International Journal of Engineering &Technology, 7 (3.12) (2018) 601-605

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research paper

An Effective Texture Features Based Mammogram Mass Detection System

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Abstract

The identification of Mammogram is a very complicated application in Bio-medical field, it has complicated tissues. Nowadays breast cancer test, Bio-medical field often miss approximately 10% - 30% of tumors because of the ambiguous margins of lesions and visual weakness ensuing from long-time identification. For these reasons, numerous computer-aided recognition systems have been residential to aid Bio-medical in detecting mammographic lesions which may point out the existence of breast cancerthis revision presents a repeated Computer detection system that uses limited and isolated quality features for mammographic mass recognition. And system segments some adaptive square regions of interest (ROIs) for apprehensive areas. This revise also proposes two tricky feature withdrawal methods based on co-occurrence environment and visual compactness alteration to illustrate restricted quality uniqueness and the isolated photometric allocation of each ROI. As a final point, this revision uses stepwise linear discriminate examination to grade typical regions by selecting and evaluating the entity presentation of each feature. Consequences demonstrate that the projected system achieves acceptable recognition concert.

1. Introduction

Breast cancer refers to tumor of malignant is developed by the cells. Breast growth is the most usually analyzed disease separated from the skin malignancy. Breast malignancy is additionally the reason of the second driving for growth passing's among ladies after lung disease. "Basically Breast Cancer implies malignancy influenced in the people particularly in ladies". Bosom malignancy is at present the high recognized growth influencing ladies in the total the world. The Mammographic (calcium stores) is a standout amongst the most dependable and powerful strategies for recognizing bosom growth. Micro calcifications (little calcium stores in bosom delicate tissue) are little stores of calcium salts inside bosom tissue that show up as little splendid spots in mammograms. The nearness of micro calcification bunches is an essential indication of bosom malignancy. The radio legitimate meaning of a micro calcification bunch is a region of 1 cm2 that contains, when all is said in done no less than three micro calcifications. The spatial determination of mammography is high (ordinarily in the scope of 40– 100 µm per pixel), the principal section of two mammographic pictures patches taken from the mammographic pictures examination society (MIAS). The radiologists(it deciphers therapeutic pictures on present day pictures filing and interchanges system(PACS)interpreting micro calcifications in mammograms, PC helped finding (CAD) frameworks have been connected to decrease the false positive rate (FPR) while looking afteraffectability.

Like in other term therapeutic determination frameworks, X-beams are utilized as demonstrative apparatus in mammography for the examination of the human bosom. These examinations are recorded as specific pictures which are then seen by radiologists for any conceivable variation from the norm. In the accompanying lines, couple of strategies are talked about that utilization mammography for early identification of bosom growth. Mammography can't identify each sort of bosom growth yet at the same time, it is the world generally utilized for bosom disease discovery because of its low unpredictability. The mammograms calculation will just distinguish irregular masses of the examination.

2. Mammography

Like in other term restorative discovering structures, X-shafts are used as expressive gadget in mammography for the examination of the human bosom. These examinations are recorded as specific pictures which are then observed by radiologists for any possible variety from the standard. In the going with lines, couple of methodologies are discussed that usage mammography for early acknowledgment of chest tumor. Mammography can't recognize each kind of chest tumor yet in the meantime, it is the world comprehensively used for chest ailment distinguishing proof due to its low versatile quality. The mammograms count will simply perceive odd masses of theexamination.The mammography procedure recognizes around 75%-85% of chest tumor issue.There are two procedures in mammograms they are "Preprocessing and Post taking.

Fig. 1.1: Mammogram Image

2.1 Preprocessing

Mammogram pictures are hard to decipher. These mammograms likewise incorporate the expulsion of the undesirable zones and to make the more unmistakable territory of enthusiasm by expanding the differentiation, this is finished by the setting a limit esteem. The principle point of the Preprocessing is to enhance the picture information.

Mammographic pictures with and masses smaller scale calcifications are typically little and have low complexity consequently making the anomalies difficult to be identified. Pre Processing piece includes improving the picture, expulsion of commotions, veins and glandular tissues which turn into a reason for some False Positives amid discovery arrange. Mammogram containing a mass in mediolateral-slanted (MLO) sees and the pre-handling technique is depicted underneath. The complexity modification was first connected to alter the difference of the mammogram by straightly scaling the pixel esteems amongst upper and lower limits. The pixel esteems that lie in this range are immersed to the upper or lower restrict esteem,individually.

3. Tumor Detection in Mammogram

In this technique for displaying and grouping miniaturized scale calcification bunches in mammograms in light of their topological (In arithmetic topology is worried about incorporate connectedness and conservativeness it is a viable device to create scientific model) properties. The topology of micro calcification groups is broke down at different scales utilizing a diagram based portrayal of their topological structure. This strategy is particular from existing methodologies that fundamentally focus on the morphology (the investigation of the frame or state of a creature) of individual miniaturized scale calcifications and just register the separation based group highlights from a settled scale. In this strategy, an arrangement of topological highlights is separated from micro calcification charts at various scales, and a multistate topological component vector is along these lines created to segregate amongst dangerous and kindhearted cases.

The information utilized as a part of the trials comprise of three datasets, which are made out of picture patches of various cases (taken from various mammograms). The principal dataset was taken from the MIAS database containing 20 picture patches with a similar size of 512 × 512 pixels. The mammograms were digitized to 50 μm per pixel with a straight optical thickness in the range 0– 3.2. The second dataset was separated from the computerized database for screening mammography (DDSM) database containing 300 picture patches with differed sizes (the normal size of these picture patches is 482 × 450 pixels).

Tumor Detection in Mammogram pictures is separated into three phases.

The stage-1 includes the upgrading the picture, the stage-2 includes the tumor division and the stage-3 includes the element extraction. The clamor evacuated utilizing dot commotion expulsion technique. The tumor area is segmented using the Modified GLCM method and binary operations. Finally, the features of tumor area are extracted using GLCM feature extractor and it is used to measure the properties of images. The potential correlation between the topology of micro calcification clusters and their pathological type. We construct a series of microcalcification graphs to describe the topological structure of microcalcification clusters at different scales. A set of graph theoretical features are extracted from these graphs for modeling and classifying micro calcification clusters. The proposed methodology consists of four main phases: estimating the connectivity between micro calcifications within a cluster using morphological dilation(is one of the basic operations in mathematical morphology)at multiple scales; generating a microcalcification graph at each scale based on the spatial connectivity relationship between micro calcifications; extracting multistage topological features from these microcalcification graphs; and using the extracted features to build classifier models of malignant and benign micro calcification clusters. The framework of our methodology is image analysis development work.

1. Connectivity estimation using morphologicaldilation.
2. Microcalcification graphgeneration.
3. Classification of micro calcificationclusters.

Mammographic images with and masses micro calcifications are usually small and have low contrast thus making the abnormalities hard to be detected. Pre Processing block involves enhancing the image, removal of noises, blood vessels and glandular tissues which become a cause of many False Positives during detection stage. mammogram containing a mass in mediolateral- oblique (MLO) view and the pre-processing method is described below.

The contrast adjustment was first applied to adjust the contrast of the mammogram by linearly scaling the pixel values between upper and lower limits. The pixel values that lie in this range are saturated to the upper or lower limit value, respectively.

3.1 System Architecture

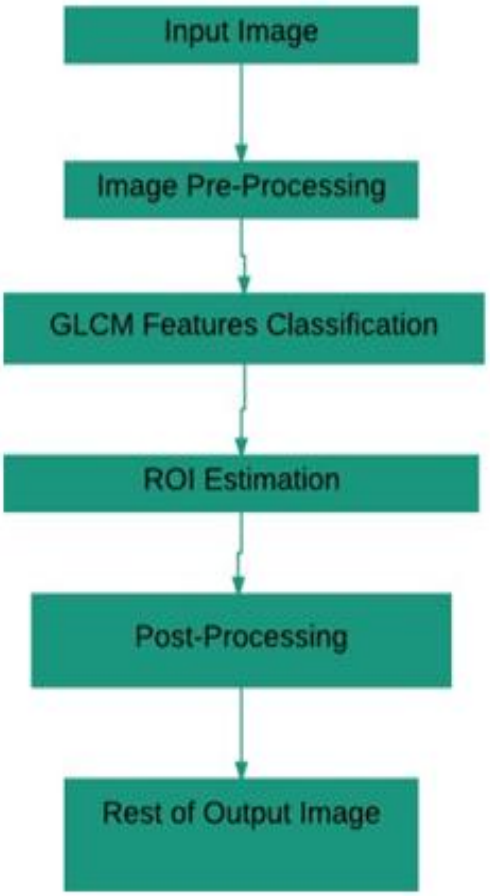


Fig. 3.1: System Architecture

3.1.1 Texture Feature of GLCM

Proposes about classifications of normal and abnormal images from digital mammograms. Method used in this work was Grey level co-occurrence matrix (GLCM) classical method for classification of patterns in an image. In This GLCM method features were modeled as the grey level two dimensional matrix. Statistical features analyzed in this GLCM method have been used successfully for segmentation of an image. This method is accurate in breast cancer detection but one disadvantage was that here by using GLCM matrix small elements cannot be extracted from the details of a given image particularly region of interest (ROI). Even though GLCM is an old extraction method but now days it was used along with the combination of other methods. Hence requirements of this model can be advanced in the next models. Classification work in this model was done by using neural network classifier based on statistical measures. Neural networks contains x inputs y hidden units and one output unit. Here extracted features from the statistical parameters are fed as inputs to these neural networks which have connected set of input and output units for every assigned weight. Depending upon the accuracy of training data here classification method can be performed approximately. Five statistical features were calculated using this model such as correlation, energy, homogeneity, sum of square variance and entropy.

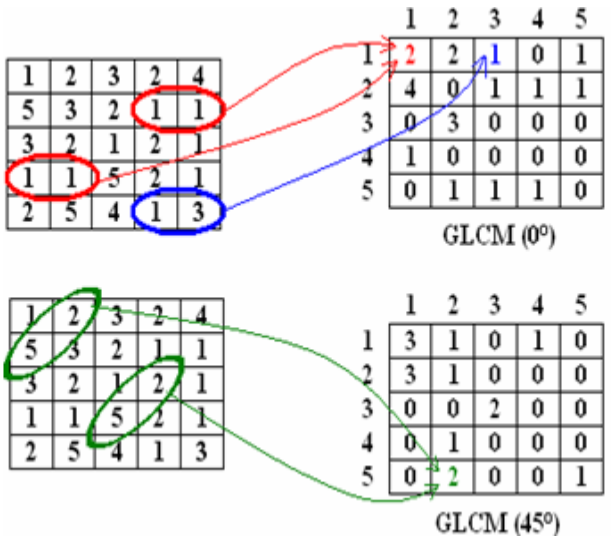


Fig. 3.2: GLCM Structure

3.1.2 Roiestimation

In this paper, a close take a gander at of surface examination systems wound up recognizably enhanced the circumstance the encasing territory dependence methodology, which have been proposed by strategy for the makers, and customary surface appraisal strategies, together with the spatial diminish organize dependence approach, the dim stage run-traverse approach, and the diminish arrange refinement approach. Textural limits isolated by methods for those methodologies have been mishandled to amass districts of recreation action (ROI's) into great ROI's containing packed Mcs and horrendous ROI's containing general tissues. A 3-layer returned multiplication neural gathering wound up obviously used as a classifier. The results of the neural framework for the surface appraisal procedures were surveyed through using a recipient working qualities (ROC) examination. The enveloping region dependence approach twists up observably ended up being superior to anything the standard surface appraisal frameworks with respect to class precision and computational multi faceted nature.

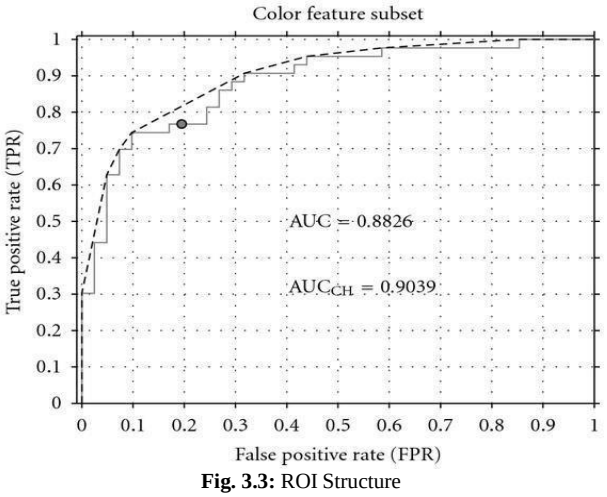


Fig. 3.3: ROI Structure

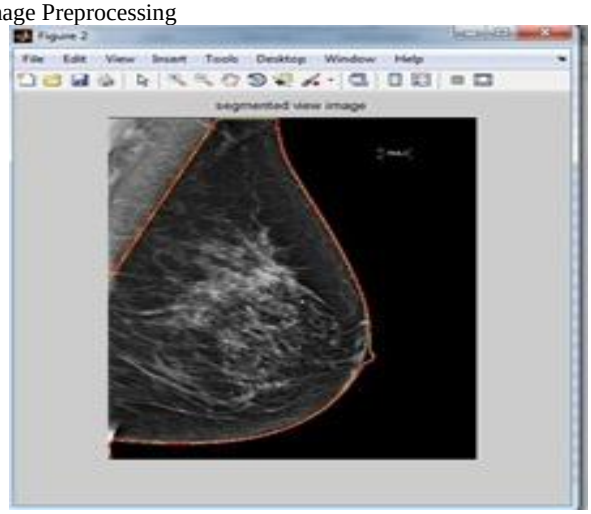
3.1.3 Postprocessing

In this stage the preprocessed mammogram picture is isolated into pixels of little pieces of 2x2 after which all pixels estimations of the square are examined and the esteem including most extreme event inside the square is allotted to all pixels of that square i.e., this esteem is proliferated to residual pixels of that square. It implies that now the entire piece pixels comprise of a similar esteem.The principle objective of the pre-handling is to enhance the picture quality to influence it to prepare to additionally

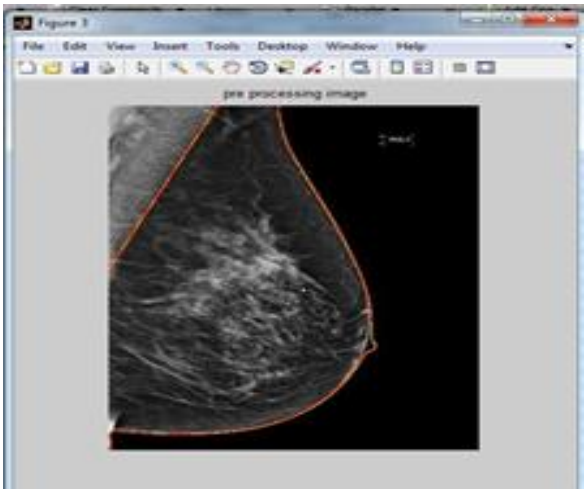
preparing by evacuating or lessening the inconsequential and surplus parts out of sight of the mammogram pictures. Mammograms are therapeutic pictures that convoluted to translate. Consequently pre-handling is fundamental to enhance the quality. It will set up the mammogram for the following two-process division and highlight extraction. The clamor and high-recurrence segments evacuated by channels.Mammographic pictures with and masses miniaturized scale calcifications are generally little and have low complexity hence making the irregularities difficult to be recognized. Pre Processing square includes upgrading the picture, expulsion of commotions, veins and glandular tissues which turn into a reason for some False Positives amid discovery arrange. Mammogram containing a mass in mediolateral-slanted (MLO) sees and the pre- preparing strategy is depicted beneath. The difference modification was first connected to alter the differentiation of the mammogram by directly scaling the pixele steems amongst upper and lower limitsThe pixel esteems that lie in this range are immersed to the upper or lower constrain esteem,separately.

4. Results

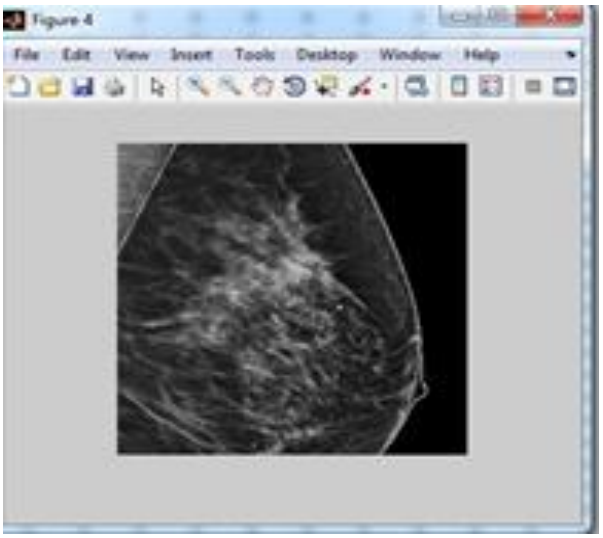
Image Preprocessing



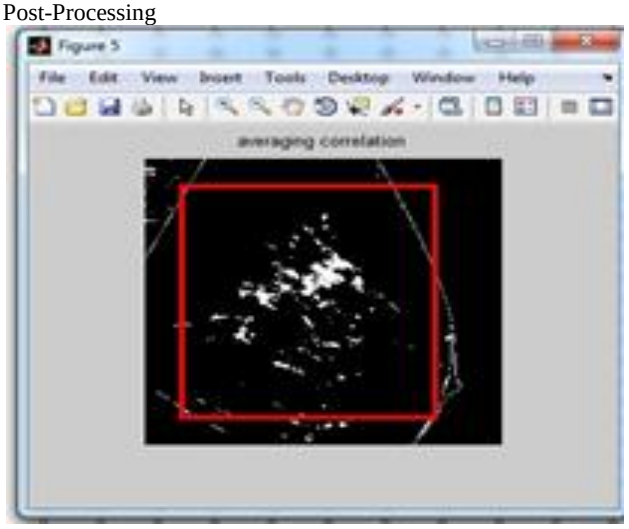
GLCM feature Classification



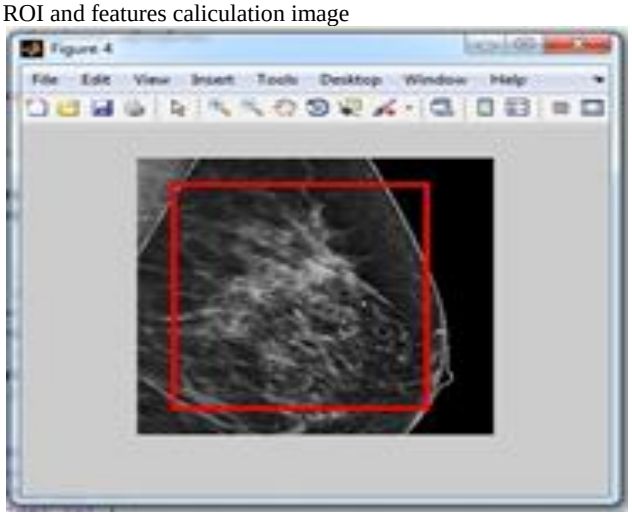
ROI Estimation



Post-Processing



ROI and features caliculation image



5. Conclusion

1. Surface elements in view of GLRLM can be utilized to recognize harmful masses and kind masses on ultrasound pictures, with precision levels that are generally lower than surface elements in light of GLCM and surface elements in light of joined GLRLM andGLCM.
2. Surface elements in view of GLCM can be utilized to recognize harmful masses and kind- hearted masses on mammogram pictures, with exactness levels higher than surface components in light of GLRLM, yet at the same time lower than

surface elements in light of consolidated GLRLM and GLCM.
3. Compare to the DDSM the results in the GLCM are accurate, by using ROI texturefeature.
4. We are calculating GLCM, here minimum & maximum pixel intensity value Optimization & finding the exact feature detection. And finally to find the exact mammogram tumor part which compare to the Existing Technology which is more accurate to our proposedSystem.

References

[1] K. Rajendra Prasad, C. Raghavendra, K Sai Saranya, "A Review on Classification of Breast Cancer Detection using Combination of The Feature Extraction Models", International Journal of Pure and Applied Mathematics, Volume 116 No. 21 2017, 203-208.

[2] Anu Alias et.al ., "Detection of Breast Cancer Using Artificial Neural Networks",International Journal of Innovative Research in Science, Engineering and Technology Vol. 3, Issue 3, March 2014.

[3] Tobia Christian cahoon et.al., "Breast Cancer Detection Using Image Processing Techniques", IEEE trans. On Image Processing.

[4] K.Rajendra Prasad, C.Raghavendra,Padakandla Vyshnav, "Intelligent System for Visualized Data Analytics A Review", International Journal of Pure and Applied Mathematics, Volume 116 No. 21 2017, 217-224.

[5] Shen-Chuan Tai et.al, "An Automatic Mass Detection System in Mammograms Based onComplex Texture Features", IEEE JOURNAL OF BIOMEDICAL AND HEALTH INFORMATICS vol. 18,NO. 2, MARCH 2014.

[6] C. Raghavendra, Dr. A Kumaravel, A. Anjaiah, "A New Hybrid Method for Image De-Noising In Light Of Wavelet Transform", International Journal of Pure and Applied Mathematics, Volume 116 No. 21 2017, 197-202.

[7] Zhili Chen et.al., "Topological Modeling and Classification of Mammographic Microcalcification Clusters", IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING, c. 62, NO. 4, APRIL 2015.

[8] K. Rajendra Prasad, C. Raghavendra, Effective Mammogram Classification Using Various Texture Features, Journal of Advanced Research in Dynamical and Control Systems, Vol. 9. Sp– 12 / 2017.

[9] S.kuma, srujanaB.jet.al., "Feature Extraction for Human Detection using HOG and CS-LBP methods" International Journal of Computer Applications,pages:11-14,2015.

[10] P. Kiran Kumar, C. Raghavendra, Dr. S. Sivasubramanyan, "Exploring Multi Scale Mathematical Morphology for Dark Image Enhancement", *International Journal of Pharmacy and Technology, Dec-2016, Vol. 8, Issue No.4, 23590-23597.*

[11] Bellotti, R., De Carlo, F., Tangaro, S., Gargano, G., Maggipinto, G., Castellano, M., De Nunzio, G. (2006). A completely automated CAD system for mass detection in a large mammographic database. Medical Physics, 33(8), 3066–3075.

[12] C. Raghavendra, A. Kumaraveland S. Sivasuramanyan, "Features Subset Selection using Improved Teaching Learning based Optimisation (ITLBO) Algorithms for Iris Recognition", Indian Journal of Science and Technology, Vol 10(34), DOI: 10.17485/ijst/2017/v10i34/118307, September 2017.

[13] Hussain, M., Khan, S., Muhammad, G., Ahmad, I., &Bebis, G. (2012). Effective Extraction of Gabor Features for False Positive Reduction and Mass Classification in Mammography, 33(1), 29–33.

[14] Mohamed Abdel-Nasser et.al., "Improvement of Mass Detection In Breast X-Ray Images Using Texture Analysis Methods", Artificial Intelligence Research and Development, doi:10.3233/978-1-61499-452-7-159.

[15] Oliver, A., et al., False positive reduction in mammographic mass detection using local binary patterns, Medical Image Computing and Computer-Assisted Intervention (MICCAI). Springer, Berlin, Heidelberg, (2007). 286-293.

[16] Zheng, Y., Breast cancer detection with Gabor features from digital mammograms, Algorithms 3.1 (2010), 44-62.

[17] Pomponiu, Victor, et al., Improving breast mass detection using histogram of oriented gradients, SPIE Medical Imaging, International Society for Optics and Photonics, 2014.

[18] Ramirez R. et al., Local directional number pattern for face analysis: Face and expression recognition, , IEEE Transactions on Image Processing 22.5 (2013), 1740-1752.

[19] Dalal, N. and Triggs, B., Histograms of oriented gradients for human detection. Computer Vision and Pattern Recognition, (2005), vol. 1, pp. 886-893.

[20] Haralick, R. M., et al., Textural features for image classification, IEEE Transactions on Systems, Man and Cybernetics 6 (1973), 610-621.

[21] C.Nalini, C. Raghavendra, K. Rajendra Prasad, "Comparative Observation and Performance Analysis of Multiple Algorithms on Iris Data", International Journal of Pure and Applied Mathematics, Volume 116 No. 9 2017, 319-325.

[22] M.venkatramana.,et.al,review of recent texture classification: methods, IOSR journal of computer engineering2278-8727Volume 14, Issue 1 (Sep. - Oct. 2013), PP 54-60.