Removal of High Density Salt and Pepper Noise in Video through Modified Cascaded Filter

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ABSTRACT

In the Transmission of Videos over channel, Video frames are corrupted through salt and pepper noise (Impulse Noise), due to faulty communiqué methods. The target of this article is to enforce a greater filtering method that makes the noisy video frames to noise free video frames. Median filters are the best identified non-linear digital filters based on order facts to solve the current problem. Median filters are recognized for their capacity to eliminate salt and pepper noise and protects original form. The noise detection system to differentiate between noisy pixels and the noisy free pixels prior to making use of non-linear filtering is enormously desirable to defend the signal important points of noisy free pixels. In this article we have proposed an algorithm called Modified Cascaded filter (MCF) algorithm for the restoration of gray scale, and color video frames which might be particularly corrupted by using salt and pepper noise. This proposed algorithm indicates better results than the Median Filter (MF), Decision based Algorithm (DMF), Modified Decision Based Algorithm (MDBA), and Progressive Switched Median Filter (PSMF). We verified the algorithm with various gray scale and color video frames and it offers higher outcome with high PSNR and IEF.

Keywords: Noise Elimination, MCF, PSNR, IEF.

1. INTRODUCTION

Video frames are most of the time corrupted through impulse noise. Customarily, the impulse noise in video frames is gift because of bit error in transmission or offered throughout the sign acquisition stage. Headquartered on the noise values, the impulse noise is categorized in to two; they are salt and pepper noise and random valued noise. Salt and Pepper noise is less difficult to revive but, the random valued noise is extra complicated to revive. Salt and Pepper noise can corrupt the frame the place the corrupted pixel takes either highest or minimal grey degree. Many distinct nonlinear filters have been proposed for restoration of salt and pepper noisy video frames[1-4].

Among all of the approaches for removal of impulse noise, the median filter is used extensively considering of its effective noise suppression ability and high computational effectively. Nonlinear digital filters, founded on order statistics are median filters (MF). Median filters are good identified for his or her capacity to do away with impulse noise without damaging the threshold understanding. However, the foremost quandary of normal Median Filter (SMF) is that the filter is potent only at low noise densities[5-9]. At high noise densities, SMF frequently reveals blurring for significant window sizes and inadequate noise suppression for small window sizes. When the noise stage is over 60% the edge small print of the common body might not be preserved by way of the average median filter (SMF).
Nonetheless, lots of the median filters are operates uniformly throughout the video frames and it modifies each noise and noise-free pixels, explanations expertise loss. Ideally, the filtering will have to be applied handiest to corrupted pixels but not to uncorrupted pixels. Adaptive median filter (AMF) works well at very low noise densities. Noise detection approach to discriminate between uncorrupted pixels and the corrupted pixels previous to applying non-linear filtering is highly desirable. Adaptive Median Filter is a decision founded or switching filter that differentiates the noisy pixels and performs the filtering operation on them leaving all different pixels unchanged[10-15]. These filters won’t remember the neighborhood features thus of which details and edges will not be recovered satisfactorily, specifically for high noise level cases. Via providing sufficient big dimension home windows, detection of impulse noise at high noise stages utilizing AMF is dependable for easy heritage video frames. Selection founded algorithm (DBA) is proposed to overcome this quandary.

On this, selected video frame is de-noised with the aid of using a 3x3 window. The detection of noise and noise free pixels is decided by way of checking the value of a processed pixel aspect lies between the highest and minimum values that occur within the selected window. If the processing pixel value is 0 or 255 it is processed in any other case it is left unchanged. Furthermore, the DBA uses simple fixed size window of dimension 3x3, and for this reason it requires scale back processing time whilst compared to AMF. However, at high noise density stages the median worth can be noisy. In this case, neighboring pixel is used for replacement. This repeated replacement of neighboring pixels produces streaking influence. Hence, small print and edges aren’t recovered satisfactorily, exceptionally when the noise level is high. With the intention to hinder this crisis, Modified Cascaded Filter (MCF) is proposed[16].

2. IMPLEMENTATION FOR VIDEO

The video is first converted into frames and frames into images. Then MCF algorithm is utilized to the images which can be divided from frames. After the filtering approach, the frames are modified again to the long-headquartered full video[17]. The MCF algorithm makes use of a combination of both DMF and UTMF, to additional give a boost to the output obtained from the UTMF. The noisy picture is first processed using the DMF. The output of DMF is given as the input of the UTMF[35-36]. The cascaded connection is consequently used to removal of salt and pepper noise with a noise density as high as 90%.

![Figure 1 Block Diagram for removing the noise from noisy Video using MCF](image)
3. PROPOSED ALGORITHM (FOR VIDEO)

1. The noisy video sequence containing noise is converted into frames, which is an uncompressed constitution and frames are extracted from the Video.
2. Frames are then converted to images for further processing.
3. The noisy pixel is de-noised utilizing MCF algorithm.
4. After completing the whole method, the processed frames are eventually changed back into original video.

4. SIMULATION RESULTS

90% Noise Added and Recovered Output

80% Noise Added and Recovered Output
70% Noise Added and Recovered Output

60% Noise Added and Recovered Output
The proposed method has been effectually implemented in MATLAB. This section offers with the results acquired after denoising making use of various filters moreover with discussions. For the entire analysis of the proposed work with conventional filters, this work utilizes a typical video from MATLAB[18-23]. The input video is “xylophone.Mpg", consists 141 frames[32-34].

Salt and Pepper noise filtering from input video using Proposed Algorithm (Modified Cascaded filter).

After denoising utilise MCF the denoised video frames converted to original video. For the whole comparative evaluation desk includes all IEF and PSNR

<table>
<thead>
<tr>
<th>Input Video (Xylophone.mpg)</th>
<th>Salt and Pepper Noise (50%)</th>
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<tbody>
<tr>
<td>S.No</td>
<td>Frame No.</td>
</tr>
<tr>
<td>1.</td>
<td>1</td>
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<tr>
<td>2.</td>
<td>21</td>
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<td>3.</td>
<td>41</td>
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<td>5.</td>
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<td>6.</td>
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<td>7.</td>
<td>121</td>
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<td>8.</td>
<td>141</td>
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</tbody>
</table>

In Fig.2 the outputs of more than a few filters like SMF, DMF, ATMF, UTMF, and Modified Cascaded Filter (MCF) are shown. Input Image represents the common video Frame 1 and Frame 31 and Noisy image represents snapshot corrupted by way of impulse[29-31] (salt &
pepper) noise video Frame 1 and Frame 31. From SMF may give a reasonable output best up to 50% for video Frame 1 and Frame 31, the same factor holds good for DMF and ATMF for video Frame 1 and Frame 31. An appropriate first-rate of the photograph is got for 70% of noised video Frame 1 and Frame 31 for the duration of the restoration making use of UTMF [24-28]. However in case of modified cascaded filter there may be an absolute restoration of 90% noise video Frame 1 and Frame 31 which will also be observed from the final row under proposed algorithm.

CONCLUSION

The restoration of Video which is extremely damaged by salt and pepper noise was projected. The modified cascaded filter (MCF) was checked with various video and the presentation of the proposed algorithm MCF are superior to the existing filters. The proposed algorithm predicted better PSNR and IEF, even at very high noise densities (around 90%), the texture, details and edges are preserved effectively.

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