DETECTION OF LUNG CANCER IN CT IMAGES USING IMAGE PROCESSING

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Abstract *Magnetic resonance imaging (MRI) of the Lung is a precious tool to facilitate physician's diagnoses and care for a mixture of Lung diseases including stroke, cancer, and epilepsy. It presents exact information to discover the diseases. Histogram equalization is one of the important steps in image enhancement technique for MRI. This paper compares different methods like Brightness Preserving Bi-Histogram Equalization (BPBHE), Recursive Mean Separated Histogram Equalization (RMSHE), Brightness Preserving Dynamic Histogram Equalization (BPDHE), Dualistic Sub-Image Histogram Equalization (DSIHE), Minimum Mean Brightness Error Bi-HE Method (MMBEBHE), using different objective quality metrics for MRI Lung image Enhancement.*

I. INTRODUCTION

MRI modality is a medical image technique relying on nuclear magnetic resonance (NMR) principals and produce images illustrating various organs in the body. This technique captivates the signals resulting from the interaction between nuclear spins when submitted to an electromagnetic field **[1]**. The fields of exploration offered by MRI are wide: the anatomical MRI is today the best suited non-invasive method to observe with a fine resolution the biological tissues, and thus particularly the Lung tissues. Today, recent developments make it possible, with the same imager, to explore different aspects of the Lung: Lung activity with functional MRI (fMRI), or connectivity of Lung areas with diffusion MRI. This imaging modality has thus become an increasingly central tool in Lung medicine or in research into cognitive neuroscience. Hence, automatic interpretastion of Lung MRI has become a major issue. Clinicians and cognitive scientists need reliable tools to assist them in their decision- making and in the interpretation of the huge amount of created information. MRI has boomed in recent years, and even the signal-to-noise ratio and spatial resolution have been enhanced, MR images are usually affected by noise and artifacts. In fact, the visual quality of MR images has a direct impact on the accuracy of clinical diagnosis, which can be seriously limited by existing noise arising during images acquisition. The major challenges of preprocessing MRI images, besides the noise, are the low contrast between tissues and inter-individual variability, non intensity uniformity distribution and poor quality of acquired images. These limitations (drawbacks) could affects not only the medical diagnostic tasks but also the ability of automatic computerized CAD tools for data analysis, such as the segmentation and the classification of relevant features, the 3-D images reconstruction and registration. Therefore, image enhancement techniques are of great interest in MR imaging to improve the relevant image contents through reducing the noise while preserving the actual details features.

Medical imaging is a field that has experienced significant advances due to new computer technologies. Digital systems have become an indispensable piece of CT, MRI, PET, SPECT, and Ultrasound imaging and even customarily non-computerized techniques(e.g. film X-beams) are bit by bit advancing into mechanized imaging. Notwithstanding, advanced imaging requires putting away, imparting and controlling a lot of computerized information. Studies have demonstrated that the radiology division of an enormous emergency clinic can create in excess of 20 terabits of picture information every year.

The measure of computerized radiologic information produced each year in the USA alone is on the request for petabytes (1015) and is expanding quickly . This stretches the abilities of advanced stockpiling frameworks, and forces really high necessities on the data transfer capacity of correspondence organizations.

Image compression

The objective of image pressure is to lessen superfluity and repetition of the image information so as to have the option to store or send information in a productive form. Digital image pressure can address these issues by diminishing the information stockpiling and transmission necessities. Numerous pressure techniques have been created and have been assessed for the clinical condition .These pressure strategies for the most part diminish the size of the information 2-3 times with no data misfortune, and in excess of multiple times with some data misfortune. Regardless of the higher pressure proportions of lossy pressure techniques, their utilization in clinical imaging is restricted due to worries on losing image subtleties. In any event, when the pressure is outwardly lossless, a fruitless analysis from an image that has lost some data may prompt legitimate ramifications. Another purpose behind evading lossy pressure is the advancement of PC supported analysis procedures. Modernized investigation of an image can utilize even the littlest subtleties (e.g., smooth varieties in pixel forces) which are frequently imperceptible to the eye. Pressure techniques ought not lose any of these possibly significant image subtleties.

Therefore, in clinical imaging lossless pressure is a higher priority than lossy pressure. When all is said in done, lossless pressure can be accomplished by exploiting information redundancies. Existing strategies can productively decrease information redundancies in singular images.

Segmentation

Medical image division assumes an instrumental part in clinical finding and has some favored properties, for example, least client collaboration, quick calculation, precise and strong division results

Image division is an image investigation measure that targets parceling an image into a few districts as indicated by a homogeneity basis. It has become an exploration field in software engineering for over 40 years, and the early want to discover general calculations that would accomplish impeccable division autonomously from the sort of info information has been supplanted by the dynamic advancement of a wide scope of extremely particular methods and the vast majority of the current division calculations are profoundly explicit to a specific kind of information, and some examination is sought after to create nonexclusive systems coordinating these strategies.

Division could be a completely programmed measure, however it accomplishes its best outcomes with self-loader (calculations that are guided by a human administrator). Self-loader measure includes a domain wherein the human administrator will cooperate with the calculations and the information so as to deliver ideal division. Contingent upon the kind of information, the administrator should cautiously pick the best adjusted calculation, which more often than not is impossible in a programmed manner. The abstract perspective of the human is required.

II. LITERATURE REVIEW

Senthilkumaran *et al.* performed a comparative study of different histogram-based techniques, mainly the histogram equalization (HE), BHE, modified BHE, AHE and CLAHE, in order to enhance the contrast of general MRI Lung images. They used different evaluation metrics as Michelson contrast, RMS contrast, absolute mean brightness error (AMBE) and Pixel Distance.

Reichel,J this research is to adapt the precoder of Laroia et al., which is used in information transmission; we combine it with expansion factors for the high and low pass band in sub band filtering and builds upon the idea of factoring wavelet transforms into so called lifting steps. This allows the construction of an integer version of every wavelet transform. In 1999,.

III DIGITAL IMAGING AND COMMUNICATIONS IN MEDICINE

DICOM (Digital imaging and communications in medication) is the First form of a standard created by American College of Radiology (ACR) and National Electrical Manufacturers Association (NEMA).

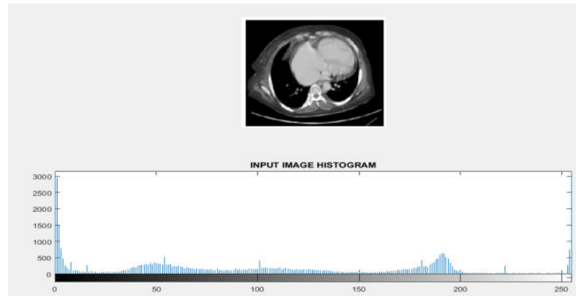
In the start of the 1980s, it was hard for anybody other than producers of registered tomography or attractive reverberation imaging gadgets to decipher the images that the machines created. Radiologists and medical physicists needed to utilize the images for portion anticipating radiation treatment. ACR and NEMA united and shaped a standard board of trustees in 1983. Their first norm, ACR/NEMA 300, was delivered in 1985. Soon after its delivery, it turned out to be evident that enhancements were required. The content was obscure and had interior inconsistencies.

IV MATLAB SOFTWARE

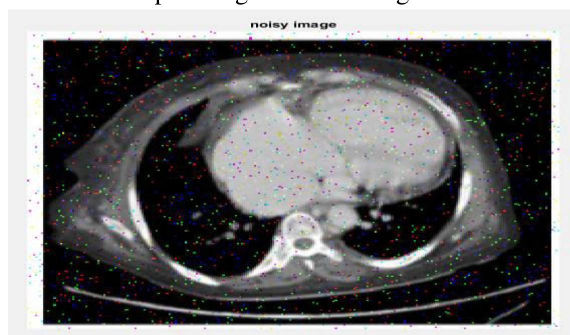
MATLAB is an elite language for specialized figuring. It coordinates calculation, representation, and programming in a simple to-utilize condition where issues and arrangements are communicated in recognizable numerical documentation. MATLAB represents framework research facility, and was composed initially to give simple admittance to lattice programming created by LINPACK (direct framework bundle) and EISPACK (Eigen framework bundle) ventures.

MATLAB is hence based on an establishment of complex grid programming in which the fundamental component is cluster that doesn't need pre dimensioning which to tackle numerous specialized registering issues, particularly those with network and vector plans, in a small amount of time. MATLAB highlights a group of uses explicit arrangements called tool kits. Important to most clients of MATLAB, tool compartments permit learning and applying particular innovation.

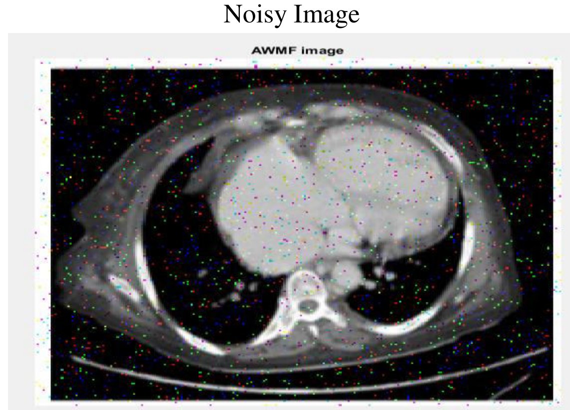
RESULTS AND ANALYSIS



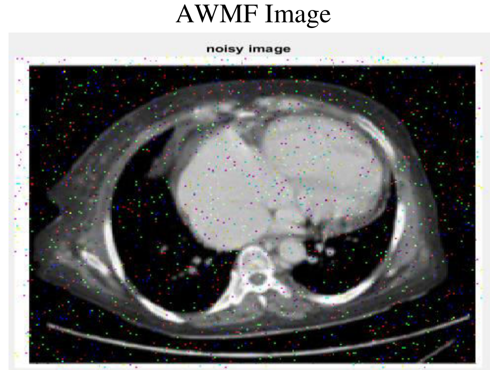
Input image and its histogram



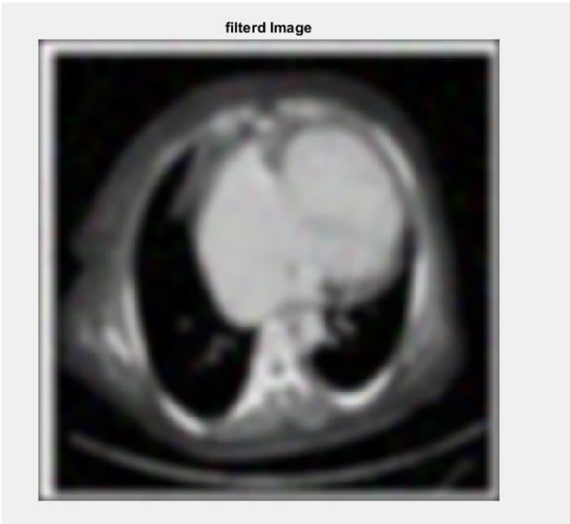
Noisy Image



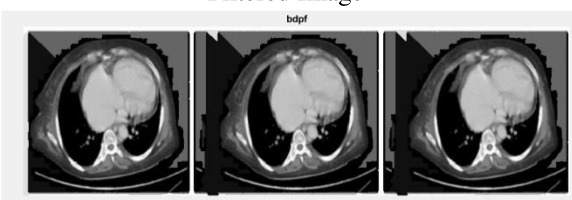
AWMF Image



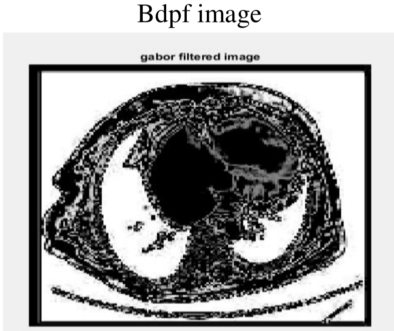
Noisy image



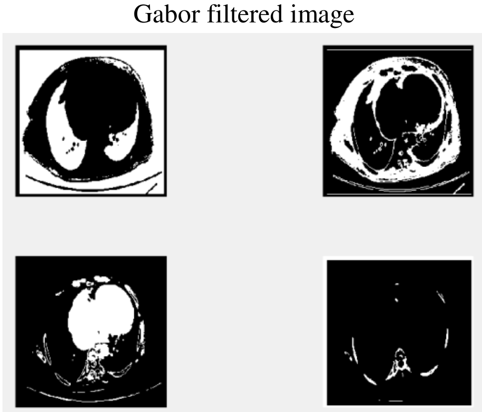
Filtered Image



Bdpf image



Gabor filtered image


Final output image

V CONCLUSIONS

The main objective of this paper is to provide a comparative study of some existing techniques of contrast enhancement based on histogram equalization for MRI Glioblastoma Lung tumor. Particularly the AHE, CLAHE, AIR-AHE and BPDHE methods are explained and then compared. Each studied method is evaluated relying on image quality measurement mainly AMBE, PSNR and entropy. For the evaluation process, we selected the most relevant slices where the tumor core appears clearly, then we computed the average value (with a standard deviation) of the quality evaluation metrics which makes the evaluation to be more precise. Through this study one could notice that, Adaptative Histogram Equalization (AHE) technique provides efficient performances for MRI contrast enhancement compared to other studied techniques. For future works, we will focus on enhancing the AHE techniques by introducing filtering approaches that could improve the results in terms of accuracy and treatment efficiency.

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