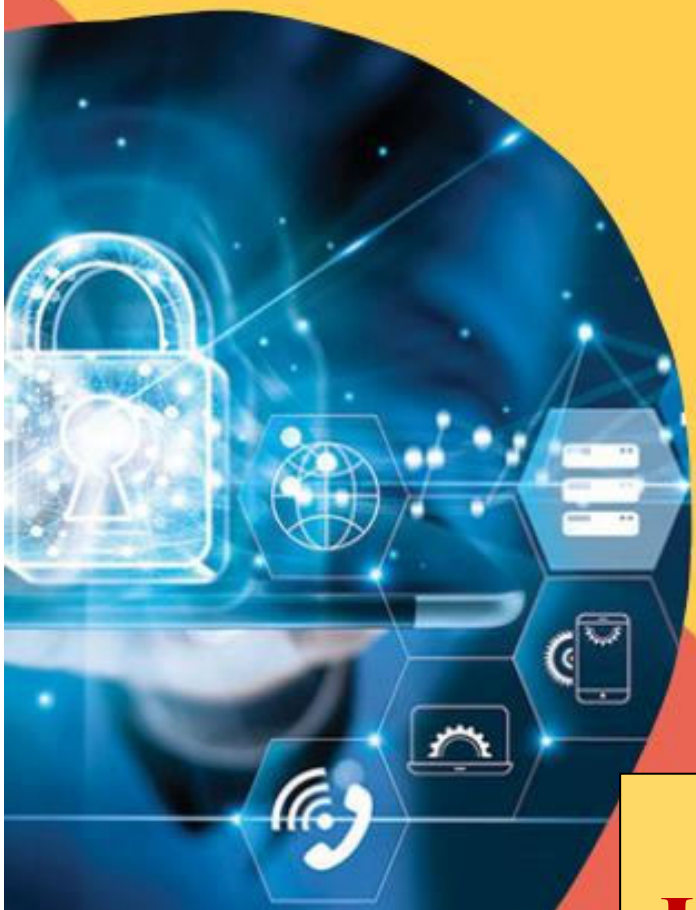
JYOTI NIVAS COLLEGE AUTONOMOUS

DEPARTMENT OF MCA

TECH-ON-TOP

E-JOURNAL ON APPLICATIONS OF DIGITAL IMAGE PROCESSING



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DIABETIC RETINOPATHY DETECTION

AMTUL HASEEBA

182MCA49

BRIEF DESCRIPTION:

Diabetic retinopathy (DR) is a diabetes related eye disease which occurs when blood vessels in the retina become swelled and leaks fluid which ultimately leads to vision loss. Several image processing techniques including Image Enhancement, Segmentation, Image Fusion, Morphology, Classification, and registration has been developed for the early detection of DR on the basis of features such as blood vessels, exudes, haemorrhages, and microaneurysms. Diabetic Retinopathy is one of the common eye diseases and a reason of blindness in the world. Image Processing is widely used to diagnose the eye diseases in an easy and efficient manner. It also supports Ophthalmologists to screen their patients and to do clinical study as well. Major eye related diseases that cause blindness worldwide are Diabetic Retinopathy, Glaucoma, and age-related macular degeneration. It is found that in America, almost 950,000 people became blind in 2002 and 2.5 million people have visionary problems due to these diseases.

NATURE OF IMAGE:

The structure of blood vessels in eye retina gives information about changes followed by these retina related eye diseases. Some of eye features, i.e., vascular blood vessels, fovea, and optic disc (OD) are used to identify diabetic retinopathy (DR) and other eye related diseases. Many screening tools are available to diagnose DR. Digital fundus cameras are used to take the retinal vessel images; therefore, unnecessary brightness, environment, and the process of acquisition of fundus image degrade the image quality to some extent. Hence image enhancement is always required to improve the quality of desired image.

FINDINGS:

Sl.no.	TITLE	PRE-PROCESSING	FEATURE-EXTRACTED	ANALYSIS
1.	Pre-Processing & Feature Extraction for early Detection of Diabetic Retinopathy	• Image Enhancement 1. Histogram equalization 2. Image is divided into smaller blocks. • Image Segmentation • Resizing Techniques (Images are chopped at top & bottom to be standardized.)	• Circular in shape • Appears with similar intensity, colour & contrast to the other attributes of the fundus image.	• Machine learning algorithm • Segmentation algorithm rendered automated segmentations & true OD regions of 86%.

2.	Detection of Diabetic Retinopathy in Human Eyes Using Pre-Processing & Segmentation Techniques	• Segmentation (walls of blood vessels are segmented) • Image Enhancement (used for improving the quality of the retinal image)	• Contrast of image is enhanced. • Filtering to remove noise • Intensity measure • Cropping of image	• If the total area of the nerve fibre is less, then it's affected with DR. • If the area of the network is more, then the eyes are not affected.
3.	Diabetic Retinopathy Detection Using Image Processing: A Survey (Nov-Dec, 2013)	⁞ Image Enhancement 1. Histogram equalisation 2. Used to enhance the blood vessels. ⁞ Segmentation (Divides the image into multiple regions on basis of colour & intensity.)	⁞ Noise removal ⁞ Morphology (Removes single pixel noise.) ⁞ Binary Thresholding (Removes irrelevant object from the image.)	⁞ Retina blood vessels are damaged due to fluid leakage ⁞ from the vessels. Hybrid methodology should be used to get efficient result.
4.	Diabetic Retinopathy Detection Using Image Processing: A Survey (Aug, 2016)	⁞ Image Enhancement (used to improve ⁞ image quality) Image Segmentation (locates lines, curves, etc. in the image)	⁞ Noise suppression (Impulse noise is removed by Mean or Median filter.) ⁞ Image Sharpening (Increases the sharpness of the image.)	⁞ Algorithms used are Laplacian, Sobel & Robert Cross.
5.	Diabetic Retinopathy Stages Detection Using Fundus Images (March-April, 2015)	⁞ Image Segmentation 1. Histogram Thresholding ⁞ Histogram Equalisation (Improves the contrast of the image.)	⁞ Noise removal (Using Median Filtering Technique) ⁞ Homogeneity (Reflects the uniformity of several pixels in the image.)	⁞ Screening of patients eyeballs for detecting ⁞ level of DR. Prevention of vision loss by determining levels of DR in its early stage.

CONCLUSION:

In diabetic retinopathy (DR), retina blood vessels are damaged due to fluid leakage from these vessels. Different lesions, i.e., Exudes, hemorrhages, micro aneurysms, and textures are used to detect the stage of DR. Use of several image processing techniques for DR lesion detection are discussed. It is found that early diagnosis of DR can reduce the chance of vision loss up to 50%. Image processing techniques can detect the DR accurately. Hybrid methodology should be used in order to get better result in terms of accuracy and efficiency for DR detection.

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PARTICLE POLLUTION ESTIMATION BASED ON IMAGE ANALYSIS

CHITHRA N

18MCA07

Introduction:

Air pollution has become a major issue in the modern world, the reason is industrial emissions and increasing urbanization along with traffic jams and heating/cooling of buildings. The negative impact of air pollution on health is could be caused breathing problems or inflammation of the respiratory tract, skin health disorders, and stress.
Monitoring urban air quality is therefore required by municipalities and by the civil society. Current monitoring systems rely on smoke and exhaust detection system that has been developed for monitoring exhaust gases using far infrared camera which is costly.
They use different pre-processing, segmentation approaches, feature extraction based on pixels and intensity levels. Diffusion process and smoky detection algorithms are used to detect the pollutant particles in the given image.

Nature of Image:

In object detection use JPG(Joint Photographic Experts Group) and PNG(Graphics Interchange Format) image format.JPG uses lossy compression and PNG uses lossless compression followed by decompression will give exactly the same image back.JPG is used for storing photograph at a smaller size whereas PNG are used for storing line drawing, text, iconic graphics and they are preferred most.

SL.No	Reference paper title and year	Preprocessing methods	Feature extracted	Anaysis
1	Air Pollution Monitoring and Estimation Using Diffusion Process, April 2018	**Enhancement techniques**: contrast Stretching,Noise filtering and histogram modification.colour images are converted to gray scale images. Mean filter used to reduce noise in images. Noise filtering- to remove unwanted or unnecessary information from an image. **Segmentation**: edge detection operator that uses a multi-stage algorithm to detect wide range of edges in images. diffusion process is used for blurring and localization problem.	Based on colour image, Partitioning the images into small frames in order to obtain a clarity regarding the frame which has the smoke content.	Plotting of the diffusion coefficient is done and the result is displayed in the form of 3D Graph.air pollution monitoring and estimation is done using diffusion process present in the image processing method.
2	Detection of indoor air pollution on wet or moist walls using thermal image processing technique(2015)	**Segmentation**: RGB colour space-RGB colour model, YIQ, YUV or YCbCr which used in video systems as well as the CMYK which usually used in colour printing. By using a threshold value. Threshold image is converted to binary image-noise. **Enhancement**: **Data acquisition**-the image is converted and stored in Joint Photographic Experts Group (JPEG). **Image pre-processing**-the. Images are represented by RGB components and represented in 3D Cartesian coordinates.	Threshold image is converted to binary image. Morphological operations such as erosion ,dilation and filling is carried out.	A combination techniques of colour thresholding and morphological operation have Been implemented. To detect wet or moist wall has proven successfully.

3	Detection air pollution based on infrared image processing(August 2019)	**Enhancement:** Infrared images are processed using frequency domain using high pass filter and low pass filter. **Segmentation:** region based segmentation pixels by pixels and average intensity levels are taken into consideration to calculate pollutants.	Based on range of wavelength and frequency transformation of infrared rays the pollution particles are estimated.	Infrared images of a RGB mode are converted into a grayscale to find out how much noise of the object. Resizing of images are done to obtain same area on different images thereby wavelet and decomposition process is carried on.
4	Satellite image processing and air pollution detection(2017)	**Enhancement:** linear and nonlinear filters are used, mainly FIR (finite impulse response) filters are used to remove denoise in images. Median filter to remove salt and pepper noise. **Segmentation:** thresholding and matrix central pixel is updated by mean values in each phase.	Based on signal analysis and volume of data set the pollutants are estimated.	Thresholded correlation functions of images is estimated between ground level and at high level by taking their mean values to detect air particles.
5	Air Pollution Monitoring Through Image Processing(2017).	**Segmentation:** binary segmentation algorithm is used and edge detection using canny edge detector. **Enhancement:** Grey level images are obtained at different densities of pixels and noise is removed by using diffusion process.	Based on high resolution and visible wavelength the smoky particles are detected.	Objective is fulfilled by obtaining the noise brightness ratio by using the diffusion process. smoke detection analysis software (SDAS) algorithm is implemented. The algorithm is based on image analysis from thermal and visible wavelength cameras, so smoky and foggy particles are detected.

Conclusion:

Pollution is one of the major problem which causes severe problems to the human health. The objective of this project is to monitor the pollution using image processing technology. This objective is fulfilled by obtaining the noise brightness ratio by using the diffusion process. Image processing obtains the images of polluted and normal images which are compared and obtains the polluted parts using different segmentation approaches. Thus air pollution monitoring is done through the image processing techniques.

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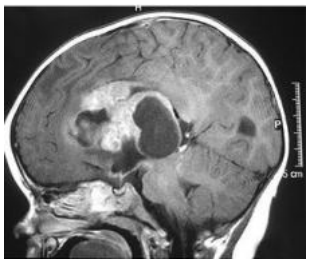
FORGERY DETECTION OF MEDICAL IMAGES (BRAIN TUMOR IMAGES)

DEEKSHITHA R KADAM
182MCA54

Introduction:-

- Human body is made up of several types of cells. Brain is a highly specialized and sensitive organ of the human body.
- A brain tumor is defined as an abnormal growth of cells within the brain or the central spinal canal.Brain cancer is the leading cause of death from cancer.
- It is mainly found in brain tissue and Spread in spinal cord, but not another part of the body.
- The extraction of the brain tumor requires the separation of the brain MR images to two regions. One region contains the tumor cells of the brain and the second contains the normal brain cells.It shows that it is very significant to diagnose brain tumor in advanced levels to save lives.



Characteristics:---

1) The methodology proposed includes application on brain MRI images of 256 x 256, 512 x 512 pixel size on dataset.
2) Certain parameters are taken into account for feature extraction as size , shape,composition , location of the image.
3) The experimental results of proposed technique have been evaluated and validated for performance and quality analysis on magnetic resonance brain images, based on accuracy,sensitivity, specificity, and dice similarity index coefficient.
4) The experimental results achieved 96.51% accuracy, 94.2% specificity, and 97.72% sensitivity, demonstrating the effectiveness of the proposed technique for identifying normal and abnormal tissues from brain MR images

Sl.No	Title	Pre-Processing	Feature Extraction	Analysis
1	**Image Processing Techniques for Brain Tumor Detection(2015)**	Image Enhancement, Median Filtering for Noise Removal,Various De-noising Filters(Media n Filter,Hybrid Filter,Morphology Based Denoising), Edge Detection, Segmentation(Active contour method,Watersheds Method), Histogram, Region growing, Morphological Operation, Threshold(foreground and background)	Boundary detection, shapes, Edge Detection(Sobel Edge), texture, color	Neural Network (NN), k- Nearest Neighbor(k-NN) algorithms, Gaussian noise, Convolutional neural networks algorithm
2	**Automated Brain Tumor Detection and Segmentation from MRI of Brain(2018)**	Images Enhancement, Filtering(Median Filter,Mean Filter Low - pass Filter,High-pass Filter,Gaussian Filter), Colour Fundamentals, SEGMENTATION(Threshold Based Segmentation, Edge-based segmentation methods), Region Growing, Morphology-based	Texture, contrast, roughness, brightness, intensity, co-occurrence matrix,gradient matrix	Fuzzy c-means algorithms, K-means algorithms, Artificial neural networks, Genetic algorithms
3	**Brain Tumor MRI Segmentation and Classification Using Ensemble Classifier(2016)**	Median Filter Image Restoration Segmentation-- >Threshold, Merging, Region growing, Splitting, Histogram	Gray-level co-occurrence matrix (GLCM), Boundaries and edges,Shape, Color, Texture and Intensity	Fuzzy C – means algorithm, Feed Forwarded Neural Network
4	**Brain Tumor Detection Techniques(2019)**	Image Acquisition(low contrast and small volume nodules), Image Pre-processing(Image Smoothing Image Enhancement),	gradients values, shape,area, perimeter and eccentricity	Artificial Neural Networks, Support Vector Machine (SVM), Radial Basis Function network, FUZZY C-MEAN Clustering,

		Image segmentation(Region Growing, Thresholding Method		Probabilistic Neural Network (PNN}
5	**Brain Tumor Detection Using Immune System with Imaging Techniques(2019)**	Image Acquisition, spatial filters,Median filter, Image Segmentation, edge detection, intensity	RGB to grey, color image, Boundary, shape, texture	KFCM Algorithm, K-means clustering technique, Fuzzy C-means algorithm

Conclusion:--

Brain tumors is an uncontrolled mass of tissue may be embedded in the regions of the brain that makes the sensitive functioning of the body to be disabled.The preprocessing techniques include different methods like Filtering, Contrast enhancement, Edge detection is used for image smoothing. The preprocessed images are used for post processing operations like; threshold, histogram, segmentation and morphological, which is used to enhance the images.

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TOMATO PLANT DISEASE DETECTION

BRUNDA V
182MCA35

Introduction:

Tomato is one of the most caring food crops of India. This plant grown in 0.458 M ha area with 7.277 M mt production and 15.9 mt/ha productivity. The tomato crop is cultivated in all the seasons but typically during winter and summer seasons. The crop cannot resist severe frost. It nurtures well under an average monthly temperature range of 21°-23°C but commercially it may be grown at temperatures ranging from 18°C to 27°C. Temperature and light intensity affect the pigmentation, fruit-sets and nutritive value of the fruits. Due to all these environments plant become very susceptible to diseases caused by fungi, bacteria, and viruses. Detection of plant disease is essential research topic. Most of the plant diseases are triggered by fungi, bacteria, and viruses. Morphological changes in leaves are the primary stage of Fungi. Bacteria are considered more embryonic than fungi in addition they generally have simpler life cycles and can be identified by morphological changes in the leaves.

Nature of Image:

- The tomato plant (Solanum lycopersicum) is a herbaceous plant that is part of the nightshade family.
- Tomatoes are a plant that grows well in a sunny, moderate climate. Their fruit is a popular food that contains vitamin C and A.
- Tomato plants are relatively easy to cultivate. They are warm-climate perennials that, during the summer months, are cultivated as annuals.
- Early tomatoes, such as 'Quick Pick,' 'Early Girl' and 'Early Cascade,' take no more than two months to harvest.
- In general, tomato plants grow to heights of between 3 and 10 feet and The leaves of the tomato plant are between 4 and 10 inches in length.
- Tomato plants have pinnate leaves, and each petiole has between five and nine leaflets. The plants produce flowers, which are yellow in colour with five lobes.

S.NO	TITLE	PRE-PROCESSING	FEATURE EXTRACTION	ANALYSIS
1	Tomato plant disease detection using image processing.	➢ Colour Transformation: The RGB images were converted into HSV colour space representation. ➢ Detection of the diseased portion: Segmented image shows the portion of the leaves affected by a disease. Total affected are calculated by counting the number of pixel values.	In this work Statistical techniques are used to calculate Grey-level co-occurrence matrix (GLCM) creates a matrix.	The detection of healthy tomato plant disease are archived around 80 to 84% of various disease such as "Powdery milede, Verticillium wilt, Leaf miners.
2	Tomato plant disease detection using image processing.	➢ Image processing: Tomato plant smoothen through various techniques they are Thresholding, Grey scale conversion, RGB to HIS, CIBAL colour model. ➢ Segmentation: Segmentation includes various techniques they are K-nearest neighbour method, Triangle threshold method.	Disease classification: 1.Name :Early Blight Energy:0.45 Entropy:3.53 Crrelation:0.977 2.Nmae:Iron chlorosis Energy:0.5768 Entropy:2.6576 Correlation:0.8751	For detection and classification using Multi-class SVM model in MATLAB 15a is used.
3	Digital image processing technique for Bacterial infection detectionon on tomato plant.	➢ Image Filtering: Image filtering is used to eliminate the noise in image. The proposed system uses median filter which is a non-filtering. ➢ Segmentation: Thresholding technique is important in segmentation it can be used in two ways Manual thresholding and Automatic thresholding.	Future extraction extracts some useful information from image for subsequent recognition. The proposed system uses texture future extraction.	The proposed system aims to find bacterial infection on tomato plant. Foremost step is colour transformation in which original RGB image is converted to YIQ colour space to acquire infected spot.
4	Detection of unhealthy region of tomato plant.	➢ Segmentation: The infected region is then segmented into number of patches of equal size. The size of the patch is chosen in such a way that the significant information is	The experimental results indicate the proposed approach can recognize and classify the leaf diseases with a little computational effort. By this method, the plant	GLCM technique is used to extract features of the image. The GLCM technique has two parts:

		not lost. In this approach patch size of 32×32pixels is taken. The next step is to extract the useful segments.	diseases can be identified at the initial stage itself and the pestcontrol tools can be used to solve pest problems while minimizing risks to people and the environment.	1. Formation of gray level co-occurrence matrix. 2. Extraction of GLCM descriptors against the co-occurrence matrix.
5	On plant disease detection of intact of tomato plant.	➢ Blob-Based segmentation: As pixel based segmentation is not perfect, numerous Misclassification were observed in the result of the process. Therefore we use blob-based segmentation.	Image-processing technologies are frequently combined with machine learning approaches, particularly supervised learning, such as k-Nearest Neighbors, Support Vector Machine, artificial neural network.	Image-processing method to accurately detect individual intact tomato fruits, including mature, immature and young fruits, on plant using a conventional RGB digital camera in conjunction with machine learning approaches.

Conclusion:

In this way by collecting data of various diseases of tomato plants and process them to train on CNN architecturte to create machine learning model, Late blight, Gray spot, bacterial canker are the detected diseases.

For detection purpose YOLO object detection algorithm build in darknet framework is used to train a model and predict diseases in tomato plant.

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WEED REMOVER IN AGRICULTURAL FIELD

DINAMANI R
182MCA33

INTRODUCTION:

In our country Agriculture is Traditional job. People all will work in the field to get the yield. From the Germination till the Harvesting all work in the field and all the works were done manually.

Later with Advancement in technology the usage of Natural Manure was replaced Artificial Fertilizers. But still now there were no technology is used to remove the weed. There were usage of some deadly poisons called Herbicides was introduced to remove the weeds. The Herbicides were used by Spraying them in the Entire Field. They cause adverse impacts to the crops and to the Environment.

In order to reduce the usage of Herbicides the Image Processing were introduced. By the process of Image processing the Herbicides were been allowed to spray the chemicals only to the weeds. This process of spraying the Herbicides only to the weeds by analyzing the entire field with the help of Image processing.

NATURE OF IMAGES:

1) The weeds seed germinate early and the seedlings grow faster.
2) They being hardy compete with the crop plants and deprive them of light, moisture and nutrients
3) They are harmful to crops, cattle and human-beings.
4) The seeds may have special structures like wings, spines, hooks, sticky hairs etc. on account of which they can be easily disseminated over long distance.
5) They can survive even under adverse conditions
6) Viability of seeds remains intact, even if they are buried deep in the soil.

Sl.no	TITLE	PRE-PROCESSING	FEATURE EXTRACTION	ANALYSIS
1.	Weed detection using image processing	*Image acquisition RGB format *Gray scale conversion Gray scale images to binary images *filtering techniques	Texture features such as entropy,energy,contrast, Etc., Size,shape and colour based features are to extract the features	Colour segmentation and edge detection to decrease the handling of herbicides by spraying them only in the areas where weed was present.
2.	Weed remover Through image processing	*De-noising – linear filter Called rank filter. *colour segmentation,edge detection	Provided earlier as shape,edge,boundary Object etc.,	Colour segmentation,edge Detection used to identify the edge and Veins of the particular crop – in the form of black in colour.
3.	Detection and removal of weed between crops in agriculture field using image processing	*Image segmentation: Clustering – used to assemble the colour ,pixels of objects *K-means clustering – used for texture analysis Edge detection, colour segmentation	Clustering – provides details of pixel colour,intensity,texure and location factors K-means clustering Algorithm – partition the leaf image into four clusters	During this process edge detection,colour segmentation analyse intensity colour,edge,size etc.,

4.	Design and forming for weed detection using image processing	*Image aquasition: take place in MATLAB. It done by using digital camera such as normal webcam. *Thresholding based segmentation , *Colour based segmentation *Gray scale images	Output images of the webcam are in the RGB format with size 640*480 pixels. Gray scale images converted into binary images from the pre processing state. Thresholding based on gray image is used to change the binary image.	The final segmented image is used as the input of the weed and crop classification stage. By using MATLAB software we can detect weed. We can detect and separate out weed affected area from the crop plants.
5.	Image processing for weed detection	*Image acquisition: HSV values *Edge detection filters laplacian filters	Using Gaussian blur ->image blurring filter Thresholding ->used to create binary images	$G(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{x^2}{2\sigma^2}}$ $G(x,y) = \frac{1}{2\pi\sigma^2} e^{-\frac{x^2+y^2}{2\sigma^2}}$

CONCLUSION:

The weeds are detected and removed by the image processing technique. The information about the presence of weed in that particular area will be provided to the Herbicide Sprayer unit. Thus the usage of Herbicides can be reduced to a big extent not spraying it into the entire field. But the only drawback of this process is that if there is an increase in weed type, that is more than two weeds then the process will not be applicable.

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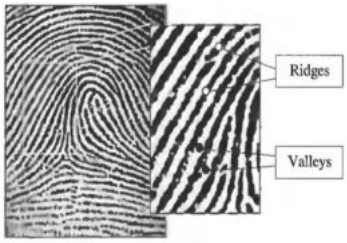
FINGERPRINT RECOGNITION AND ANALYSIS

BRUNDA S
18MCA05

Introduction:

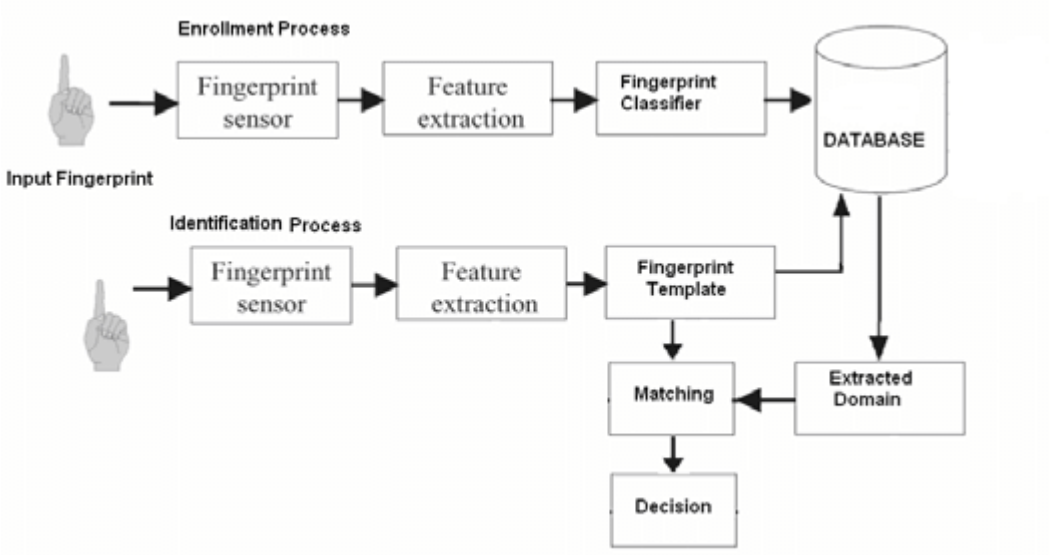
A fingerprint is an impression left by the friction ridges of a human finger. Human fingerprints are detailed, nearly unique, difficult to alter, and durable over the life of an individual, making them suitable as long-term markers of human identity. Scientists look at the arrangement, shape, size and number of lines in these fingerprint patterns to distinguish one from another. They also analyze very tiny characteristics called minutiae, which can't be seen with the naked eye.



Fingerprints can be used in all sorts of ways:

- Providing biometric security (for example, to control access to secure areas or systems)
- Identifying amnesia victims and unknown deceased (such as victims of major disasters, if their fingerprints are on file)
- Conducting background checks (including applications for government employment, defence security clearance).

Nature of image:
TIFF (Tagged Image File Format), JPEG, PNG etc.
Steps involved in fingerprint processing:



Sl.no	Reference paper title and year	Pre-processing methods	Feature extracted	Analysis
1	Fingerprint Image Enhancement Based on Various Techniques, Feature Extraction and Matching (2016)	Enhancement: Histogram Equalization Segmentation: mean adjustment technique	Pattern: ridges and valleys	The dependability of any natural fingerprint system powerfully relies on correctness obtained in the minutia extraction procedure, the proposed system shows that it has more value of PSNR, in case of histogram technique and less value of PSNR in case of mean adjustment technique
2	Fingerprint Recognition using Image Segmentation (2011)	Enhancement: Histogram Equalization, Fast Fourier Transformation, Binarization Segmentation: Ridge Flow Estimation Feature extraction: Ridge Thinning, Minutiae Marking, False Minutiae Removal	Pattern: ridges and furrows	We use an iterative ridge alignment algorithm to first align one set of minutiae w.r.t other set and then carryout an elastic match algorithm to count the number of matched minutia pairs
3	Fingerprint Recognition and Matching using MATLAB (2015)	Image Acquisition: inkless fingerprint sensor Segmentation: Edge Detection-using 'Roberts', 'Prewitt' or 'Sobel' operators	Pattern: minutiae-ridge ending and ridge bifurcation	Decision making is done on the basis of the percentage of image matched, i.e. if more than 90% matched; images are matched. If less than 90% matched; images are different
4	Fingerprint Feature Extraction (2011)	Enhancement: Smoothening - Gaussian low-pass filter (Smooth the orientation field) Thinning- standard thinning algorithm	Pattern: ridges and furrows	We have changes like orientation by changing the filter size and use of Morphological operations in region of interest. A New method for ridge smoothing has

		(preserves the connectivity of the ridge structures) Morphological operations-Dilation and erosion		been developed. Our primary focus is to do the enhancement
5	Fingerprint Recognition Improvement Using Histogram Equalization and Compression Methods (2016)	Enhancement: contrast enhancement (simple histogram equalization to enhance the image) Image compression-Lossless (archival purposes and medical imaging), lossy (natural images such as photographs) Feature extraction: Principal component analysis	pattern of ridges, furrows	PCA used for feature extraction and dimension reduction, City block distance is used for matching process, when applied these methods the recognition rate.

Conclusion:

The above implementation was an effort to study and understand how a Fingerprint verification system is used as a form of biometrics to recognize identities of human beings by various methods used in digital image processing. In this process we try to process bad quality fingerprint images and also enhance the images for better comparison of fingerprints and also faster processing.

Reference:

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SIGNATURE RECOGNITION

ISUKAPALLI DIVYA
182MCA39

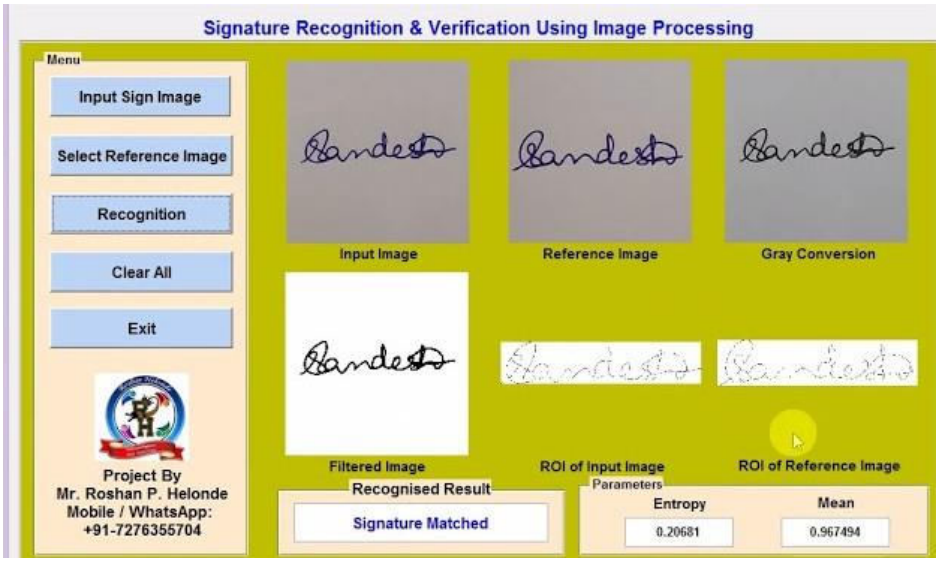
INTRODUCTION: Signature has been a distinguishing feature for person identification. When a large number of documents, e.g. bank cheques, have to be authenticated in a limited time, the manual verification of account holders signature is often unrealistic.
Signature provides secure means of authentication and authorization. So, there is a need of Automatic signature verification systems. The present dissertation work is done in the field of offline signature verification system by extracting some special features that make a signature difficult to forge. In this, existing signature verification systems have been thoroughly studied & a model is designed to develop an offline signature verification system.

PROBLEM STATEMENT

Signature recognition is the procedure of determining to whom a particular signature belongs to. In this work the global and grid features are combined and used to differentiate among the signature images. These combined features are given to back propagation neural network (BPNN) to train it, so that particular signature image is recognized.

CHARACTERSTICS OF IMAGE

To determine the identity and creator of an image from its pattern, we have to extract some general or specific characteristics out of image that is called attribution extraction. For example, in signature recognition by image processing, some attributes are extracted out of scanned image of signature to recognize the person who has signed it. The main purpose of attribute extraction is to make the raw data ready and usable for the next statistical processes. Different methods of extracting attribute may accomplish one of the following task or more according to the philosophy behind them: Eliminating data noise, Separating independent elements of data, decreasing the dimension for producing brief representing, increasing the dimension for producing separable presentation Overall, in this extracting step, the appropriate attribute for signature recognition is extracted and pattern classes are formed if necessary.



Sl number	Reference paper title and year of publication	Processing methods	Features extracted	Analysis
1	Preprocessing algorithm for Offline signature verification system. (2012)	Preprocessing	Image conversion, image cropping, image filtering, thresholding and edge detection.	The approach is to convert the scanned image into a gray scale and perform automatic cropping, filtering, thresholding and edge detection.
2	Off-line Signature Verification Based on Fusion of Grid and Global Features Using Neural Networks. (2010)	Neural network based recognition.	**Global**: Height, Width, Number of black pixels, Centroid of signature. **Grid:** The cropped image is divided into 9 rectangular segments.	The test signature is compared with data base signatures based on the set of features and match/non match of signatures is decided with the help of Neural Network. The performance analysis is conducted on random, unskilled and skilled signature forgeries along with the genuine signature.
3	DWT based Off-line Signature Verification using Angular Features. (2012)	DWT (discrete wavelet transform)	Vertical splitting and horizontal splitting. image is scanned from left to right and top to bottom to calculate the total number of black pixels.	The signature is resized and discrete wavelet transform (DWT) is applied on the blocks to extract features.
4	Offline signature using Pixel matching technique. (2013)	Pixel matching technique	Capturing signature, Noise and color removal, Adjust properties	Algorithm to Calculate rectangular signature area, Algorithm to Make image black and white, Algorithm to remove noise,

				Finding the exact position of signature in signature box, Angular problem solutions
5	Signature recognition using MATLAB. (2015)	Matlab	Math and computation Algorithm development Data acquisition Modeling, simulation, and prototyping Data analysis, exploration, and visualization	The collected hand signatures have gone through pre-processing steps such as producing a digitized version of the signatures using a scanner, converting input images type to a standard binary images type, cropping, normalizing images size, and reshaping in order to produce a ready-to-use hand signatures database for training and testing the signature identification system.

CONCLUSION

Although the existence of an automatic signature verification tool is necessary, it is not yet applied in most of the financial institutions. The reason is that most of the currently available tools work with a highest accuracy of ca. 80%, which makes them not reliable in the verification task. For many years, researchers are trying to develop more robust signature verification tools using the advances in image processing algorithms. The main objective of signature recognition is to recognize the signer for the purpose of recognition. It has been observed that the global and grid features extracted using discrete wavelet transform are found to be efficient for offline signature recognition. The combination of discrete wavelet transform and back propagation neural network will give expected results ranging from 93% -89% .

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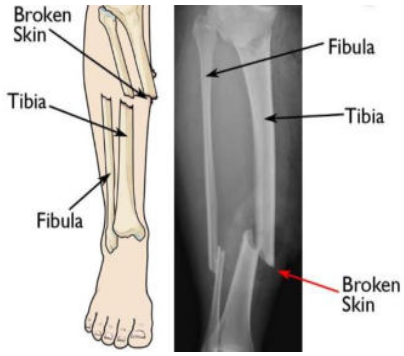
DETECTION OF LEG BONE FRACTURE

MEGHANA R
182MCA32

INTRODUCTION

Today, medical image processing is a field of science that is gaining wide acceptance in healthcare industry due to its technological advances and software breakthroughs. It plays a vital role in disease diagnosis and improved patient care and helps medical practitioners during decision making with regard to the type of treatment. Human body has 206 bones. The second largest bone is leg bone which is made up of two bones, the tibia and fibula. The tibia bone is larger and ticker than the fibula bone. Moreover, tibia fracture most commonly happens because it carries the significant portion of the body weight. Among the various diseases, bone fracture detection and treatment. Bone fracture can occur due to a simple accident or different types of diseases. Detection in x-ray image with preprocessing, segmentation, fracture detection and classification algorithm. It contains information about canny edge detector produces perfect information from the bone image for segmentation.

NATURE OF IMAGE:



- Textures of an image are complex visual patterns that are composed of entities or regions with sub-patterns with the characteristics of brightness, color,shape,size, etc.
- The tested X-ray images were taken at 53 kV and 4mAs and were digitized at 7bit/pixel from the X-ray mechanism.The
  size of the processed images is generally specified as 400x400 resolutions.
- It can identified straight lines, shapes, curves in image.

S.NO	TITLE	PRE-PROCESSING	FEATURE EXTRACTION	ANALYSIS
1	**Analysis on Detecting of Leg Bone Fracture from X-ray Images.**	Mean filter, Median filter, Gaussian filter. Image. segmentation: Edge approach, Boundary approach, Region approach.	Statistical technique. Image texture analysis. GLCM(Gray-level co-occurrence matrix) is used for exctraction of features.	Harris corner detection algorithm.
2	**Analysis on Leg Bone Fracture Detection and Classification Using X-ray Images.**	Image enhancement technique can be used as pre-process or post-process portion. Converted to gray-scale image.	Corner detection is a technique. Sharpen or smooth image features.	Harris corner detection algorithm. RGB image to gray scale image.
3	**An Enhanced Tibia Fracture Detection Tool Using Image Processing and Classification Fusion Techniques in X-Ray Images.**	X-ray images are frequently degraded by Poisson noise. Wiener filter is recommended by T sukahara et al. (1998). Segmentation.	Gray-level feature-based methods and texture feature-based methods. The texture features used are GLCM Mean, GLCM Variance, Energy, Entropy, Homogeneity, Intensity Gradient Direction (IGD).	Analyzed using two performance metrics, namely, detection rate and speed of detection.
4	**Automatic detection of fracture in femur bones using image processing.**	Median filter and average filter used for removal of noise from the given image. Image Enhancement: Logarithmic operator is used.RGB conversion is done to grayscale prior to image pre-processing stage.	Morphological operation and sobel edge detection technique is used.	Algorithm for automatic detection of fracture in femur bone.

5	**Detection of bone fracture using image processing methods.**	Noise removal: Present in the image are Gaussian noise,salt and pepper noise etc. Edge detection: Gradient and laplacian. Segmentation: RGB to grayscale conversion.	K-means clustering technique is used. Based on pixel intensity,color,texture and loction. Gray-Level Co-occurrence Matrix is used for feature extraction and selection.	GLCM is main tool used in image texture analysis.
6	**A Novel Approach for Bone Fracture Detection Using Image Processing.**	Edge Detection: algorithms for edge detections such as Canny, Laplacian and Sobel. edge detection algorithms. Segmentation: Region. approach, boundary approach, and edge approach. Otsu's thresholding method. RGB2gray to convert it in gray scale.	Features are used to detect fracture or non-fracture image. The image will during Canny Edge method.	In Discrete steps algorithm our main focus is on segmenting the bone area. There are different algorithms for edge detections such as Canny, Laplacian and Sobel.

CONCLUSION:

This paper presented the detection of leg bone fracture analysis in X-ray images using image processing tool.It starts from the pre-processing to remove the noise and edge detected by using sobel edge detector. After the segmentation the area of the fracture is calculated.Segmentation techniques are still open to a lot of improvements for making them effective in segmenting desired areas in X-Ray images. It gives an easy step by step approach in X-Ray image segmentation, which gives better bone segmentation results comparatively; with minimum steps it gives desired results in a matter of seconds when implemented in MATLAB.We aim to classify the types of fractures in all bone of the body.

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ROAD LANE DETECTION FOR AUTONOMOUS ROBOTS

Madhu Shree.S.M
182MCA27

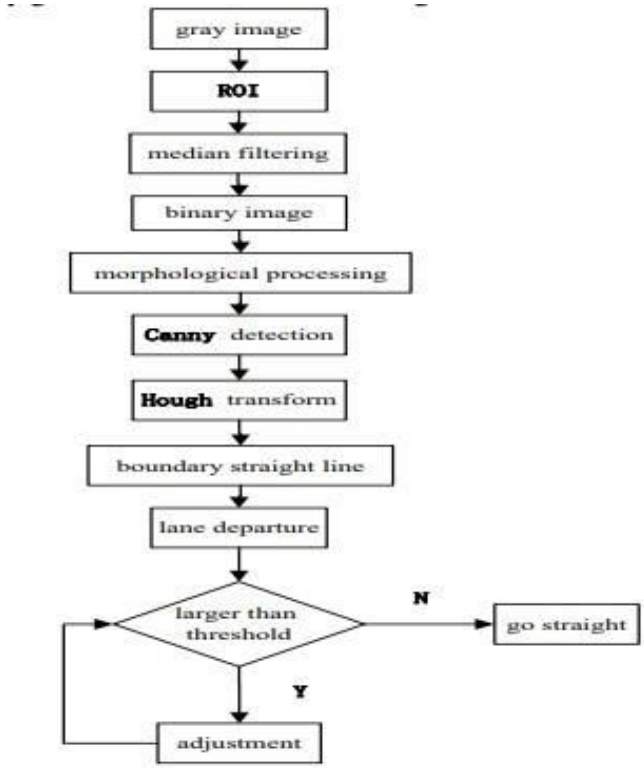
Abstract:
The autonomous robots navigate autonomously in specific areas or highways using maps,GPS,video sensors so on.. To navigate autonomously it should detect the road lanes. The principal approach is to detect road lanes using vision based system. It has components like cameras,LiDAR,GPS etc.. It uses several algorithms to track road lanes.
A Hough transform and Edge detection, basic techniques for image processing, are used for detecting lane marks. Vision- based systems provide natural and powerful information of the environment at a high frame rate with a wide field of view . Image data captured by vision sensors contain rich information, such as luminance, color, texture, etc

Working Steps:

- Firstly ,The road image and information are obtained by using an image acquisition device.
- Secondly, the noise in the region of interest which is selected in the road image, is removed

  with the digital image processing algorithm, the road edge is extracted by Canny operator, and the road boundaries are extracted by Hough transform.
- Finally, the distance between the robot and the left and the right boundaries is calculated,

  and the travelling distance is obtained. The robot's walking route is controlled according to the travel deviation and the preset threshold.



Sl No	Reference paper title and year of publication	Preprocessing methods	Features extracted	Analysis
1	L*a*b*color model based road lane detection in autonomous robots (2017)	**Enhancement** -Histogram equalization: used to enhance gradients between white lanes and roads. -Top-hat filters : eliminate uneven illumination. **Segmentation** -Binarization:binary image is created by applying thesholding values. -Color-based segmentation using L*a*b [L* = 0 – black ,100-white,a* and b* are positive and negative values] -Edge detection(sobel operator)applied in vertical direction of the image. **Morphological operation** Outlier removal	**Classical Hough transform** - detect lanes or identifying positions of arbitrary shapes,circles or ellipses.	The algorithm is based on L*a*b* color space for detecting roads,adjustingroad contrast, filtering with Sobel operators, outlier removal with morphological operation and then using line detection Hough transform technique to detect lanes.
2	Vision based road lane detection for autonomous robots.(2011)	**Enhancement** Image capturing : The color image captured by camera and saved in memory. Grayscale: color image is converted to grayscale. Noise reduction : F.H.D algorithm is applied to reduce noise and make edge detection more accurate. **Segmentation** Edge detection:Edge detector is used to produce edge image by using canny filter with automatic thresholding to obtain edges. Line detection : It produces right and left lane boundary segments.	**Hough transform**lanes are extracted with this technique through pair of hyperbolas which are fitted to edges of lanes.	Hyperbola fitting Model : search the left and right vector points that represent the road lanes, the lane scan boundary phase uses the edge image and the left and right Hough lines and the horizon line as inputs, to effectively allocate the lane points. That was demonstrated by two hyperbola lines.

	3	Road Lane Detection for autonomous vehicles(2019)	Noise Reduction - median filter is used. **Segmentation** -Region growing technique. -Texture segmentation by applying SS EE filters. -Edge detection: canny edge detection -Binarization : Ostu threshold method is used	*Contour tracing to extract the boundary pixels of given pattern. *Hough transform	*Asphalt detection algorithm-to detect black and grey path of road. *Fuzzy set Theory *OpenCV works on machine learning algorithms.
	4	Design of Road Lane detecting and following Autonomous robots(2012)	**Enhancement** -capturing image:image is captured by webcam -Image smoothing:Mean filter is used to smooth image data. -colour detection:Red color is used for lanes.Images from camera are taken and values os RGB color ranges are matched. **Segmentation** -Edge detection:It hightlights image contrast.It gives boundaries of features in image. Horizontal edge detector is used to detect vertical changes in the intensity.	Hough transform-it detect shapes in the images. It is used to extract lines,circles,ellipse.	*OpenCV librarymachine learning algorithm. Centre finding : Epsilon i=0 to width (pi/pn) Pi:coordinate of pixel in row. Pn:Total number of pixels in row.
	5	Proposed method for Road Detection and following Boundaries.(2018)	Gray scale conversion – convert colour image tograyscale. Kalman filter – used to track lanes. Threshold (ostu method)– to generate binary image. Noise Reduction – Median Filter Edge Detection-canny edge detection Enhance image : use function (bwareaopen) in MATLAB.	Hough transform-to find out straight lines. -delta:distance between left and right line. -Theta-determine the direction of road.	RANSAC algorithm-to avoid outliers. Eucliedean distance d(p,q)=squareroot((q1-p1)2 + (q2-p2)2).

Conclusion:

The "Proposed method for Road Detection and following Boundaries.(2018)" paper has implemented an efficient and robust algorithm for detecting and tracking lanes.They used threshold Ostu method and applied to the image,then enhacement of image to remove noise and pixels that do not belong to region of interest by using the function (bwareaopen) in MATLAB. Lane tracking algorithm is applied to calculate theta and and find its direction.

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DETERMINATION OF SOIL PH VALUE

DIVYA P

18MCA23

Definition:

Agricultural soil is considered as one of the most treasured natural resource whose soil pH should be property used to define the gradation of acidity or basicity which will affect the nutrient availability of the soil and also the growth of plants. With the pH Value 7.0, considered to be neutral, the values which are above and below are either alkaline or acidic in nature.

Characteristics: pH is a term that is used to describe the degree of acidity or basicity. Soil acidity or alkalinity directly affects plant growth. Most nutrients that plants need are readily available when the pH of the soil solution ranges from 6.0 to 7.5. Below a pH of 6.0 (acid): Some nutrients such as nitrogen, phosphorus, and potassium are less available. Above a pH of 7.5 (very alkaline), Iron, manganese, and phosphorus are less available

Yellow or red soil indicates the presence of iron oxides. Dark brown or black colour in soil indicates that the soil has high organic matter content. Wet soil will appear darker than dry soil. Red and brown colours caused by oxidation. The presence of specific minerals can also affect soil colour.Manganese oxide causes a black colour, glauconitic makes the soil green, and calcite can make soil in arid regions appear white. Thus due to concentration of organic matters, presence of water and oxidation are influenced factors of pH and colour association

SUMMARY OF THE RESEARCH OF FIVE EXISTING PAPER AVAILABLE.

SL.NO	TITLE	PREPROCESSING	FEATURE	ANALYSIS
1.	**Analysis of Agricultural soil pH using Digital Image Processing**	1)It includes color space conversion, image enhancement for contrast improvement, image resizing, filtering to remove noise etc. 2)Take the average of the contribution from each channel: (R+B+C)/3. Classifier system PCA algorithm.	1)Digital soil morph metrics (application of tools and techniques for measuring and quantifying soil profile) 2)Interpolative functions using the analytical data from soil horizons(to estimate soil property values) 3)methods for feature extraction such as color cooccurrence method, leaf color extraction	1)The training is done with known value of these data to train the neural network. 2)The eigenvectors are a small group of characteristics extracted by the designed classifier system using PCA. Eigen values are compared of both the images here matching is done of soil images and

			using H and B components, gray level co-occurrence matrix, Gabor filter, wavelet transform etc. principle component analysis (PCA).	the pH value is extracted.
2.	**Determination of soil pH by using digital image processing technique**	For the capturing images, digital camera was used. Transformation of the multispectral image was carried out through TNT Mips spatial software. This JPEG format of images was converted into img. file for the purpose of digital value extraction and finally determined their digital values. Soil pH index value is analysed by ph=[red or green/blue]	1)Image transformation option was used for RGB layer analysis using TNT Mips (a geospatial analysis system providing a fully featured GIS, RDBMS and automated image processing system with computer aided design,triangulated irregular network, surface modeling, map layout and innovative data publishing tools). 2)RGB+IHS yielded values provide very high accuracies for the calculation of the texture of the objects 3)Transformation of the multispectral image was carried out through TNT Mips spatial software in image correction option.	1)Image data have been converted into geographical information system (GIS) environment for digital/pixel analysis using TNT Mips software. 2)On the basis of RGB grey values, pixels properties and their digital correlations, results showed that there was a clear cut gap in grey values of colours 3)Correlation between digital value and soil pH values should be helpful in determination of soil pH of different type of soils, in deep brown colour. Ranges of soil pH and pH index values were 7.30-
				7.50 and 0.0070-0.0261

3.	**Determination of Soil pH by using Digital Image Processing Technique-A**	1)Digital values of red, green and blue (RGB) provide a clue for spectral signature capture of different pH in soil. 2)Determined the solute concentration of soil by developing model based on digital image. 3)The polynomial regression is used to build the model with a primary color (RGB) validation of the technique with independent data	1)Ranges of Soil pH and pH index values were 7.30-7.50 and 0.0070-0.0261, in deep brown color. Similarly, soil pH range varies from 6.80-7.04 and 5.586.58 in light yellowish and greenish color its pH index values were 0.0071- 0.0451 and 0.0084- 0.0239. 2)Estimated the water content of soil by using two colour spaces of digital image (RGB) and (HSV). the soil became darker when the water content increase and the soil wetted up, but this will be in a limited range. The regression analysis has been used to find the relation between the color of the soil and the water content of the soil.	1)Using fuzzy logic method with matlab software for determining soil PH.A fuzzy system is successfully design in order to control soil ph The input for this system is temperature ,light intensity ,humidity By constructing fuzzy system the condition for the roses to grow is collected and analyzed. 2)The colour values (RBG) of the soil will compare with the color values of the samples that already store in database and find the minimum error to determine the pH. value of the current sample 3)The two RGB values of the sample and database will compare to find the value of pH using neural network.

4.	**Testing of Agriculture Soil by Digital Image Processing**	1) Total Eighty soil samples were analyzed and camera (minimum requirement: 5megapixel) Used for capturing images (Generally JPEG format). The format of images was converted into image file for getting digital value and finally determined their digital values of pixels. Those pixel values can give us RGB value of each Image File	1)Capture the image of soil then by using the formula of Soil pH factor (index) we calculate the new factor of new image. The image capture in the system can be taken as matrix of pixels associated with combination of RGB values. The average of each sector can be used to calculate the Single soil pH factor value for each image. 2)Add +0.01 and subtract -0.01 to get the approximation in the results	1) using MATLAB 7.0 as software for Digital Image Processing. Firstly we took 80 Soil pH values and calculate their soil pH factor (index) and stored both in Row Vector (database). Soil pH factor (index) of each sample can be calculated as: *A. Soil pH factor (Index) [(AVG G/AVG B)/AVG R]*
5.	**Determination of Soil Nutrients and pH level using Image Processing and Artificial Neural Network**	1)The process of using soil test kit and rapid soil testing will be conducted first. 2)Image is captured using controlled light module box. Noise reduction contrast/brightness adjustment is done. 3)image segmentation includes cropping region ,thresholding and masking. 4)cropping region includes setting of region of interest 5)using colour threshold app in MATLAB	1)a database consists of images of different level of pH and nutrients (Nitrogen, Phosphorus, Potassium, Zinc, Calcium, Magnesium) of soil after it undergo soil testing from the laboratory of BSWM. 2)Variability in numbers of the images per level is due to the availability of soil colorimetric result that matched the STK color chart.	1)The changes in the color of the chemical after reacting with the soil will undergo image capturing using the light controlled module box. The captured image will be then processed using MATLAB software. Based on the result, it will generate the nutrients and pH level of the soil sample. 2)The Backpropagation Neural Network is used as training

			3)Each photo undergoes three image processing techniques	model. It was used to increase the accuracy of the program in providing the level of nutrients and pH of the soil.

Conclusion: The aim of the study is to assist in defining and analyzing the soil image as an input during training phase, and performs image pre-processing on it. In the Image Preprocessing we are extracting the main features as the RGB index-values and further computation is done. In testing phase, classification of images takes place using different analysis and index values are compared with the trained values. As the result, we obtain the final pH value.

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De La Salle University Manila, Philippines 978-1-5386-0912-5/17/$31.00 ©2017 IEEE

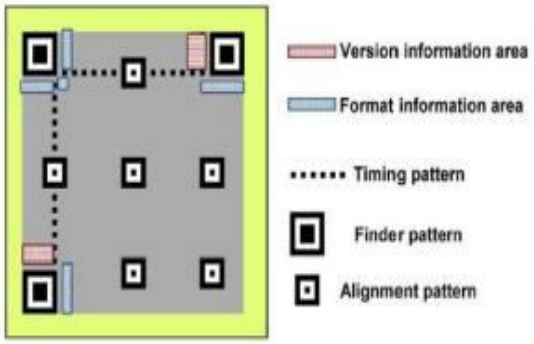
QR CODE DETECTION

Kushmetha K A
18MCA08

Introduction:

QR code is the trademark for a type of matrix barcode. A QR code consists of black squares arranged in a square grid on a white background, which can be read by an imaging device such as a camera, and processed using Reed–Solomon error correction until the image can be appropriately interpreted. The required data is then extracted from patterns that are present in both horizontal and vertical components of the image. QR codes can actually hold more information in a very small amount of space compared to a normal barcode which makes them more compact and easier to scan. This allows the user to put a lot of information in a small space. There are also micro QR codes that are available for use as well as the normal sized ones.

Architecture of QR Code:



QR Code reads images that are in PDF, TIFF, JPEG, BMP, GIF, PNG, WMF, WEBP forms.

Methods Used:

The algorithm for QR code recognition process based on image processing :

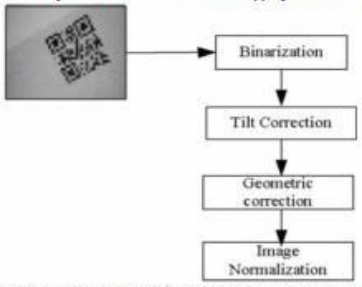


Fig.8 QR code recognition from image processing

Sl. no	Reference paper title and year	Pre-processing methods	Feature extracted	Analysis
1.	QR Code Recognition from Image(2015)	Image binarization: Gray scale conversion Image enhancement: local threshold algorithm(used to create binary images)	Peaks of histogram	In order to adapt various sizes, various gray-level values, and under various lighting conditions of real QR code image, a highspeed, high-accuracy Binarization method is developed, which can locate the finder pattern accurately and integrate the local thresholding method with global thresholding.
2.	Mobile Barcode for Event Schedule using Android(2014)	Image Recognition: Finder patterns, separators, timing patterns and Alignment Patterns are used to extract any patterns that match the actual image.	Pattern Extraction	RS codes are viewed as cyclic BCH codes, wherever encryption symbols area unit are derived from the coefficients of a polynomial .The Reed-Solomon encoder reads in k information symbols, computes the n - k parity symbols, and appends the parity symbols to the k information symbols for a complete of n symbols. The Reed-Solomon decoder tries to correct errors and/or erasures by calculative the syndromes for every code word.
3.	QR Code image correction based on corner detection and convex hull algorithm(2013)	Morphological features: Harris corner detection to point the corners and convex hull algorithm to extract the outlines of the image.	Corners and outlines	The algorithm which combines Harris corner detection with convex hull algorithm to get the outline of the outer quadrilateral of the QR code, then finds the four apexes of the QR code image borrowing the geometric algorithm, and finally corrects the QR code image by perspective collineation.
4.	An Effective Method for Removing Scratches and Restoring Low -	Enhancement: contrast enhancement (simple histogram equalization to enhance the image)	Text, icons and option buttons. Codes and patterns	To remove the scratches on the QR code the procedures consist of Image Segmentation. It is performed by HSV, Dilation. Using median filter the scratches can be removed. This is very

	Quality QR Code Images(2013)	Morphological operations: Dilation and closing (remove the text, spots, and other artifacts adjoining the code) Code alignment.		effective method for QR code decoding.
5.	A Simple and Efficient Image Pre-processing for QR Decoder(2012)	Binarization: dynamic iterations method is used to implement dimensional histogram statistic. localization of QR code: Image enhancement: Image sampling(digitizing the co-ordinate values)	patterns	It uses alignment pattern to adaptively sample the QRcode in terms of regions, which greatly improves the recognition rate.

Conclusion:

The QR code is detected using enhancement methods, morphological operations like dilation and closing which also have few algorithms to recognise these QR codes. Many algorithms have been proposed for recognizing QR Code Recognize in an image. Each method gives robust results for specified set of images. They provide a secure and reliable authentication for various platforms that uses these QR code.

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DETECTION OF ELECTRICAL COMPONENTS

Gowri A(182MCA25)

II MCA

Introduction

Detection of electrical components like transistor, capacitor, diode, PCB (Printed Circuit Board) and resistor is carried out by three major steps. The first step is based on recognizing the physical appearances via length, breadth, area, perimeter, boundary and number of legs in the electrical component. The second step involves finding the roundness of the objects in the component. And final step includes matching by correlation.

Input Image

A digital image is a 2D continuous image (x,y) which is converted from analog form to digital form. This image is divided into m rows and n columns whose values are m={0,1,2…….,m-1} and n={0,1,2,……,n-1}. Patterns are certain set of descriptors used in boundary analysis. Each object is recognized by a pattern descriptor and is grouped under different pattern classes depending on its features. An input image is been captured from a live video of a electrical component. This input image is taken in RGB format and is converted into binary image. Some information cannot be obtained from the image if it is in RGB format, especially the edges are not always sharp. Hence converting it into binary image makes recognition and matching efficient. The input image is matched with the image present in the database and checked for similarities.

***Converting RGB to Binary image* :** This process involves two steps. Firstly the RGB image is converted into gray scale image which is a matrix that holds the luminance value of the image. Luminance is obtained by the formula : Y = 0.3 * R + 0.59 * G + 0.11 * B. Secondly the gray scale image is converted into binary image by using thresholding technique. A threshold value is calculated from the luminance values of the image or from the histogram of intensity values of the image. If the luminance value is lesser than threshold value then it is grouped under logical zero else it is grouped under logical one. Here thresholding is used for image segmentation. This processing technique is used in all the papers below.

SL.No	*Paper and Year of Publication*	*Preprocessing methods*	*Feature Extracted*	*Analysis*
1	**The Detection of Electrical and Electronics Components using K nearest Neighbor (KNN) classification Algorithm (2016)**	**1. Image segmentation. 2. Converting RGB to binary image.**	**1. Length, breadth. 2. Area, Perimeter. 3. Number of legs in electrical component like transistor, diode, capacitor. 4. Metric=4*pi*area/ perimeter^2.**	**1. K-nearest neighbor(KNN) Algorithm is used to find the pixels which are closely related.**

2	Image Processing based PCB Component Detection (2018)	1. Image segmentation. 2. Converting RGB to binary image. 3. Histogram analysis.(HOG) 4. Chain code technique.	1. Area of the PCB (Printed Circuit Board) and AVI (Audio Video Interleave) by summing the pixel values.	2. Visual inspection approach using background subtraction algorithm
3	PCB Faults Detection Using Image Processing (2017)	1. Image segmentation. 2. Converting RGB to binary image. 3. Edge detection.	1. Length 2. Edge 3. Roundness of the PCB (Printed Circuit Board)	1. Fault detection algorithm for detecting the points in the cluster 2. Fault location 3. Fault Classification for grouping pixels points
4	YouOnlyLookOnce: Unified,Real-TimeObjectDetection, (2012)	1. Converting RGB to binary image. 2. Bounding box . 3. Bit plane slicing. 4. Convolution technique. 5. HOG	1. Width 2. Height 3. Size of object by summing pixel values 4. Boundary of circular electrical connectors using HOG	1. YOLO for locating the component using bounding box 2. Unified detection algorithm checks for uniqueness.
5	Measurement and Inspection of Roundness Using Computer Vision (2008)	1. Image Segmentation. 2. Edge detection. 3. Chain code 4. Converting RGB to binary image.	1. Length 2. Width	1. Roundness profile algorithm by finding max(Rmax) and min(Rmin) distance from the edge to center and subtracting (Rmax-Rmin)

Conclusion: Yolo and unified algorithm provides detail information about the image than other methods. K nearest neighbor algorithm is the easiest algorithm used to detect an object. Grouping the nearest pixels and matching them with the image in database makes detection of and electrical component much easier.

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MEDICAL PALMISTRY

CELESTINE JEENA J

18MCA06

Palmistry is a science which observes human palm by different aspects and derives conclusions about nature of the person. Since ancient time, in many civilizations like Indian, Chinese, Persian, Egyptian, Roman and Greek, people were used to get guidance about their present and future by means of palmistry . It describes attributes of human, like, health, psychology, intelligence, and lifestyle and other related entities. Medical palmistry is one branch of palmistry, which works on identification of probable diseases by observing some symbols in human palms. According to principles of medical palmistry, there are some symbols like Iceland, cross, star, square, grill, spot, and circle. If one or more of them is/are found on specific region of palm, or on specific line of palm, it indicates probability of disease of respective organ of body. Apart of symbols, color and surface of palm and nails, shape of palm and fingers also plays important role in decision making.

NATURE OF THE IMAGE

The nature of the image is digitized with high definition camera.

Input image

PROBLEM STATEMENT

An application of digital image processing is discussed which can be useful in healthcare domain to predict some major diseases. The application is an image processing system, which works on the basis of medical palmistry. The images of human palm form input to the system. Then, system applies digital image processing and analysis techniques on input images to identify certain features in the image. By using knowledge base of medical palmistry it analyzes certain features in image and predicts probable disease. This paper is focused on development and implementation of an algorithm to segment the human palm into several meaningful regions. Segmentation of the palm is needed for automatic symbol detection, pattern matching, and object identification by the computer .Highlighting feature of the algorithm is that, it does not include human intervention throughout the process. The fields like criminology, fingerprint recognition, security, medical science, and palmistry need careful study of different sections of palm. Now days, all these fields are computerized, but still there are some steps where human intervention is needed. The developed algorithm removes the role of human in all above mentioned processes.

S.NO	TITLE	PRE-PROCESSING METHODS	FEATURES	ANALYSIS
1	Application of Digital Image Processing and Analysis in Healthcare Based on Medical Palmistry, 2011	1.Image Formation 2.Digitization 3.Image enhancement 4.Segmentation 5.Edge, line detection and color processing	1. Pixel color value. 2. RGB color model.	1.A prototype model is designed which predicts diseases that may occur to the human being in future. 2. An algorithm to distinguish lines and special symbols from rest of the palm is discussed.
2	Automated Medical Palmistry System based on Image Processing Techniques, 2015	1.Enhancement a. Intensification b. Noise leaning 2. Gray image segmentation and distridution. 4. Gaussian distribution 5. Distance Image algorithm. 6. Hessian based Frangi filter 7. SURF algorithm to replace Hessian matrix.	1.Function corrMatching 2.Template Matching using Correlation Coefficients Input	1. No palm-reader required. 2.Comparison of palm with sample image is eliminated 3.AMPS can outspread to embrace numerology and graphology methods for prediction.
3	An Automated Medical Support System based on Medical Palmistry and Nail Color Analysis , 2016	1. Image extraction through flatbed scanner. 2. Nail region extraction. 3. Edge extraction. 4. Colour analysis algorithm. 5. Neural network.	1. Sobel Operator for edge detection 2. Gradient magnitude of the image $G = \sqrt{G_x^2 + G_y^2}$ 3. Neural learning methodology.	1.Accuracy of proposed system is obtained through neural network algorithm. 2.Training the dataset is most crucial part of the system to gives accurate prediction of diseases. 3.A system is useful to the doctor for assistency . 4.It saves cost and time of the user.

4	Digital Image Processing in Medical Palmistry, 2016	1.Image Formation 2.Digitization 3.Image enhancement 4.Segmentation 5.Edge, line detection and color processing	1. Pixel color value. 2. RGB color model.	1. Operations on image up to pattern recognition is done in the first module. 2. The knowledge about medical palmistry is fed into the system in second module. 3. At last these two modules combine their work products, and system generates final output, that is prediction.
5	Application of Digital Image Processing in Healthcare Analysis based on Hand Image, 2018	1. Image as the input with high definition camera. 2.Segmentation 1. ADPS segments the palm region from palmar side and nails from dorsal side of hand image. 2. Entropy based segmentation for nails and the segmented nail image is applied in block truncation coding. 3.Averaging color algorithm 4.Texture analysis algorithm i.e. GLCM algorithm	1. The color is extracted by calculating Mean, Standard Deviation and Skewness. 2. The texture and shape are extracted by calculating Gray Level Directional Matrix. 3. Principle Component Analysis (PCA) is used for vector generation of palm image.	1. It is developed using MATLAB. 2. It is done with the use of MPHH technique. 3. The accuracy of the ADPS system is obtained through neural networks.

CONCLUSION

AMPS allows users to diagnose the diseases in human body by taking image of users palm as input. Then, system applies digital image processing and analysis techniques and uses knowledge base of medical palmistry on input images to identify certain features in the image. In this paper, prediction is made on several symbols (see Table 1) for 100 palm images. The experimental results demonstrate that AMPS is reliable if the images represent a distinct view of the palm and are of 300dpi resolution or more. Scope of AMPS can be further extended by trying out AMPS for images of different type of people, increasing the number of symbols to be detected and show the future of an individual along

with medical prediction. Also AMPS can outspread to embrace numerology and graphology methods for prediction.

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IMAGE STEGANOGRAPHY

ZAINAB FATHIMA K Z
182MCA28

ABSTRACT

Steganography, which means "covered writing" is the science of communicating in a hidden manner. Image steganography hides & recovers a message of substantial length within digital imagery while maintaining the original image size and dynamic range. The hidden message can be recovered using appropriate keys without any knowledge of the original image. Blind schemes allow direct extraction of the embedded data from the modified signal without knowledge of the original cover and are considered to be predominant among steganography techniques. Almost all digital file format can be used for steganography but the formats that are more suitable are those with a high degree of redundancy. The redundant bits of an object are those bits that can be altered without the alteration being detected easily. Image steganography can be divided into 2 groups, image domain and transform domain.

- Image domain: Embed messages in the intensity of the pixels directly.
- Transform domain: Images are first transformed and then the message is embedded in the image.

NATURE OF THE IMAGE: Any kind of 2 or 3 dimensional images can be used for practising image steganography.

SL. NO	NAME OF THE PAPER	TECHNIQUE APPLIED	PROCESSING METHODS	FEATURES	ANALYSIS
1	A New Steganography Approach for Image Encryption Exchange by Using the Least Significant Bit Insertion	Least Significant Bit	LSB insertion, Encryption, Decryption, Data Mixing and data extraction	Bit Array, horizontal number of blocks (HNB), vertical number of blocks (VNB), Secret key, Image entropy, Image correlation	ALGORITHM MIXING_DATA is used to hide the data in ciphered image & ALGORITHM SPLITTING_DATA will extract the hidden data from the ciphered image.
2	Enhanced Least Significant Bit algorithm For Image Steganography	Least Significant Bit	Pixel selection filter, Bit Replacement method.	BLUE component,	Enhanced LSB algorithm works in the spatial domain. It improves performance of LSB by hiding information in only one of the three colors that is blue color of the carrier image.
3	A New Method in Image Steganography with Improved Image Quality	Least Significant Bit Hiding Technique (LSB)	Least Significant Bit Hiding Algorithm.	Binary table, RGB parts of the selected pixel	Divide the image into three parts (Red, Green and Blue parts) hide two by two bits of the secret message in each part of the pixel by searching about the identical. If the identical is satisfied then set the image with the

					new values. Otherwise hide in the two least significant bits and set the image with the new values save the location of the hiding bits in binary table.
4	A Secure Image Steganography using LSB, DCT and Compression Techniques on Raw Images	Least Significant Bit	LSB, DCT, Quantization, Run length Coding	Cover image, hidden image, no of bytes	DCT: transforms the stego-object from spatial domain to frequency domain and then compress the frequency domain stego-object using quantization and runlength coding to generate a secure stegoobject.
5	High Capacity Image Steganography using Wavelet-Based Fusion	Wavelet-Based Fusion	Digital Wavelet Transform (DWT), Data Embedding, Data Extraction.	normalized image, Human Visual System(HVS) perception	It involves merging of the wavelet decomposition of the normalized versions of both the cover image and the secret image into a single fused result. The extraction process involves subtracting the original cover image from the stego image in the wavelet domain to get the coefficients of the secret message. Then the embedded message is retrieved by applying IDWT.
6	Chaos Based Spread Spectrum Image Steganography	Spread Spectrum	Chaotic Shift-Keying (CSK) modulation and demodulation, Error control code(ECC) encoder and decoder, Chaotic Encryption, interleaving, Quantizer, Restoration filter.	Key 1(chaotic sequence), key2(CSK), key3(interleaving),	Keys used for encryption can either be the parameters of the chaotic maps or initial conditions of the variables which are used for encoding and decoding in both the ends.

7	Vibrant color image steganography using channel differences and secret data distribution	Partition scheme approach	Partition Schemes, adaptive partition scheme (estimate capacity to hold secret data), RGB variable bit scheme.	Secret key at both ends, c=$\sum_{i=1}^{8} if_i S$ where S is the number of pixels in the cover image	Use one of the three channels in RGB and store the data in the LSB bits in one among the 2 channels. The indicator sequence can be made random, based on a shared key between sender and receiver

CONCLUSION

A steganography method is proposed to embed information within an image data randomly. With the reference to the above discussed schemes the following conclusions can be stated:-

- It improves the performance of the LSB method because information is hidden in only one of the three colors that is BLUE color of the carrier image. This minimizes the distortion level which is negligent to human eye
- It search about the identical then start hiding, hence the change in the image resolution is quite low, as well as it makes the secret message more secure.
- The integrated approach of combining LSB, DCT and compression techniques enable secure transfer of payload with low BER and MSE compared to earlier techniques
- The incorporation of chaotic encryption and modulation in the steganography scheme lends itself to cheap implementation and can therefore be used effectively for ensuring security and privacy in commercial consumer electronics products. Further, in the present scheme, robustness is achieved by interleaving the message using a chaotic sequence.
- Algorithm spreads out the secret message as much as possible by selecting an appropriate partition scheme

Hence for any scheme discussed above the image entropy and correlation values gives the better idea about the analysis of the concerned algorithm.

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POMEGRANATE DISEASE DETECTION

NIKHILA W

18MCA24

INTRODUCTION:

India is developing country. In this development contribution of agricultural field is major. The classical approach for detection and identification of fruit diseases is based on the naked eye observation by the experts. Automatic detection of fruit diseases is essential to automatically detect the symptoms of diseases as early as they appear on the growing fruits. This system helps to detect the diseases of fruits easily.

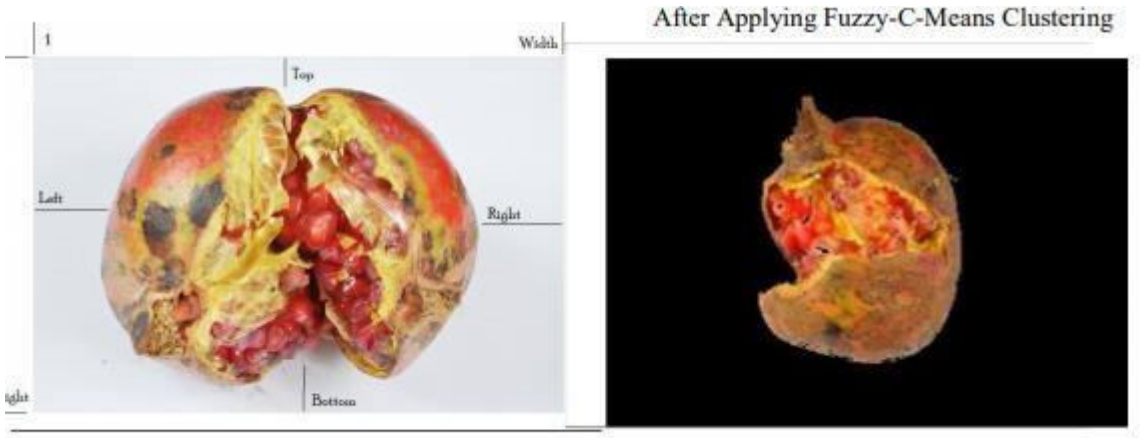
Pomegranate is the one of the fruit that is taken in the low rain area region of the Maharashtra state of India. Now days this fruit is under the attack of one major disease called Bacterial Blight due to which farmer's faces economical loss. Symptoms of bacterial blight on young and developing pomegranate fruits are initially, spots are black and round and surrounded by bacterial ooze. . The disease may cause up to 90% yield reduction. This disease need to be controlled in the primary stage of the infection otherwise it will difficult to control it in the final state.

NATURE OF IMAGE:

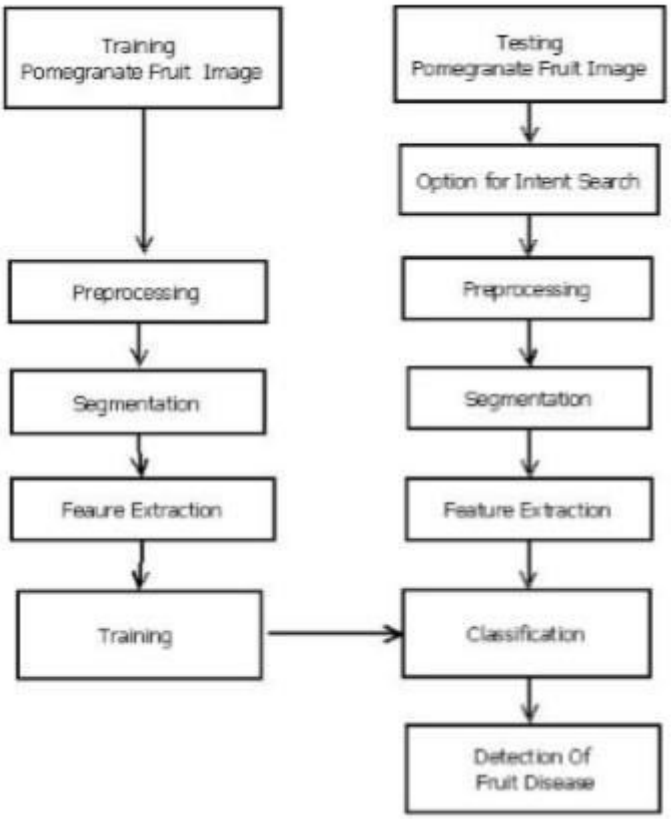
Small, regular to irregular black spots on fruits which turn later on as dark brown depressed spots.

Prevent the spores from germinating or penetrating leaf tissue

(b) Bacterial Blight



The framework of proposed approach are shown below. For detection of fruit disease, two image databases are required, one for training purpose and other for testing.



Sl.no	Title	Year	Pre-processing steps	Feature extraction	Analysis
1	A Review of Image Processing for Pomegranate Disease Detection	2015	Segmentation: involves removing low frequency background noise, normalizing the intensity of individual particles images, removing reflection and masking portion of images	Colour: feature is one of the visual feature Morphology: Morphology is tool used for extracting image components Texture: Texture describe visual patterns ,each having properties of homogeneity	K-means clustering algorithm: Clusters will classify in two classes i.e. one class will consist diseased fruit images and another class will consist nondiseased images.
2	Grading & Identification of Disease in Pomegranate Leaf and Fruit	2014	Image segmentation: Image segmentation refers to partitioning the digital image into objects so as to change the representation of the image into something that is more meaningful and easier to analyse.	Feature extraction is a special form of dimensionality reduction	K-means segmentation algorithm requires users to select the value 'k'. The correct choice of k is often ambiguous. Increasing k will always reduce the amount of error in the resulting clustering
3	Pomegranate Disease Detection Using Image Processing TechniqueS	2016	Image segmentation refers to the procedure of separation the digital image into its constituent regions	Different features like colour features, size, and shape etc.	Minimum distance classifier (MDC): clusters will classify into two classes that is diseased and non-diseased.

4	Detection of Diseases and Grading in Pomegranate Fruit Using Digital Image Processing	2017	Image segmentation is used to partition the diseased part and healthy part of the pomegranate fruit.	Mean, Variance, Entropy, RMS value, Standard deviation, Smoothness, Kurtosis, Skewness, IDM, Contrast, Correlation, Energy, and Homogeneity.	K-means clustering and SVM techniques(A support vector machine constructs a set of hyper planes in a high- or infinite-dimensional space, which can be used for classification)
5	Disease Identification of Pomegranate Fruit using Image Processing	2018	Image segmentation makes collections of homogeneous pixels in a regions depending on common similarities.	HSI (hue, saturation and intensity) color model. For extracting image components, morphology tool is used For texture feature extraction Gabor filter is used	Fuzzy C Mean clustering: The process of organizing objects into groups whose members are similar in some way.

CONCLUSION:

Bacterial blight disease is identified on pomegranate fruit and leaf. Once the disease is detected proper treatment can be suggested. The proposed system consist pre-processing, segmentation, feature extraction, training and classification. This system will provide immediate solution to farmers which is time saving and reduce loss of fruits due to disease.

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BRAIN TUMOUR DETECTION USING MRI (MEDICAL IMAGING)

SWATHI A S

18MCA21

INTRODUCTION:

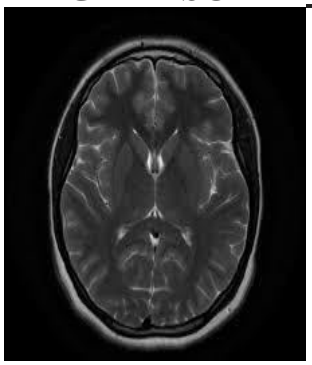
A Brain Tumour is a collection, or mass of abnormal cells in our brain. The growth of tumour cells in the restricted space can cause huge problem and it is rigid. When cancerous or noncancerous tumours grow, they can cause the pressure inside or skull to increase. This can cause brain damage, and it can be life threatening.

Tumour detection and removal is one medical issue that still remains challenging in field of biomedicine. Early imaging techniques had the drawback of being invasive and MRI imaging technique help the surgeons in providing a better vision. In tumour image processing involves mainly three stages namely pre-processing, segmentation and morphological operation. After the acquisition of the source image, it is pre-processed by converting the original image to grey scale in addition high pass filter for noise removal and median filter for quality enhancement is provided which is followed by enhancement stage resulting with histogram equivalent image. Finally segmentation and feature extraction is obtained. The present work demonstrates that this method can successfully detect the brain tumour and thereby help the doctors for analysing tumour size and region.

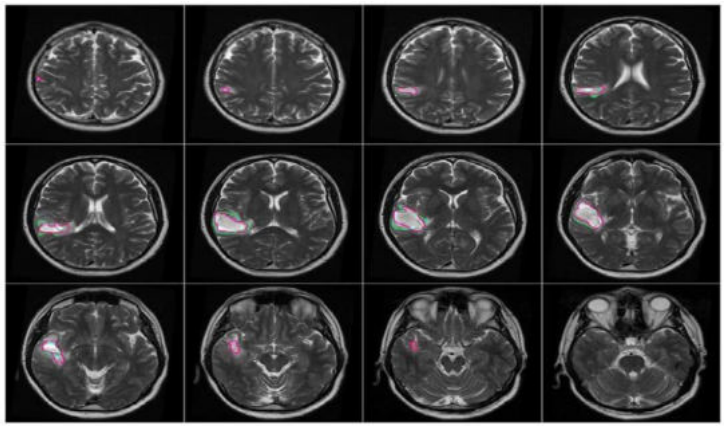
NATURE OF IMAGE:

A Magnetic resonance imaging(MRI) images are used in brain tumour detection. MRI uses standard DICOM format. **DICOM** (Digital Imaging and Communications in Medicine) is a standard for handling, storing, printing, and transmitting information in medical imaging. It includes a file format definition and a network communications protocol. The DICOM format was developed by NEMA (national electrical manufacturers association). It was designed for exchanging and viewing of medical images, such as CT scans, MRIs, and ultrasound images. DICOM images use the. DCM extension.

IMAGE DESCRIPTION:



Normal human brain



Segmentation of tumour cells in human brain

MRI uses a strong magnetic field and radio waves to create detailed images of the organs and tissues within the body. MRI with injection of contrast or contrast dye is a more definitive and detailed imaging test which can detect or rule out a brain tumour in most cases. A brain tumour can be benign or malignant. The extraction of the brain tumour requires the separation of the

brain MR images to two regions. One region contains the tumour cells of the brain and the second contains the normal brain cells. Further segmentation, region growing, feature extraction techniques are used and tumour cells are determined.

Slno	Title	Year	Pre-processing steps	Feature extraction	Analysis
1	Brain tumour detection using image processing.	2016	**Enhancement**: noise reduction by using anisotropic filter and median filters to remove salt and pepper noise. **Segmentation:** boundary approach, edge approach and region approach based on threshold values, grey image is converted to binary images.	Based on Size, shape, composition, location of an image.	K-means, fuzzy clustering, and genetic algorithms are used to extract and detect tumour cells.
2	Brain tumour detection system for MRI images.	2019	**Enhancement:** conversion of RGB to grayscale images, average filters are used **Segmentation:** thresholding (global thresholding method is used), region properties (convex hull).	Based on size, location of an image. Neighbourhood of pixels is taken into consideration.	Based on Calculation of area, the centre pixels are updated with max and min values to estimate the tumour cells which lie on respected hemispheres.
3	Development of MRI Brain Image Segmentation-technique with Pixel Connectivity.	2016	**Enhancement:** the Gaussian Mixture Model (GMM)-based intensity equalization, neighbouring pixel variation is checked by adjacency and connectivity of pixels. **Segmentation:** edge based, region based and thresholding	Based on size, shape, location, texture and heterogeneity by Grey level Co-occurrence Matrix.	Adaptive median filtering algorithm, Fractional Fourier Transform to extract texture of tumour cells in brain tissue.

4	Automated Brain Tumour Segmentation Using Hsom.	2013	**Enhancement:** histogram equalization in spatial domain and median filter is used to remove noise. **Segmentation:** edge detection, region or surface growing, threshold level.	Based on area of interest volume of image.	Hsom algorithms and is used to detect how many cells are affected. Vector quantisation process is used.
5	Tumour detection in medical imaging: A Survey.	2014	**Enhancement:** Gaussian, linear and average filters are used to remove noise. **Segmentation:** edge detection, canny edge detection is used.	Based on shape and thickness of tumour tissues.	Canny edge detection algorithms are used to detect the area of tumour cells.

CONCLUSION:

In this work, several methodologies are examined to denote the conventional stages of MRI image processing, also analysed individual segmentation approach. The performance of the MR image in terms of execution time and the number of affected cells are detected. It can be generally concluded that the program will be interested in detecting damaged tissue with a certain intensity of brightness to its grayscale image. The thresholding will detect the damaged tissues. Through the image segmentation process, this research intends to use grayscale converted images of MRIs and they use different algorithms and detection methods which use machine learning concepts and implemented. Thereby it's easy to detect the damaged tissues and tumour cells in brain by using MRIs.

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ULTRASOUND IMAGES OF PREGNANCY

Sudeshna Bose
18MCA19

Introduction: An ultrasound scan uses high-frequency sound waves to create images of the inside of the body. It is suitable for use during pregnancy.

Ultrasound is safe because they use sound waves or echoes to make an image instead of radiation. It is a sound that travels through soft tissue and fluids, but it bounces back or echoes off denser surface. This is how it creates an image.

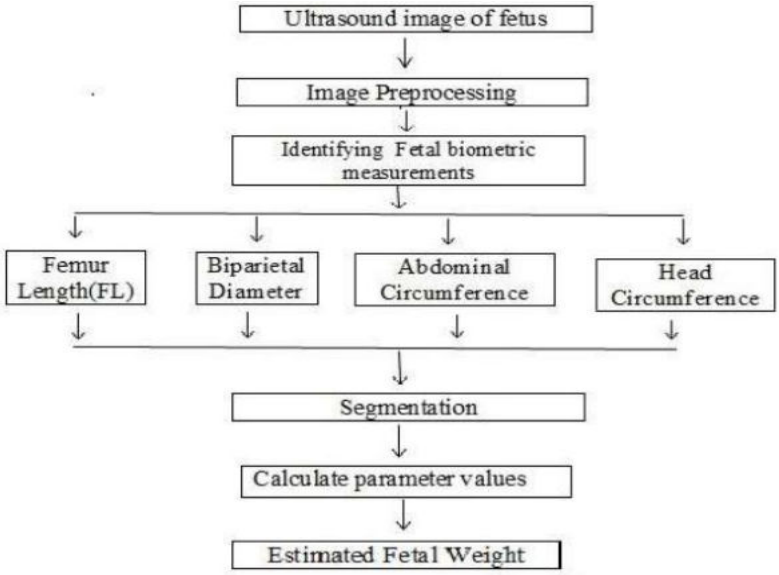
The term "ultrasound" refers to sound with frequency that humans cannot hear. For diagnostic uses, the ultrasound is usually between 2 and 18 MHz.

Along with a standard ultrasound there are a number of more advanced ultrasounds including a 3-D, 4-D and a fetal echocardiography which is an ultrasound that looks in details at the fetus' heart.

3-D IMAGE

Normal Image

- Pregnancy ultrasounds uses image formats such as png, jpg and Dicom.



USED FOR CALCULATING FETAL WEIGHT

Serial No.	Reference paper title and year	Pre-processing methods	Feature Extracted	Analysis
1.	Analysis of Fetal Development Using Ultrasound Images **(2016)**	1. Denoising: To reduced speckle noise. 2. Enhancement: Histogram Equalization (To improve image quality)	• Shape of the object, • Examined by small shape,	Development analysis done by morphological image processing method and

		3. Development stage: Morphological image processing unit is considered for the development analysis of the fetus. It include erosion and dilation. 4. Movement Detection: Fuzzy Logic which includes correlation.	• structuring elements compared with neighbourhood pixels	movement of the fetus is observed by the Fuzzy logic method.
2.	An approach To Monitor Fetus Growth and Its Weight Estimation Using Ultrasound **(2017)**	1.Remove Noise: • Mean filter, • Median filter, • Weiner filter (To remove amplifier noise, Impulse noise, Poisson noise, speckle noise) 2. Segmentation: • Thresholding • Edge detection technique • Region based segmentation methods, • Artificial neural network (helps to separating digital image into distinct region)	• Grey level, • color intensity, • group pixels based on common property	To check growth of the fetus a model is presented by applying the fetal biometric measurements on different formulas
3.	Perinatal Fetal weight Detection Using Image Processing **(2018)**	1.Enhancement: • Mean filter, • Median filter, (used to remove the unwanted artifacts for improving the quality of the image in order to get a clear view of the internal organs) 2.Segmentation: • Canny edge detection • Sobel edge detection (partitioning the image obtained in the scanning process)	• Bi-parietal Diameter, • Head circumference, • Femur length	Fetal weight estimation is done by applying the Hadlock IV formula accurately. This helps to find abnormalities in the fetus during 1st and 2nd trimester.

4.	Fetal Gender Segmentation from Two Dimensional Ultrasound Images Using DIP Technique **(2019)**	1. Enhancement: Image cropping and filtering(used for gender detection) 2. Segmentation: Thresholding, Morphological operation (used to extract the edge ,filter and skeletonize an image)	• Pixel intensity value, • color, • texture	The gential area of fetus is pre-processed and then the locations are segmented using Otsu's thresholdig method.
5.	Region of interest detection for pregnancy Image processing **(2017)**	1. Segmentation: Remove speckle image(to improve analysis) Edge detection: to observe features of an image.	• Texture • Edges • Rectangle • Circle • Ellipse(for ROI detection)	ROI detection done with segmentation (mostly used ellipse detection) which helps to give more higher value for MSE and PSNR values.

Conclusion: Enhancement, segmentation are used for removing noise, checking abnormalities in fetal estimating weight. It also helps to remove speckle noise. Perinatal Fetal weight Detection Using Image Processing uses automatic segmentation method which is more reliable and it will provide accurate output.

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