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Short Survey on Noise Removal systems in Video Sequences

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ABSTRACT
Noise is one of the pre-processing techniques. The image noise may be termed as random variation of brightness or color information. There are various types of image noise. Modern technology provides us with useful tools to capture images and videos with different scales of time.Noise removal is greatest challenges in the digital word among the researchers, no number of noise removal algorithms are implemented with respective multiple types of application areas and the typenoises. The basic idea behind this paper is the find out scope and limitation of the noise removal systems for image which are existing and able to remove the noise from the distorted or noisy video sequence. There are various methods to help restore an image from noisy distortions. Selecting the appropriate method plays a major role in getting the desired output. The de-noising methods tend to be problem specific. For example, a method that is used to de-noise satellite images may not be suitable for de-noising medical images. Thus a large number of studies have been launched to assess of quality and quantity of video sequences.

Introduction

Noise is one of the pre-processing techniques. The image noise may be termed as random variation of brightness or color information. There are various types of image noise. Modern technology provides us with useful tools to capture images and videos with different scales of time (Figure 1.3). At one end of the spectrum, high-speed imagery now supports frame rates that allowing the high quality capture of ultrafast events. At the other end of the spectrum, time-lapse sequences can reveal long-term processes spanning decades. However, methods to automatically identify and analyse the noise in visual data are still in research pipeline.

This thesis is comprised of several projects studied during my project research work , which focus on analysing and manipulating noise in video and image sequences, in order to removing the noise and improving the quality in captured by imagery, and reveal interesting temporal signals and processes that may not be easily visible in the original data. Here we give a high-level overview of these projects. The details of the proposed techniques and review of related literature are given in the chapters to follow.

We designed a video processing system which treats visual changes as noise, and re-renders a video to reveal the underlying events . We call this technique “Frame Filtering” in analogy to image de-noising (the process of removing noise added during image denoising). The result is an automatic decompo-sition of the original video components. We show that existing temporal filtering approaches are often incapable of achieving this task, and our computational approach to de-noise salt and pepper noise in video sequences, making it applicable to diverse videos containing noise .figure 1gives the overview of Spatial Filter and Temporal Filter.

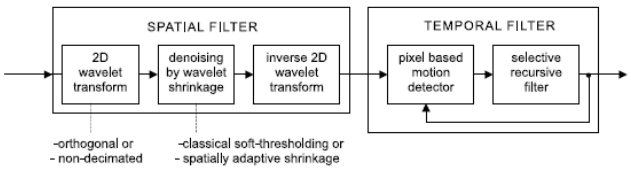

Figure 1 Spatial Filter and Temporal Filter

Of importance to noise filtering is the fact that in image sequences two kinds of approaches to the same signal with different properties can be distinguished. These sub signals are the spatial and temporal signals. Three major issues associated with the image/video degradation are addressed in this work. The issue are noticeable between intra picture frames or between an intra-picture frame and neighbouring inter picture frames. To resolve this problem, a novel robust statistical temporal filtering technique is proposed.

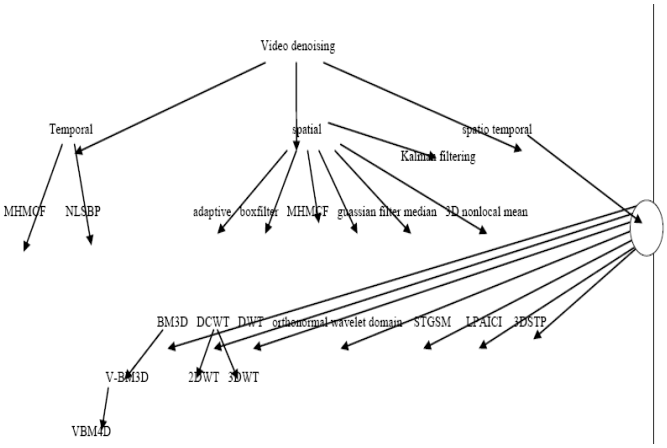

Figure 2 Detection techniques and the noises

Literature Survey

In image processing systems, the noise generated due to various sources is characterized by using some known probability distribution functions (PDF). For example, Gaussian function is used for thermal noise and under some reasonable conditions, it is the limiting behaviour of other noises e.g. photon counting noise and film grain noise. The Rican density function is helpful in characterizing range imaging (MRI), Exponential and Gamma density functions find applications in Laser imaging. Most image acquisition devices are photon counters and Poisson distribution is well suited for such type of noise.

Reeja S R and researchers in [1] provides a detailed state of the art of different video de-noising techniques. They observed that Most of the video de-noising algorithms are done through the motion detection technique. Main focus was on a survey of various noise reduction techniques for video. Object detection was the first level of video de-noising. That was achieved through Motion Detection. Researchers explained about the motion estimation and compensation techniques. The different video de-noising techniques, motion detection techniques and the noises used were shown through the taxonomy as shown in figure 2.

The author of [2] proposed a wavelet transform based video filtering technique that uses spatial and temporal redundancy. In [3], a content adaptive video de-noising filter has been proposed recently. This method filters both impulsive and non-impulsive noise but the filtering performance is highly reduced in case of Gaussian noise with high variance. In this work, a new pixel based spatio-temporal video noise filter that takes motion changes and spatial standard deviations into account is proposed. The main objective of this paper is compressing the noise in archive video to produce a high visual quality for archive videos. [6] Propose hidden markov tree modeling for wavelet coefficient and provide high CPSNR, good quality and removes colorartifacts while preserving edges. In [5] spatio-temporal filtering is used for film restoration, which provides good PSNR and Visual results.

[7,8] Proposed an Improved Switching Median Filter for Impulse Noise Removal. An Improved progressive switching median filter proposed for salt and- pepper impulse noise removal from digital images. Results of comparative analysis of this algorithm with other filters for impulse noise removal show a high efficiency of this approach relatively to other ones.

Thus a large number of studies have been launched to assess of quality and quantity of video sequences. Figure 3 shows the basic block diagram of Video Restoration.

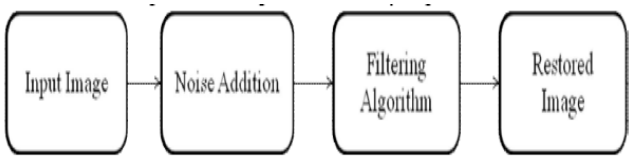

Figure 3 Basic Block Diagram for Video Restoration

Problem Definition

The basic idea behind this paper is the find out scope and limitation of the noise removal systems for image which are existing and able to remove the noise from the distorted or noisy video sequence. There are various methods to help restore an image from noisy distortions. Selecting the appropriate method plays a major role in getting the desired output. The de-noising methods tend to be problem specific. For example, a method that is used to de-noise satellite images may not be suitable for de-noising medical images. Thus a large number of studies have been launched to assess of quality and quantity of video sequences

Limitation of Existing Systems

Median filter fails at higher noise density and they tend to modify both good pixels and noise pixels. So, sometimes, some important information's may be lost from the image. This is the major disadvantage of conventional median filter. [9]

Algorithm II can preserve edges during denoising but it has problem in detecting noisypatches, i.e., a connected region containing many noisy pixels [9,10].

Some issues with median filter includes that the majority of the computational effort and time is spent on calculating the median of each window[11].

Median Filter (AMF) perform well at low noise densities. But athigh noise densities the window size has to be increased which may lead to blurring the image [12,13]

In switching median filter These filters will not take into account the local features as a result of which details and edges may notbe recovered satisfactorily, especially when the noise level is high.[12]

Scopes For Video Denoising Systems

In this section, focus towards extension and future related works are identified as follows:

Optimization technique like Genetic Algorithm (GA) can be used to select the optimum threshold for the random valued impulse noise detector.

The maximum algorithms are applied for impulse noise only. It can be extended to minimize mixed noise.

The filtering method suggested can be further improved by using neural networks for further enhancing the outputs and also to remove other types of noise, such as random-valued impulse noise, mixed noise etc.

Conclusion

In Our Survey we have gone through different papers and research by the different researcher's, and we notice some limitation from some methods. Also we observe That effectiveness of any algorithm is directly prapostional to Quality and Quantity of Input and Output. Hence We conclude that the researches works with Qualitative and Quantitative data for various experiments.

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