in the tumour region. PSNR value of 35.86dB had been obtained

after denoising using Non Local mean filter. The mean, entropy and standard deviation parameters are analyzed for the different cluster size of the benign and malignant image. From the results it had been observed that the cluster size 4 provides better segmentation as it provides almost constant parameters for different images. From the cluster that belongs to the region of interest, fuzzy level set algorithm had been applied for minute edge detection. The segmented image after applying fuzzy level set provides better perception compared to the image without level set. After the segmentation, in the feature extraction, important features such as edge, intensity, contrast and orientation are extracted using Feature-based morphometry approach (FBM). Specifically to extract orientation, the images are scaled at 0°, 45°, 90° and 135° using Gabour filter. The features such as mean, standard deviation and entropy are calculated for all the seven features and the results are compared for more number of benign and malignant images. These extracted features are used for the classification stage. In the classification, 50 ultrasound breast cancer images consist of 14 benign images and 36 malignant images are used. The images are trained by Support Vector Machine using the Generalized Multiple Kernel Learning with the help of regularization 0 and 1. From this training, the maximum accuracy, sensitivity, specificity and BAC obtained as 73, 100, 38 and 69 respectively with regularization 1.

Keywords: centroid, fuzzy clustering, computer aided diagnosis.

Cardiac Arrhythmia Diagnosis system from Electrocardiogram Signal using Machine Learning Approach

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ABSTRACT

People nowadays come cross lot of life threatening diseases. One of the crucial diseases is cardiac disease. Cardiac arrhythmia is a disorder which needs timely diagnosis for avoiding sudden cardiac arrest. In Arrhythmia, the heartbeat is too irregular, too slow, or too fast. The Cardiac diseases are monitored using electrocardiogram (ECG).The major objective of this paper is to discriminate between the normal and diseased persons using machine learning approach. The Cardiac Arrhythmia Diagnosis system involves the following processes such as feature extraction, feature selection and classification. Feed forward Neural Network is proposed in this work and results are compared with support vector machine.

Classification of Cloud/sky Images based on kNN and Modified Genetic Algorithm

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ABSTRACT

The main objective of this paper is to identify the types of clouds from the high-dimensional feature set extracted from sky/cloud images. The identification of types of clouds finds its scope in prediction of weather, natural disasters like storms,thunderstorms etc. The feature set of sky/cloud images are fuzzy, and incomplete and highly spatial and temporal. Hence, it is necessary to optimize the feature set to for further analysis. Neighborhood Component Analysis (NCA) is used for optimizing the feature set extracted from sky/cloud images and it also improves the speed of classification. K-Nearest Neighbor (kNN) classifier is combined with Genetic Algorithm that uses Tabu search is used for classification. Finally, this paper identifies the following types of clouds. (i) Pattered cloud (ii) Thick dark cloud (iii) Thick white cloud and (iv) Veil cloud. kNN algorithm is modified to include condensed training set representation to improve the classification performance. The experimental results are verified with Singapore Whole sky IMaging CATegories (SWIMCAT) database and achieve better performance in classifying the types of clouds.

Machine Learning Approach Improves the Quality of the MRI Images in Tumor Detection and Diagnosis: A PSO Based Cluster Analysis

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ABSTRACT

Segmentation is the most important and basic technique of image processing which is used for the extraction of suspicious region from the given image. Brain tumor is diagnosed at advanced stages with help of the MRI images. This research aims to quantify the brain tumor loss in MRI human Head Scans by using a computational method. This method proposes Particle Swarm Optimization (PSO) for finding the centroid value to segment the brain tissue. The segmented brain MRI helps the radiologist in detecting brain abnormalities and tumor.

Keywords: Magnetic Resonance Imaging, PSO, Clustering, Morphological Operation, Brain Tumor Segmentation

A Neuro-Fuzzy Approach for anomaly identification in Brain fMRI using K-Means Algorithm

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ABSTRACT

Now-a-days a Conflict identification and categorization in brain functional MRI (fMRI) are inherently a toilsome in research. It is particularly because of the overlapping intensity distribution between the healthy and pathological tissues in the fMRI. The important features of that characterize the brain have to be diagnoses for efficient categorization and deblocking of contradiction from fMRI. Since MRI suffers from substantial grayscale contrast the categorized procedure should be done in a trained manner. This work proposes a Neuro-fuzzy based system for categorization and deblocking of abnormalities from Brain fMRI. The work consists of three major stages such as Feature deblocking, categorization and conflict detection. In the feature deblocking phase vital data that drive to categorization are analyzed. Texture and Wavelet features are used as discriminating features to diagnose the image class. The categorization phase discriminates the normal and pathological fMRI slices using feed forward Back propagation neural network. The categorized abnormal images are then applied for feature extraction and comparison of them with a ground truth data.

Keywords: Anomaly, Functional MRI, Wavelet, Neural network, Neuro-fuzzy.

Linear Weighted Multiple Watermarking in DWT-SVD Domain through Covariance Analysis
(Linear weighted multiple watermarking in DWT-SVD domain)

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ABSTRACT

This paper proposes a covariance based multiple watermark embedding using modified normalized principal components watermarking. Multiple watermarking increases the reliability of watermarks against various attacks. Blocks of the host image are selected for multiple watermark embedding by evaluating covariance between the blocks and textures of the watermark. Once the blocks and textures are identified, modified normalized principal components watermarking is applied in DWT-SVD domain to avoid false positive error. Performance of the proposed watermarking technique is analyzed by peak signal to noise ratio, correlation coefficient and structural similarity index. Comparative analysis with other watermarking methods also reveals the better performance of the proposed method.

Keywords: multiple watermarking, covariance, DWT-SVD, normalized principal components

A Survey on Multimodal Biometrics Authentication and Template Protection

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ABSTRACT

Biometric systems occupies a vast space in the field of security systems. Most of the applications make use of biometric systems such as attendance system, locker systems in banks, hospitals, industries, etc. Besides authentication provided by these biometric systems there is also need to protect the templates that are stored in them. This work involves a review of multiple biometrics such as fingerprint, face, hand vein, iris, signature, etc and the techniques used for authentication, fusion and template protection. Different traits and techniques are compared to obtain the most unique and suitable methods for biometric authentication and template protection. This paper also includes the comparison between the unimodal and multimodal biometric systems. Parameters such as Genuine Acceptance Rate(GAR), Equal Error Rate(EER) ,False Acceptance Rate(FAR) and False Reject Rate(FRR) are used to evaluate the various unimodal and multimodal biometric systems.

Keywords: Query template, GAR, FAR , FRR and EER.

Automatic Optic Disc Localization and Optic Cup Segmentation from Monocular color Retinal images for Glaucoma Assessment

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ABSTRACT

In recent years, computer-aided screening and diagnosis of glaucoma have made considerable progress. Computer-aided retinal image analysis provides an instant detection of retinal features before specialist inspection. Eye disease of glaucoma is a significant globally is due to an increase in intraocular pressure. It causes permanent vision loss, and also early prognosis is complicated. The present work provides an image processing technique used to automatically detect the center of the optic disc and segment the optic cup for prediction of glaucoma by developing software algorithms in MATLAB. Three kinds of steps are used such as pre-processing, detection of optic disc center and optic cup. In the first step, green Chanel image and filtering methods used for removing noises. In the second step, Region localization using entropy is applied to locate Optic Disc center. In the third step, the Optic Cup has segmented by region growing technique. This subject to different retinal fundus image datasets such as DRIONS and DRIVE. Proposed algorithm is obtained100%Accuracyrate(A),98%Sensitivity(S),99% Specificity(Sp), 95% Precision(P), 87% F-score(Fs), 94% G-mean(Gm) and trivial computation time.

Keywords: Glaucoma, image processing, fundus images, optic disc, optic cup, MATLAB, localization, segmentation.

Investigation of various Speckle Noise Denoising Filters

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ABSTRACT

In this paper, various ultra sound image denoising techniques are investigated and results are compared for various conditions. Synthetic Aperture radar images and ultra sound images are often corrupted by speckle noise. It is also known as granular noise. There are many methods for removal of speckle noise. The filters are developed for the removal of speckle noise. This paper reviews filters mostly used to remove speckle noise. Frequency analysis methods, various adaptive methods, temporal analysis methods are defined for the removal of speckle noises.

Keywords: Speckle noise, denoising adaptive filter

Finger Knuckle Biometric Authentication using Texture-Based Statistical Approach

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ABSTRACT

Reliable authentication techniques play major role in designing security applications. Initially, passwords and tokens are used for identifying the authorized user which are easily forgotten or stolen by others. Therefore, biometric is an evident and secure way of authenticating the user in most of the applications. Various biometric traits such as physical or behavioral characteristics of individual are used for identification. Finger Knuckle Print (FKP) is one of the new emerging modality used for recognition of an individual. Finger Knuckle is rich in texture, a contactless biometric trait with highly unique characteristics. In this work, Gabor filter, texture based statistical approach is used to extract the feature vector from each segmented FKP. In addition, K-nearest neighbor (KNN) algorithm is used to train the system for extracting the feature vector. PolyU database and IIT Delhi databases are used to test the proposed FKP biometric authentication. Proposed FKP biometric authentication technique is implemented and experimental results show that the average efficiency of the algorithm is 86.133% and 99.4% for IIT Delhi and PolyU finger Knuckle databases respectively.

Keywords: FKP, Feature extraction, Gabor Filter, Authentication, KNN

Performance Comparison of Adaptive Filters for Speckle Noise Reduction in SAR Images

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ABSTRACT

Noise is the most common problem in imaging systems that affects the quality of the image. Noise is unwanted data that has the capability to reduce the contrast and deteriorate the

object's size and shape in the image. It also blurs the edges or dilutes the fine details in the image. Reducing the noise in images has become very essential in image processing. This paper presents the comparison of Frost and Kaun filter for noise reduction in images. Speckle is a characteristic attribute of SAR (Synthetic aperture radar) and Ultrasonic images.Speckle noise is modelled as spatially correlated multiplicative noise. The speckle noise filters are designed for enhancement of visualization of speckle images. SAR and Ultrasound are the main applications areas for speckle noise filters.

Keywords: Speckle noise, Kaun filter, Frost filter, MSE,PSNR.

Performance Evaluation of Image Binarization Technique for Recognition of Ancient Historical Documents

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ABSTRACT

Information acquisition from degraded historical document has always been a challenging task due to various forms of degradation. Image binarization is very much essential in the restoration of degraded historical documents.Eventhough many algorithms have been proposed, still there is a need for an effective algorithm to solve all kind of degradation problems. In this paper,an optimum binarization technique is proposed that addresses these issues by using a combined approach of local image contrast and gradient.Firstly,the input image is binarized and then canny egde map is applied to extract text stroke edge pixels.To enhance further,morphological operations are carried out base on shapes.Finally an adaptive thresholding is applied to segment foreground and background pixels.To determine the quality,the proposed method has been tested on 4 public datasets (DIBCO 2009, 2010, 2011 and 2012) that were taken from pattern recognition and image analysis(PRImA) research labSimulation result shows that the proposed binarization method achieves performance improvement interms of F-measure, NRM, MPM, PSNR as 88.4461, 0.0708, 0.00265 and 18.420respectively.

Keywords: Binarization, Canny Edge Map, Adaptive Thresholding

Isolated Offline Tamil Handwritten Character Recognition Using Deep Convolutional Neural Network

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ABSTRACT

In this paper, a Convolutional Neural Network architecture (ConvNet) for offline isolated Tamil character recognition is proposed. A first-ever attempt has been made to recognize all 247 characters in the Tamil text using 124 unique symbols. The proposed architecture contains two Convolutional layers and Two Fully Connected (FC) Layers with ReLu activation function. Softmax function is used in the final layer to compute the probability of the classes. The 9.6 million parameters of the network are randomly initialized using He initialization and fine-tuned using Nesterov Accelerated batch gradient descent optimization algorithm. Dropout regularization method has been used to avoid over-fitting of the network to the training data. A total of 98,992 image samples from IWFHR database are divided into 69% for training set (68,488), 20% for validation set (20,584) and 11% for test set (9920). Cross entropy loss has been used during the training phase to measure the loss and thereby update the parameters of the network. The network has achieved 88.2% training accuracy and 71.1% testing accuracy. The reason for reduction in the test accuracy is analysed. The source code and the dataset have been published for a quicker reproducibility of the result.

Keywords: ConvNets, Tamil Character Recognition

Steganography based Data Hiding for Security Applications

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ABSTRACT

Steganography is an art of sending hidden data or secret messages over a public channel so that a third party cannot detect the presence of the secret message. It is used widely in banking, military applications, E-commerce and so on because in it transmissions

of information are more secure. In the current paper, the data are hidden in two stages. First, the data are hidden within an image and the image is further hidden in an audio file. For data hiding in image and image hiding in audio, Least Significant Bit (LSB) algorithm is used. In order to overcome security threats and to equip the data with high security, binary values of the data are hidden in different locations on the last three bits. The audio file selected may be a .WAV or .AIFF files. If the binary value of image is hidden in the last bit, the execution time is more. To reduce it, the binary value of the image is hidden in the last two bits of an audio file, so that the processing speed gets increased while execution time gets reduced. For security applications, the execution time should be less. Thus, the paper meets the security requirement and it can be used for military applications.

Keywords: Data Hiding, Security application, Steganography

The Survival of Intellectual Disabled Subjects in Social Environment using BCI

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ABSTRACT

The BCI (Brain Computer Interface) systems are used for the damaged people (i.e., subject in our project) who were not able to interact with the computer according to their brain signals. The BCI can convert the brain signal into digital form. The BCI is widely used in various fields such as education, industries, video games and medical appliances, etc.

In our project, the EEG based brain controlled Robot and home appliances using IOT was developed using BCI. Here, the Neurosky technology is used in BCI. Here, the neurosky technology is used in BCI. The e-sense algorithm is used to characterize the mental states. And also with the help of think gear technology which is used in our headset can be able to extract the subject's brain signal by eliminating the artifacts. The extracted brain signal is transmitted to the Arduino microcontroller using HC-05 Bluetooth module. Here the robotic module consists of Arduino microcontroller coupled with DC motor for controlling the entire system. The combination of BCI system in the brain controlled Robot by using the recommended technologies, the paralysed people can able to control their home appliances without any difficulties.

Keywords: BCI – Brain Computer Interface, IOT – Internet of Things, EEG – Electroencephalogram