

A review on Noise removal techniques from Remote sensing Images

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Abstract

In this paper a noise removal algorithms studied because noise removal process is a basic pre-processing step, a thorough review is presented of noise reduction filters for digital image sequences. The detailed descriptions of several noise reduction algorithms are provided. To aim in comparing with different techniques with results. The fundamental key to noise reduction is to reduce or eliminate the noise without failing other aspects of the image. Those results are discussed and analyzed to determine the overall average of the filters on remote sensing image to remove noise from them.

Keywords: Remote Sensing Image, Filter

Introduction

Reducing noise from the satellite image is a challenge for the researchers in digital image processing. Several approaches are there for noise reduction. Generally speckle noise is commonly found in synthetic aperture radar images, satellite images and medical images etc. To give considerations and suggestions that is relevant for the development of methods for the detection, reduction. To creating a link to fields direct importance to the image analysis community. This can help people to understand better the context in which the remote sensing image analysis takes place. Digital image processing is the most important technique used in remote sensing. It has helped in the access to technical data in digital and multi-wavelength, services of computers in terms of speed of processing the data and the possibilities of big storage. Several studies can also take the benefit of it such as technical diversity of the digital image processing, replication sites and maintaining the accuracy of the original data. Remote sensing is used to obtain information about a target or an area or a phenomenon through the analysis of certain information which is obtained by the remote sensor. It does not touch these objects to verify. Images obtained by satellites are useful in many environmental applications such as tracking of earth resources, geographical mapping, prediction of agricultural crops, urban growth, weather, flood and fire control etc.

Literature of survey

1. Hasan S. M. Al-Khaffaf, Abdullah Zawawi Talib and *et.al*, [2009], in this paper, they proposed and used new algorithm TAMD to remove salt and paper noise as a pre-processing step. Real scanned images used which had 20 % salt and pepper noise exists. The end the proposed algorithm has shown that better noise removal algorithm than other studied algorithms.
2. Y. Wang, w. Chen and *et.al* [2011], has proposed modified total variation Model for removing noise from images. They have studied and applied You-Kavesh model, Perona-Malik model, TV Model and Proposed MTV model got similar result with same time frame.
3. Jaun C., Jimenez-Munoz, Jose A. Sabrino and *et. al* [2012], “Surface emissivity retrieval from airborne hyper spectral Scanner data; insights on atmospheric correction and noise removal” has been used data processing to minimization of stripping based noise. T/E Separation algorithm shows undesirable noise that photointerpretation for this purpose they have been used Airborne Hyperspectral Scanner sensor and applied hyper spectral Scanner (Minimum Sensor Fraction) to removed part of noise.
4. Mr. Salem Sahel Al-amri and *et. al* [2010], worked on Saturn image and passed MF,AWF,GF,AMF filters to de-noise Salt and Paper Noise(SPN),Random variation Impulse Noise(RVIN) and Speckle noises. As a view they were arrived on Standard Median Filter (SMF) is good for filter for SPN with less than 40% density noise.

Types of Noise

Random Variation Impulsive Noise (RVIN)

This type of noise is also called the Gaussian noise or normal noise is randomly occurs as white intensity values. Gaussian distribution noise can be expressed by

$$P(x) = 1/(\sigma\sqrt{2\pi}) * e^{-(x-\mu)^2 / 2\sigma^2} \quad -\infty < x < \infty \quad \dots\dots\dots(1)$$

Where: $P(x)$ is the Gaussian distribution noise in image; μ and σ is the mean and standard deviation respectively.

Salt & Pepper Noise (SPN)

This type contains random occurrences of both black and white intensity values, and often caused by threshold of noise image.

Gaussian and salt & Pepper are called impulsive noise.

Speckle Noise (SPKN)

If the multiplicative noise is added in the image, speckle noise is a ubiquitous artifact that limits the interpretation of optical coherence of remote sensing image. The distribution noise can be expressed by

$$J = I + n * I \dots \dots \dots (2)$$

Where, J is the distribution speckle noise image, I is the input image and n is the uniform noise image by mean μ and variance σ .

Filters name

These below filters are always used in all process like Arithmetic Mean, Geometric Mean, Harmonic mean, Contraharmonic mean, median, max, min, midpoint and alpha-trimmed mean. Median Filter (3X3), Median Filter (5X5), Two Stage filter, Two Stage filter with hyper trapezoidal fuzzy membership function and Modified LM, Two Stage Noise Removal using FANFIS. But this research work carried experiments reviews of Filter which attribute to make image enhancement at high quality.

The PSNR (Peak Signal Noise Ratio) is quality measure technique is higher when compared to the existing filtering techniques. Moreover, the execution time taken by the studied approach is very significant when compared with the existing approaches.

Conclusion and Future Scope

A novel approach is essential to remove noise from remote sensing images. Images play an important role in remote sensing domain. Therefore, we need to focus on denoising methodology which give high quality enhanced Images. In this study we explore that the type noise and how to preprocess them sophisticatedly. Thus, we look to all type of noises from remote sensing images and interpret the results is future scope of this works.

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