1) Michahialet.al. (2012)

Research paper on “Speech Synthesizer & feature extraction using DWT with classification by Euclidian distance & neural network of EEG signal” describes the work done by the author about the development of an EEG electroencephalogram based BCI system. The thought of a healthy person’s brain is read & preprocessing is done on it. Here number of filters and wavelet transforms are used and exact features are extracted. Depending on the extracted features it is classified into different classes.

2) Sharma et.al. (2012)

Research paper on “Techniques for feature extraction from EMG signal” describes about the thing that human being can control equipment by using myoelectric signal (MES). These are bio signals. In this work hand movements are required. The first & important step used is feature extraction. The EMG analysis uses the optimal feature. The computational cost of multifunction myoelectric control system can be reduced by using the extracted feature. The main objective of this paper is to define the methods & approaches which are most suited for extracting the features from EMG signal. The number of techniques are used in this work such as spectral approaches like STFT, Thompson transform, wavelet based analysis, fuzzy based feature extractor & temporal approaches.
3) **Mahanaiah et. al. (2013)**

Research paper on “Image texture feature extraction using GLCM approach” describes the method used for capturing visual content of images for indexing and retrieval is feature extraction. Extraction of color, texture and shape or domain specific features are low level or primitive image features. The above mentioned work makes use of (GLCM) gray level co-occurrence matrix to extract second order statistical texture features for motion estimation of images. Xilinx PPGA method is used for calculating Angular Second Moment. This paper shows many real time pattern recognition applications such as high discrimination accuracy, requires less computation time.

4) **Jafari et. al. (2013)**

Research paper on “A Neural Network based approach for brain tissue classification using GA” describes that MRI images are classified based on Artificial Neural Networks (ANN) & Generic Algorithms (GA). The proposed work classifies the brain tissues, such as white matter (WM), gray matter (GM), Cerebral spinal fluid (CSF), background (BKG) & tumor tissues. Two texture & intensity features are taken as input after performing segmentation & connected component labeling.

5) **Unser (1995)**

Research paper on “Texture classification & segmentation using wavelet frames” describes about the use of wavelet transform to characterize texture properties at multiple scales. The over complete decomposition of wavelets is used in the analysis to get description. The proposed algorithm is a fast algorithm due to use of tight frame of l2. The characterization of a texture is carried by set of channel variances. This set is used by filter bank as output. 12 Brodatz textures are used for classification.
6) Rajaeiet. al. (2011)

Research paper on “Wavelet feature extraction for medical image classification”, describes about the various medical image retrieval systems that are available that classify image according to image modalities, orientations, body part or disease. The paper presents a method for classification of medical images. For each medical image the wavelet features of different modalities are extracted. Then the formulas of mean and standard deviation are used using extracted wavelet features.

7) Ramadanet. al. (2009)

Research paper on “Face recognition using particle swarm optimization-based selected features”, describes about getting the acceptable recognition accuracy by use of feature selection. This reduces the number of features, removes irrelevant, noisy and redundant data. Selecting the appropriate feature is most important step for recognizing the pattern. The proposed work makes use of PSO (Particle Swarm Optimization) algorithm, as feature selection algorithm.

8) Giakoumiset.al. (2006)

Research paper on “Digital Image Processing Techniques for the Detection and removal of cracks in digitized paintings”, presents an integrated methodology, which is used for the detection & removal of cracks on digitized paintings. Thresholding is used to get the output of morphological top-hat transform for detection of cracks. The noisy data such as thin dark brush strokes are removed using either a median radial basis function neural network on hue & saturation data or a semiautomatic procedure based on region growing. Finally, order statistics filters are used to fill the cracks and then controlled anisotropic diffusion is performed.
9) Nikolaidiset. al. (2001)
Research paper on “Region- based water marking”, introduced a method for embedding &
detecting a chaotic watermark in the digital spatial image domain. The image segmentation &
localization methods are used. The experimental results displays that the method is robust & the
immunity of the embedded watermark to several kinds of attacks, such as compression, filtering,
scaling, cropping & rotation. The current paper aims to provide a watermarking technique that
faces the image copyright protection.

10) Singh et. al. (2013)
Research paper on “An Iris Feature Extraction Using 2D-Dual Tree Complex Wavelet
Transform”, presents an iris recognition system consists of an automatic segmentation system that
is based on the 2D-Dual tree complex wavelet transform(2D-CWT), and is able to localize the
circular iris and pupil region, occluding eyelids and eyelashes, and reflections. The extracted iris
region was then normalized into a rectangular block with constant dimensions to account for
imaging inconsistencies. Finally, the data was extracted and quantized to four levels to encode
the unique pattern of the iris into a bit-wise biometric template. The K-nearest neighbor
technique was employed for classification of iris templates. The obtained experimental results
showed that the proposed approach enhanced the classification accuracy. Iris verification is
shown to be a reliable and accurate biometric technology.

11) Throop (1988)
Patent on “Image processing system for detecting bruises on fruit”, shows the method of
detecting & measuring the size of bruises on fruit, such as apples as a technique of image
processing. A gray level image of each piece of fruit is obtained using a line scan camera. The
image is digitized and transferred to a computer which performs many steps on image to determine the sizes of any bruises on the fruit from gray-level data.

12) Clarke (1999)

Patent on “Computer assisted method and apparatus for displaying x-ray images”, describes about an enhancement on early cancer detection using digital mammography, which is known as (CAD) computer Assisted Diagnostic method. The apparatus are described for the enhancement & detection of suspicious regions in digital X-ray images. The main objective of the patent is to improve the sensitivity of detection of suspicious area such as masses, while manipulating a low false positive detection rate. The masses are classified as benign or malignant. The author has developed an automatic mass detection & classification in digital mammography, known as modular CAD technique.

13) Son (2008)

Patent on “Method of controlling digital image processing apparatus for efficient reproduction & digital image processing apparatus using the method”, gives a method of controlling a digital image processing apparatus which processes & stores an input image in a recording medium & reproduces files stored in the recording medium in a stored image display mode. The methodology uses classifying the stored image display mode into first and second mode, determining whether any one of the first and second mode was selected by user if a command to perform the stored image display mode is input by the user, displaying a latest file first if the first mode was selected and displaying a file most recently reproduced first if the second mode was selected.
14) Singh (2010)

Patent on “Recent patent on image compression – a survey”, describe about the concept of how multimedia & communication applications use the image compression as the key technology. Still & moving image compression uses the standards like JPEG, JPEG 2000, MPEG, H.26 X. To deal with the compression requirements of different applications such as camera, printer, scanner, a number of patents have been filed related to image compression. The survey given here presents an extensive survey or recent patents in the field of image compression.

15) Najarian (2012)

Patent on “Automated methods and systems for the detection & identification of money service business transactions”, gives the automated method for the detection & identification of money service business transactions. Number of steps are performed to get the result such as preprocessing, feature extraction, statistical analysis and classification. The present invention relates to automated methods & systems for the detection & identification of money service business transactions that include preprocessing algorithm, a feature extraction algorithm, a statistical analysis algorithm for the testing of significance & dimension reduction, and non-linear classification algorithm. The automated method & systems of the present invention are based on unified signal processing & non-linear classification algorithm & pattern recognition & analyze financial institution customer transaction histories to detect & identify previously unknown money service business.
16) Kakarwalet. al. (2010)

Research on “Wavelet Transform based Feature Extraction for Face Recognition”, proposed a method for Face recognition based on Wavelet Transform. This algorithm has been used to extract the features of the FERET face database. The proposed methodology is able to achieve excellent performance when there are only a very small set of features being used. The author has calculated error rate using FAR and FRR. Image’s insensitivity to large variation in light direction, face pose, and facial expression made the author to accept the choice of wavelet transform. Correlation and Threshold values are used in the proposed work to assure high consistency of the produced classification outcomes. The encouraging experimental results demonstrated that the proposed approach by using frontal and side-view images is a feasible and effective solution to recognizing faces, which can lead to a better and practical use of existing forensic databases in computerized human face recognition applications.

17) Abdalla et. al. (2013)

Research paper on “DWT and MFCCs based Feature Extraction Methods for Isolated Word Recognition” describes the method for speech recognition using a combination of discrete wavelet transform (DWT) and mel Frequency Cepstral Coefficients (MFCCs) for feature extraction. Use of more features from the signal has enhanced the performance of the proposed method. There is a comparison of performance of the Wavelet-based mel Frequency Cepstral Coefficients method & mel Frequency Cepstral Coefficients based method for features extraction. Wavelet transform is applied to the speech signal where the input speech signal is decomposed into various frequency channels using the properties of wavelet transform. Then Mel-Frequency Cepstral Coefficients (MFCCs) of the wavelet channels are calculated. The author has got a new set of features by concatenating both features. The speech signals are sampled directly from the microphone. The proposed method of classification uses Neural
Networks (NN) concept. The method is implemented for 15 male speakers uttering 10 isolated words each which are the digits from zero to nine. Each digit is repeated 15 times.

18) Manikantanet al. (2012)

“DWT-based Illumination Normalization and Feature Extraction for Enhanced Face Recognition”, describes an effective approach of extracting illumination invariant feature to solve the proposed problem. Face recognition under varying lighting condition is challenging. In this paper, authors propose to utilize DWT for normalizing the illumination variance in images as well as for feature extraction. Attempt is made to improve each stage by examining individual stages of FR system. A binary particleswarm optimization (BPSO) based feature selection algorithm is used to search the feature space for the optimal feature subset. Experimental results, obtained by applying proposed algorithm on YaleB and color FERET face database, show that the proposed system outperforms other FR system. Substantial reduction in the number of features and a significant increase in the recognition rate is observed. For both YaleB and color FERET database dimensionality reduction obtained is more than 99%.
19) Srivastava et al. (2013)

Research paper on “DWT - Based Feature Extraction from ECG Signal”, describes about the rate and regularity of heartbeat and irregularity to the heart can be detected and measured by Electrocardiogram. An ECG translates the heart electrical activity into wave-line on paper or screen. Discrete wavelet transform (DWT) is used for the feature extraction and classification task. The wavelet transform is a two-dimensional timescale processing method, so it is suitable for the non-stationary ECG signals (due to adequate scale values and shifting in time). Hybrid of artificial neural networks and fuzzy logic neuro-fuzzy logic is used to analyze & classify the data.

20) Bhatia (2013)

Research paper on “Extraction of Unique Feature Sets (Bio-metric Identifier) For Human Ear’s Image using DWT Analysis”, presents the statistical analysis of the DWT coefficients of ear’s images in order to ascertaining the bio-metrics identity of a person. The DWT coefficients matrix contains the frequency variations of ear’s images in three parts; the lower half of the matrix that contains the low frequency elements that make up the flashy part of the ear, the upper half that contain the high frequency elements in form of noise and diagonal elements that contain the maximum information about the features of the ear’s image. The diagonal elements or DWT coefficients are then analyzed statistically in terms of standard deviation, entropy and covariance to identify the given ear’s image.
21) Lahmiri (2013)

Research paper on “Features Extraction from High Frequency Domain for Retina Digital Images Classification”, gives the main objective to extract features from retina digital images based on a further analysis of high frequency components (HH) obtained with the discrete wavelet transform (DWT). DWT is used for obtaining photograph of retina with High-high (HH) image subband. Then, a further decomposition by DWT is applied to the HH image subband of the previous step to obtain HH*. Finally, statistical features are computed from HH*. To classify normal versus abnormal images using leave-one-out cross-validation method (LOOM) the support vector machines (SVM) are used. The simulation results show strong evidence of the effectiveness of features extracted from HH* than features extracted from HH. In summary, the proposed methodology based on a further analysis of high frequency images using DWT helps extracting suitable features for automatic classification of normal and abnormal retina digital images.

22) Zhang et. al. (2012)

Research paper on “Adaptive Feature Extraction and Image matching Based on Haar Wavelet Transform and SIFT”, describes the use of algorithm recently, Scale Invariant Feature Transform (SIFT) in feature extraction and image matching. However, it has some defects, such as large volume of computational data and low efficiency of image matching. To address these defects, adaptive feature extraction and image matching based on Haar Wavelet Transform and SIFT (AHWT-SIFT) is proposed by the authors in this paper. In view of the characteristics of Haar wavelet, the low-frequency components of image can be decomposed adaptively by DWT, which represents the main features of the image and avoids the high-frequency of instability redundant information. Then SIFT is applied in these low-frequency components to extract the feature points. For image matching, nearest neighbor algorithm is utilized. The experimental results
have shown that the proposed scheme not only retains the general characteristics of SIFT, but the speed and accuracy of feature points matching have been greatly improved.

23) Gupta et. al. (2013)

Research paper on “Feature extraction using MFCC”, describes a very common and efficient technique for signal processing called Mel Frequency Cepstral Coefficient. The authors have presented a new purpose of working with MFCC by using it for Hand gesture recognition. The objective of using MFCC for hand gesture recognition is to explore the utility of the MFCC for image processing. Till now it has been used in speech recognition, for speaker identification. The present system is based on converting the hand gesture into one dimensional (1-D) signal and then extracting first 13 MFCCs from the converted 1-D signal. Support Vector Machine (SVM) is used for Classification. Experimental results represents that proposed application of using MFCC for gesture recognition have very good accuracy and hence can be used for recognition of sign language or for other household application with the combination for other techniques such as Gabor filter, DWT to increase the accuracy rate and to make it more efficient.
24) Subha (2014)
Research paper on “Automatic Feature Based Image Registration using DWT and SIFT”, shows that Image processing techniques provides opportunities for search of related or similar images. The authors have proposed an approach to identify some visual objects or “Landmarks” in the image & generate relevant images in matching probability order using “Image registration” methods. The important & fundamental task in image processing used to match two different images is Image registration. Given two or more different images to be registered, image registration estimates the parameters of the geometrical transformation model that mapped the sensed images back to its reference image. The work is a feature based approach to automated image-to-image registration. In the proposed work, various methods are used in different phases of image registration. Phases of image registration are preprocessing, feature detection, feature extraction, feature matching and estimation of threshold for best match. The characteristic of this approach is it combines scale interaction of discrete wavelets for feature extraction, scale invariant feature transform (SIFT), for feature matching and normalized 2D cross correlation for obtaining maximum positive matches.

25) Tamilkodiet. al. (2013)
Research paper on “A new approach for Feature Extraction in Content Based Image Retrieval using Texture Spectrum Wavelet domain”, describes the concept of Higher retrieval efficiency which can be achieved for an effective color image retrieval scheme by contrast based texture features. The proposed method uses Texture Spectrum in Wavelet (TSW) domain which is very fast to compute and enable to speed up the wavelet computation phase for thousands of sliding windows of varying sizes in an image. Proposed TSW provides a robust contrast features for image retrieval from a lot of objects in an image can be distinguished solely by their textures
without any other information. The authors had divided the lower resolution approximation image into four sections, where each section extracts 12 contrast features and stores the features of the query image and also all images in the database and extracts the features of each image. The proposed TSW method reduces the computation of possible patterns as well as fast and retrieving accurate images. Experimental results show that the proposed method for image retrieval is more accurate, efficient and quite understandable in spite of the availability of the existing retrieving algorithms.