REMOVAL OF GAUSSION NOISE, SALT AND PEPPER NOISE IN MEDICAL LUNG IMAGES BY MEAN FILTER

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Abstract:-

In our work, a improved fast and efficient adaptive and selective mean filter is proposed which removes high-density salt and pepper noise effectively than many existing state-of-the-art filters. A fast adaptive and selective mean filter is presented to remove salt and pepper noise effectively from images corrupted with higher noise densities. Adaptive filters that use variable window size produce better restoration of salt and pepper noise at higher noise densities than filters that use fixed window size, but they consume more time. Adaptive filters show better restoration results for images corrupted with high-density salt and pepper noise than 3×3 filters, but they consume more time. The proposed improved adaptive filter consumes considerably less time than the existing best adaptive filters for high-density salt and pepper noise removal, which is vital for their implementation in image acquisition devices.

Keywords: - Adaptive filters, image acquisition devices, pepper noise.

1. Introduction

Image processing is widely used in many applications for extracting knowledge and hidden information, bioinformatics, medical imaging and cell therapy are some of the fields where image processing is extensively used in many applications and it produced effective results. The better image quality is highly demanded. But a practical image obtained consists of noise degrading the image quality.

1.1 Image Noising

The quality of the images is degraded due to many factors. One such factor is variations in the brightness. This variation in the brightness usually random and has no particular pattern. In many cases, it reduces image quality especially significant when the objects being imaged are small and have relatively low contrast. This random variation in image brightness is designated noise. Image noise is the random (not present in the object imaged) variation in brightness, in color information in images. It is usually an aspect of electronic noise.All medical images contain some visual noise. The presence of noise gives an image with a mottled, grainy, textured, or snowy appearance.

2. Literature survey

Images can be contaminated with different types of noise for different reasons. For example, noise can occur because of the circumstances of recording such as electronic noise in a cameras, dust in front of the lens, because of the circumstances of transmission damaged data or because of storage, copying, scanning, etc. Impulse noise e.g., salt and pepper noise and additive noise e.g. Gaussian noise are the most commonly found. Impulse noise is characterized by the fact that the pixels in an image either remain unchanged or get one of the two specific values 0 and 1; an important parameter is the noise density which expresses the fraction of the image pixels that are contaminated. Image noise is the random variation of brightness or color information in images produced by sensors and circuitry of a scanner or digital camera. Image noise can be originated in film grain and in the unavoidable shot noise of an ideal photon detector.

3. Proposed methodology

Median filter is good for salt and pepper noise. These filters are widely used as smoothers for image processing, as well as in signal processing. A major advantage of the median filter over linear filters is that the median filter can eliminate the effect of input noise values with extremely large magnitudes. Adaptive filters change their behavior on the basis of statistical characteristics of the image region, encompassed by the filter region.BM3D is an example for adaptive filter. It is a nonlocal image modeling technique based on adaptive, high order group-wise models. This de-noising algorithm can be divided in three steps described by (Aram et al., 2011):

1. Analysis. Similar image blocks are collected in groups. Blocks in each group are stacked together to form 3-D data arrays, which are de-correlated using an invertible 3D transform.
2. Processing. The obtained 3-D group spectra are filtered by hard thresholding.
3. Synthesis. The filtered spectra are inverted, providing estimates for each block in the group.

4. Result

The nature and the operation of the various transformations and its importance have been thoroughly evaluated in this

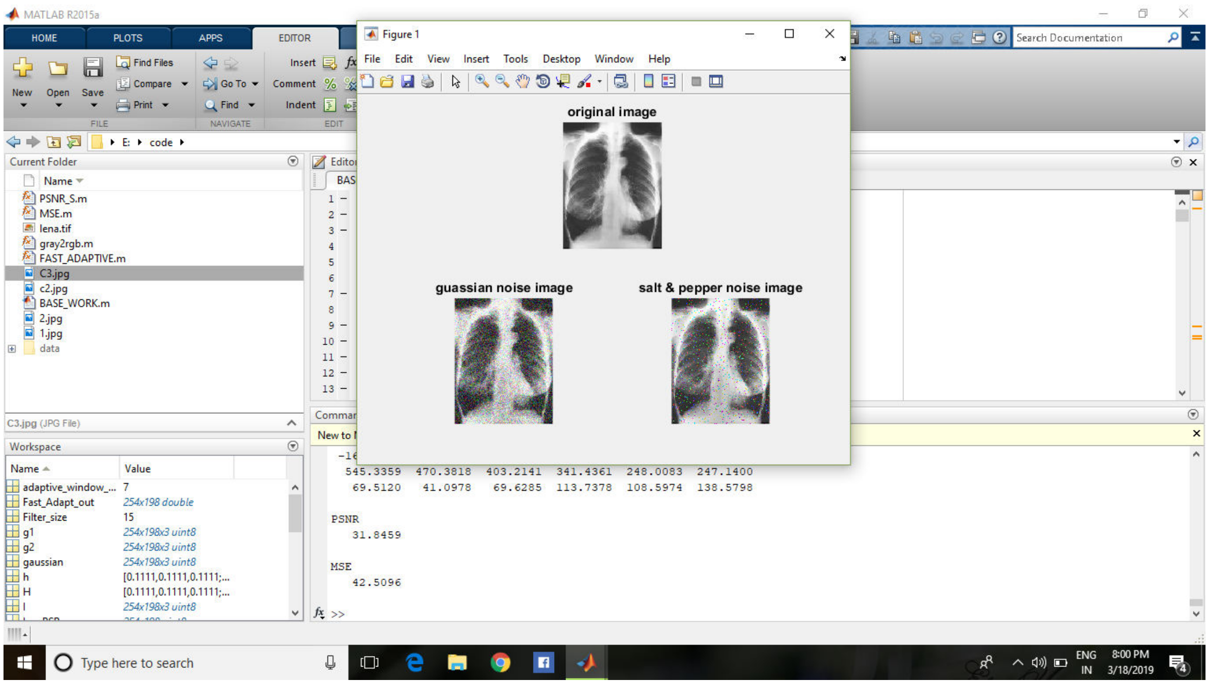

Fig 4.1 Noise Applied Image

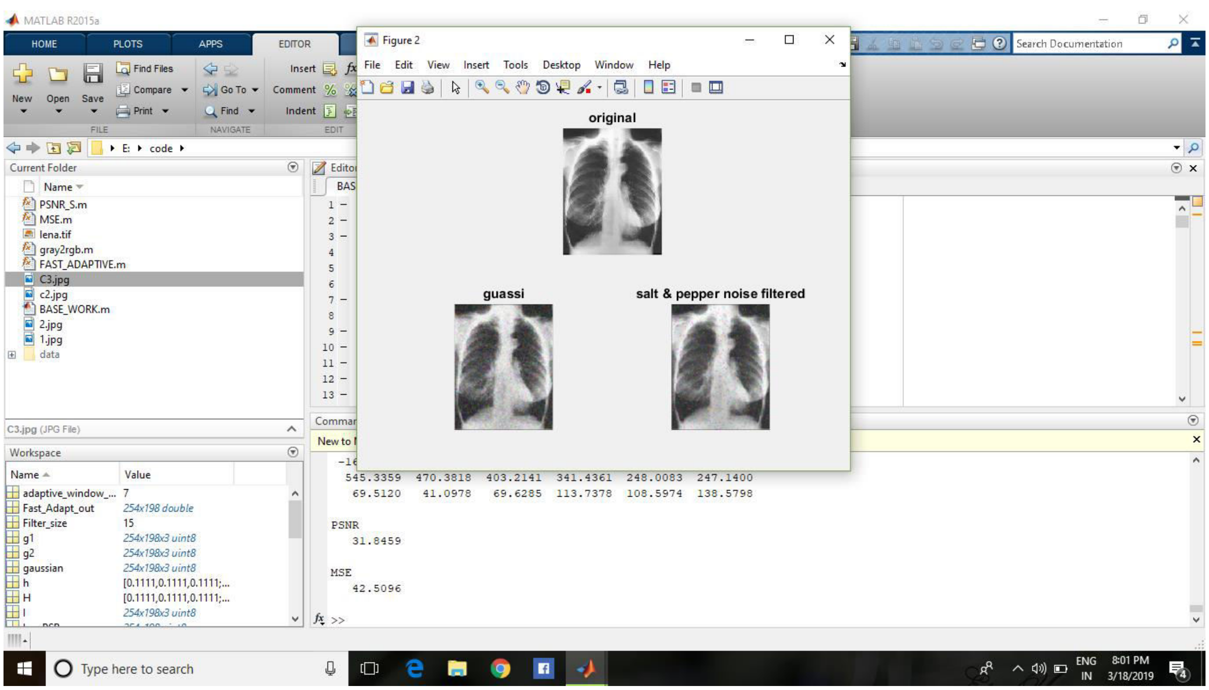

Fig 4.2 mean filter image

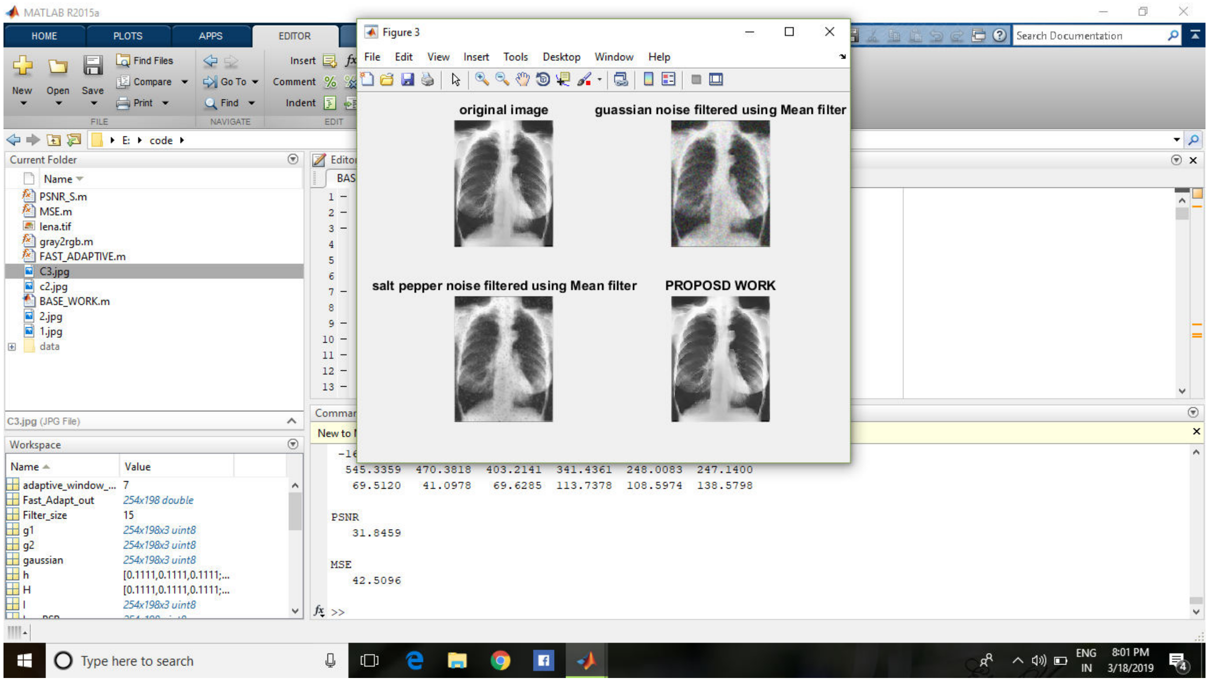

Fig 4.3 Fast Adaptive Mean Filter Output Image

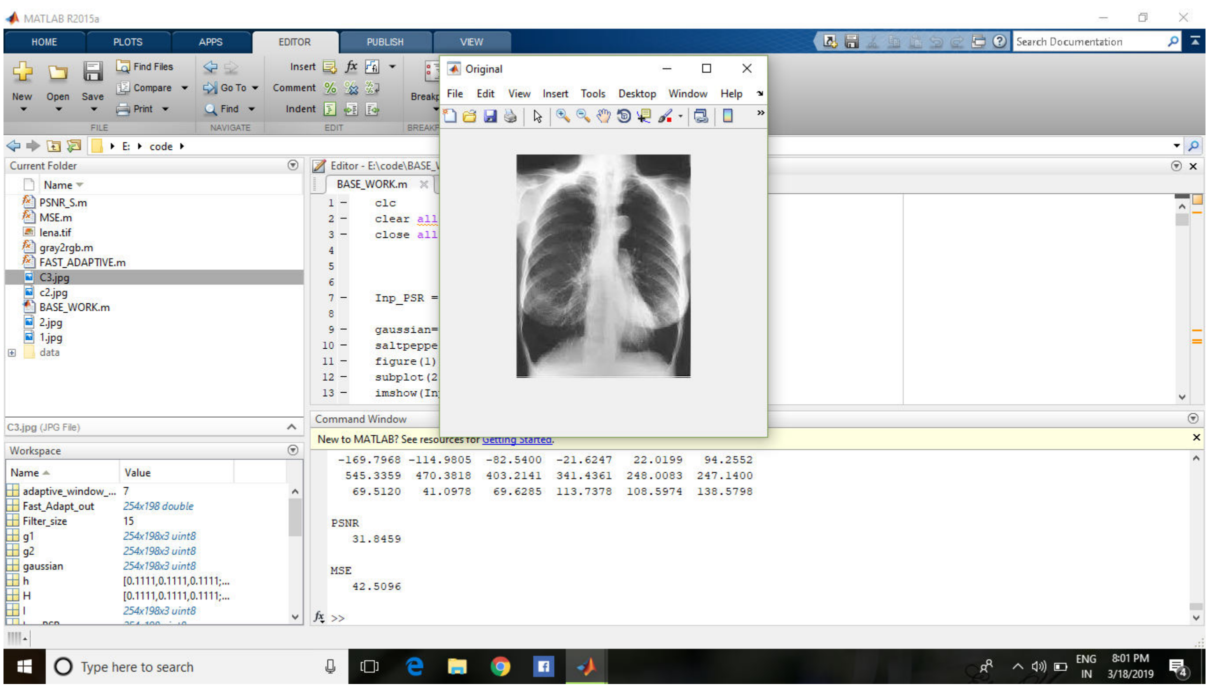

Fig 4.4 Original Image

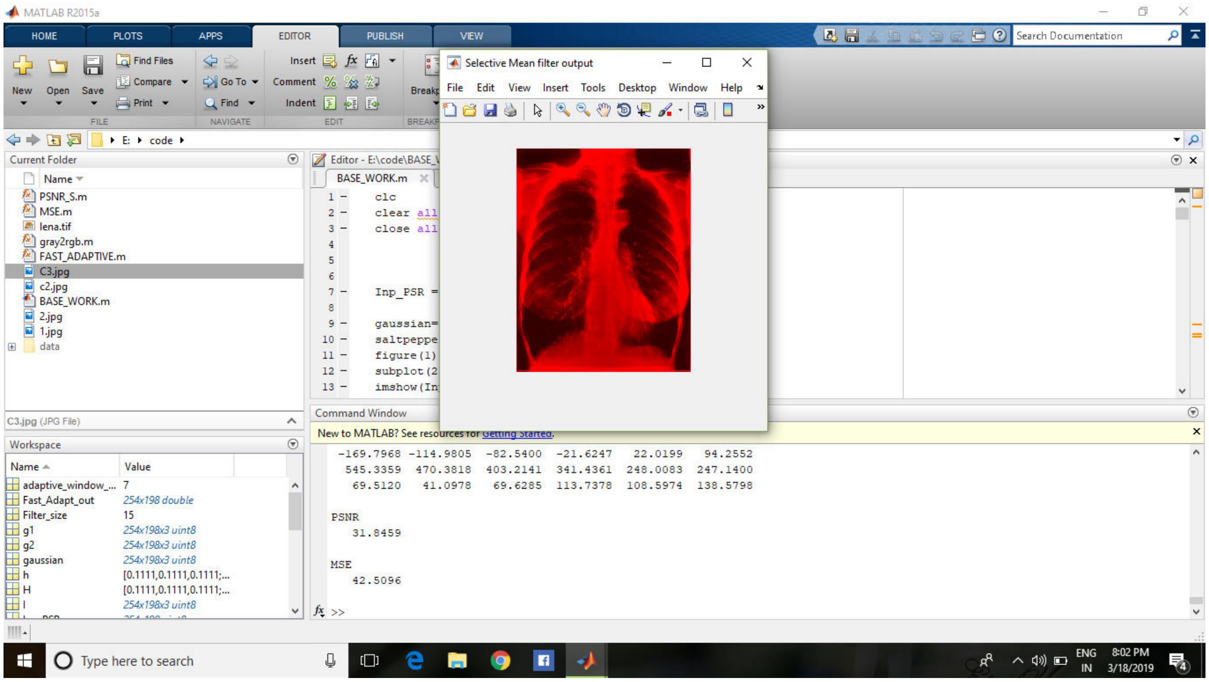

Fig 4.5 selective mean filter output image

6. Conclusion

In proposed work, various image filtering techniques has been discussed with the experiment results. Intensity transformation functions based on information extracted from image intensity histograms play an important role in image enhancement. The histogram equalization is able to increase the dynamic range of the intensity level of the image. A linear filter is implemented using the weighted sum of the pixels in successive windows. Typically, the same pattern of weights is used in each window, which means that the linear filter is spatially invariant and can be implemented using a convolution mask. An alternative approach is to replace each pixel value spatially with the median of the gray values in the local neighborhood. Filters using this technique are called median filters. The Gaussian smoothing filters are effective low-pass filters from the perspective of both the spatial and frequency domains, are efficient to implement, and can be used effectively by engineers in practical vision applications. Edge detection is an efficient means of finding boundaries of objects or their parts in an image. Edges represent sharp changes in image intensities, which could be due to discontinuities in scene reflectance, surface orientation, or depth. The magnitude of the first derivative can be used to notice the presence of an edge at a point in an image. Similarly, second derivative can be used to determine whether an edge pixel lines lie on the dark or light side of an edge. Two main approaches to edge detection exist. One approach determines the zero-crossings of the second derivative of image intensities, while the second approach finds locally maximum gradient magnitudes of image intensities in the gradient direction. Denoising is often a necessary and the first step to be taken before the images data is analyzed. It is necessary to apply an efficient denoising technique to compensate for such data corruption.

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