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Study on the noise removal processing of TV picture at high speed

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ABSTRACT

This paper proposes a motion estimation method using the position estimation method of TV noise for motion picture restoration. On the basis of the block-matching used in the past, a new method is developed. The motion of the picture between the frames is calculated by the mean vector and the search position, and the search center moved is corrected by the approximated value. The method was verified as useful in this study.

1. Introduction

China has a vast terrain, there is TV receiving the signal unstable regions. In addition, affected by the TV around the home appliances, television image is noisy compared to the situation in general. Additionally, with the big screen and 3D television into the home, a television image in the presence of noise becomes more conspicuous. Television image denoising must be immediate.

Noise removal is a commonly used means of spatial filtering method and the dual axis direction of the ternary space filtration method, the means to achieve denoising purpose, but can not be repaired to avoid the negative portrait of the phenomenon of blurring can not be expected to obtain repair effect. Information so you can consider using vintage video of the large snowflake-like noise removal algorithm for point, the image of the frame correlation between the noise does not have the lock, and with noise corresponding to part of the previous frame or a frame image after the corresponding replacement parts to achieve the purpose of Noise. Noise is characterized by means of this to ensure removal of noise, but the large amount of computation, if the TV image denoising operation when used in real-time processing cannot guarantee the existence of the problem.

Based on this, the research problem to be solved is to ensure that the noise removal can be achieved under the premise of real-time repair process in order to carry out future IC chip equipped television to provide a theoretical basis. Improvement of the specific algorithm is used to explore the position correction, the implementation of exploration to determine the timing, noise removal and other block matching methods to determine timing of high-speed, accurate processing, to carry out experiments and performance analysis.

1.1. Vintage video noise removal method snow blocks being used in feasibility

1.1.1. TV image noise characteristics

- Lateral movement of the thread-like to do highlights.
- Bottom-up movement of the band spot.
- Shake the whole image (see less).

1.1.2. TV image band noise and block noise from vintage tape similar snow

- Randomly generated.
- The occurrence of two kinds of noise, location of the image for each frame is independent, and does not have the time axis direction correlation.
- The occurrence of noise and its position are usually different from the surrounding brightness values.

Based on the above characteristics, these two types of noise using the same method of noise reduction are feasible.

Snow black or white noise block the majority, and a number of multi-frame images in time up to 5% of the noise, the visual effect is not obvious. In addition the location of the noise is random, and does not have the time axis direction correlation. In addition, the direction of moving images on their own time, highly relevant, therefore, considers using the same method to remove the belt noise [6].

1.2. Band noise removal method

The object of this study is the dynamic image; dynamic image is composed of many image frame-by-frame combinations. Then

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the dynamic search method BM (block matching) method can be applied.

1.2.1. Improvement of noise removal performance

- Images and objects around the frame between frames for dynamic image processing, using BM method [3,4].
- Based on 1) the dynamic movement to determine the amount of income, to identify the object before and after the frame image with the relative position of two images, the implementation of the middle filter method (MF) [1]

BM method by the above two processes.

1.2.2. Past the BM method based denoising methods and problems

BM method: The average of the past BM method is often used, but the average method for the detection of noise and dynamic ribbon determine the failure cases more. Band noise than their brightness values around some large, containing the pixel noise error is considered to be the absolute value of deviation from the experimental setting. Therefore, the average absolute value of the block is also considered, as deviations from the correct decision cannot be achieved dynamically [2].

Using BM method, the value of dramatic changes in luminance area that is noise, which determine the way to do the whole full-frame image retrieval; naturally there will be enormous computational deficiencies.

BM calculation: Now, the dynamic is often determined by the BM approach is to target the frame image is divided into E × E of the block, in blocks for dynamic search and dynamic determination. Reference frame the same position as the central image, within a certain range (±*P*) the corresponding minimum error block retrieval. Now set the image frame *n*, with reference to frame the image, compared with *n*−1. *n* in a position *x*, the value of brightness is In (*x*), *x* the pixel location and reference frame image from the displacement of that position is set to *d*, then moved the position *x* + *d* of the pixels of the absolute error (AE) can use Eq. (1) said. (Fig. 1)

$$AE(x, d) = |\mathrm{In}(x) - \mathrm{In} - 1(x + d)| \quad (1)$$

These functions are called the block error analysis functions. Over the past BM (average BM) analysis of the function can be expressed as follows (*N*: number of pixels within the block E × E).

$$MAE(d) = \frac{1}{N}\sum_{i=1}^{N} AE(x_i, d) \quad (2)$$

1.3. To do with the BM method to determine

In noise removal, the first frame image is divided into *N* × *N* small blocks, a frame of reference for the field of image and the frame around the image relative to its corresponding position to do with the BM method to determine, as the first process, that is, dynamic decision process. The second process is the so-called dynamically determined based on the object frame before the frame image and its corresponding position image map together, the timeline on the direction of filtering, also known as the filtering process. Also, filtering processing is embedded in the normal image noise, only the noise part of the detection, treatment [5].

2. Suitable for high-speed removal of the BM strip method of noise

To achieve high-speed processing, the location of the study, the search and retrieval of the implementation of amendments to deal with two schemes to determine.

2.1. The amendment to retrieve location

The average application and principles of dynamic displacement: Calculate the dynamic displacement of the frame image, retrieving center shift along the displacement, as amended position on the search [7,8].

The amendment to retrieve the position: Image for the movement along the frame just behind the location of fine-tuning. This correction method to retrieve the location of the former a dynamic image obtained average displacement of all images, and do according to all the moves from the displacement. This approach can make the search to determine rate and high-speed processing (Fig. 2, dynamic displacement (indicative) and Fig. 3, dynamic displacement (example) said.).

Shown in Fig. 3 is the timeline on the direction of two successive frames represented by the image. In both images in the frame, all are in the mobile landscape. Frame images are small and are behind the pink light pink small frame image comparison; the peak position of the movement has occurred, and the location must be amended.

In the first exploration, the average of all images was obtained with reference to the dynamic displacement, the number of amendments with the obtained search to determine the location and retrieval.

2.2. The implementation of the decision to retrieve

In order to achieve real-time processing, the dynamic part of the high-speed retrieval was studied. A high-speed processing method is implemented when the low matching search was processed. This authentication feature is used to find matching to achieve, rather than view the difference [9].

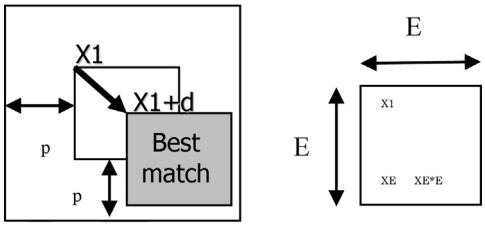

Fig. 1. About BM.

Fig. 2. Indicative.

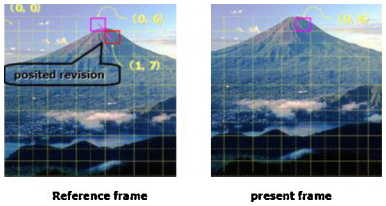

Fig. 3. Example.