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How to eliminate the shaking of motion image sequence

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ABSTRACT

In order to meet the requirements of analyzing sports techniques to have quick feedback and to be easy to operate and for the sake of providing the subsequent sequence of motion video analysis system with motion image sequence, which is convenient for computers to recognize automatically, this paper bases on the regularity of two adjacent images produce the shaking of vertical lines of pixels, and uses the method of using the odd-numbered frame image of the next pixel on an adjacent line to replace the even-numbered pixel rows in the frame, which lead to an unchanging result to eliminate the shaking of motion image sequence.

KEYWORDS

Motion image sequence; Shaking; DirectShow technology.



INTRODUCTION

The development of modern science and technology has greatly promoted the progress of science and technology in sports. High-tech means is widely used in sports training which improves the scientific training level, promotes the sports technical level and improves the results of the competition. With the rapid development of computer technology and the emergence of the Internet, sports video parsing system, as a monitoring sports technique in sports training and one of the important means of training methods, has made considerable progress. However, behind the large-scale development of sports video analysis system there are still serious defects. They are not timely feedback and complex operation. It is not until a month or two or even three or four months later after the image is captured can we get the test data, which not only can not achieve real-time monitoring, but also the resulting data do not have practical guidance value. The operation of sports video parsing system is relatively complex, which requires some basic knowledge and rigorous training. For busy coaches, it can be less maneuverability.

Now, there is a trend of using automatic human movement analysis to solve the problems of rapid feedback and operability of the motion video parsing system. There are many advantages of using computer intelligence to automatically capture, edit, recognize, judge, and analyze the moving images. They are low cost, short cycle, high accuracy, good repeatability, and most importantly it can achieve rapid feedback and have better maneuverability, which is very promising.

To extract the image sequence is the preparatory stage of the resolution process. Its quality directly affects the subsequent steps in the results. This paper eliminates ghosting images and re-frames by using the method of filling, which at the same time brings the problem of the shaking of motion image sequence. This is not only the problem existing in this study. Foreign advanced image analysis system, such as America's Ariel image analytical system also has this problem.

The shaking of vertical pixel row of the image lines is very small. It has little impact to traditional image parsing process, namely the light pen point by hand joint point. But for the computer to automatically recognize human movement, it will have a great impact. Using computer to extract human movement should use the method of absolute difference that is the comparison between current image and reference image (a static background image), in other words, between input image and background models. By judging the change of grayscale or other characteristics, we can detect the motion of human body in video images. The shaking of the vertical pixel row of the image lines makes the odd and even frames in image sequence an enormous difference in the pixel level, which greatly affects the effects of detecting and extracting the motion of human body, thereby restricts the achievements of image segmentation, automatic recognition based on the key points of grayscale or contour line, automatic division in sports stage, and automatic motion analysis.

In order to meet the requirements of analyzing sports techniques to have quick feedback and to be easy to operate, and to provide easy to use image sequence for subsequent human movement analysis system to automatically edit, recognize, judge, analyze. This research bases on the regularity of two adjacent images produce the shaking of vertical lines of pixels, and uses the method of using the odd-numbered frame image of the next pixel on an adjacent line to replace the even-numbered pixel rows in the frame, which lead to an unchanging result to eliminate the shaking of motion image sequence.

EXPERIMENTAL SECTION

System operating environment and system overview

This system can be operated on windows operating system platform, and it is written in VC ++ language^[6,7]. This system is composed of open-motion video, save path setting, set frame rate, crawling motion picture sequence, help, and quit six major modules. The open-motion video module is used to import some motion picture video to be analyzed (This program provides support for both formats avi and mpg). Save path setting module is applied to set the location for the exported motion picture sequence. Set frame rate module is used to set the frequency of crawling motion picture sequence.

Crawling motion picture sequence module is used to change the motion picture video into a sequence of moving images (It is saved as the type of Bitmap File (*. bmp)). Help module completes online help. Exit module is the system of export, which is used to exit the system^[1]. System structure diagram is shown in Figure 1.

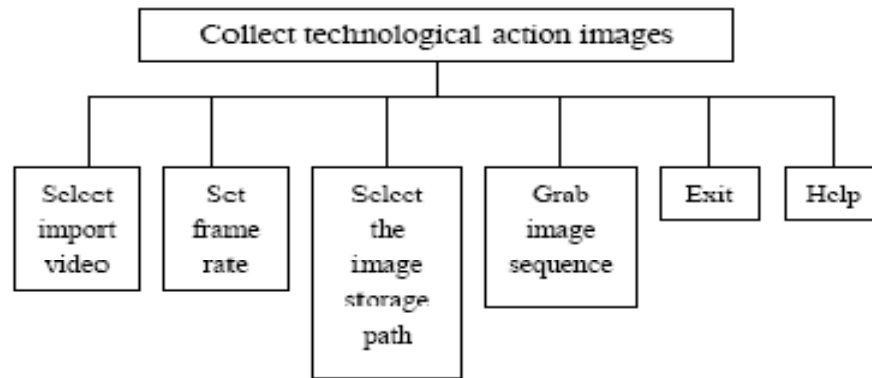


Figure 1 : System structure

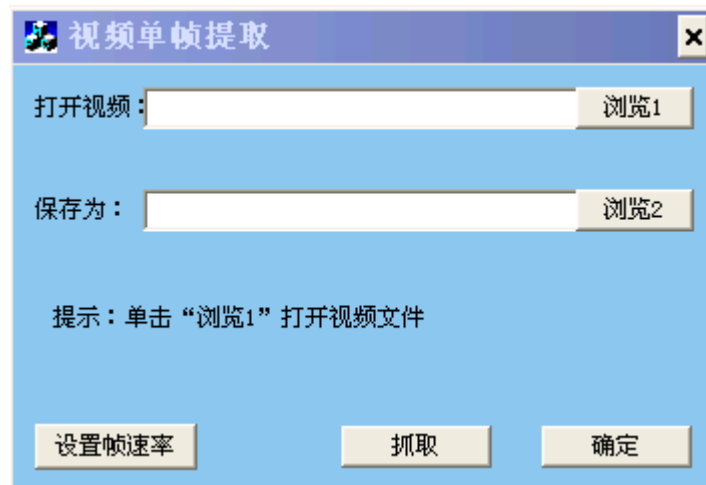


Figure 2 : Main program interface of "single frame extraction of video"

CORRELATION TECHNIQUE

DirectShow technology^[5]

Microsoft DirectShow is a streaming architecture of Microsoft's Windows platform. It provides multimedia stream of high quality to capture and playback. It supports a variety of formats, including advanced streaming format (ASF), crisscross of moving pictures expert group (MPEG), audio and video (AVI), the MPEG audio layer 3 (MP3) and WAV sound files. It supports capturing information from Windows Driver Model (WDM) or Video for Windows (VFW) digital equipment and similar devices.

DirectShow enables media playback, format conversion and capture task to be simple. At the same time, it entitles the application programs which need customized solutions to use the underlying flow control architecture. Moreover, it can also create its own DirectShow components to support new formats or custom effects.

By using Media Detector (IMediaDet) in DirectShow, we can not only obtain information about the video format, but also grab a bitmap image of the video stream from the source file. Assume that this video is searchable, we can get any image file at a point and the returned image is a 24-bit RGB format.



Figure 3 : Ghosting image

Media Detector uses IMediaDet interface. Through IMediaDet interface, we can obtain the multimedia file information, such as number of streams, media types, duration, frame rate of the stream, etc, and we can also obtain a function of a single frame image from the video stream.

Image processing

Problems

Through ImediaDet interface, we can extract images from videos. But there are two problems:

(1) Ghosting image phenomenon

For motion picture (in running motion, for example), we extract an image with ghosting image phenomenon as shown in Figure 3. The contour edge of the athlete in the image is very unclear, which exhibits a sawtooth shape. Figure 4 is an enlarged display of the effect of a part of the thigh.

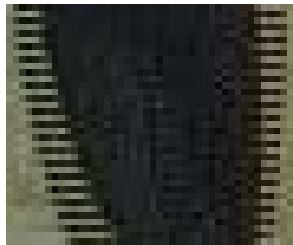


Figure 4 : Enlarged ghosting image

(2) Re-frame phenomenon

In the extracted image sequence, each of the two adjacent odd and even frames is same. Numbering the images accordingly as one, two, and so on to the first and second, etc images. Then one and two, three and four, five and six..., they are the same respectively, which means half of the extracted image is “redundant”.



Figure 5 : Tagged ghosting figure

Resolutions^[8]



Figure 6 : Black filling diagram

In order to better analyze the reasons of these problems, we add a horizontal line in Figure 4 as shown in Figure 5. On the left side, the part that the sawtooth shape intersects with the dotted line is the background color, while the right side is the foreground color (the scene is defined as background and the athlete as foreground). When the left side is foreground color, the right side is just background color. The foreground color just alternates with the background color on both sides. And the middle part which is the intersection of both sides is foreground color. Therefore, suggesting that the extracted image is composed of two frames and single scan line and dual scan line are taken from two adjacent frames, we separately put the single and dual scan lines of the repeated frame in two images. But after such treatment, the resultant image is only a single scan line or dual scan line. The missing part can be filled by using two methods:

Fill the missing part with certain color (such as black). The effect is shown in Figure 6. The image becomes dark as a whole. And the effect is not very ideal.



Figure 7 : Adjacent line filling diagram

Fill the missing part with the color of its adjacent line. The effect is shown in Figure 7. This effect is better.

Removal of the image shaking

Due to the process of filling the adjacent line, it produces the problem of image shaking. The reason is that during the filling process, the missing part is filled with its adjacent line, which makes the two adjacent frames corresponding to two adjacent scanning line storage single or double row pixels not the same line pixel. As a result, it makes the two obtained adjacent images produce vertical lines of pixels of shaking. It is shown in Figure 8 (h is a pixel height):



Figure 8 : Shaking image (Overhead point)

This paper bases on the regularity of two adjacent images produce the shaking of vertical lines of pixels, and uses the method of using the odd-numbered frame image of the next pixel on an adjacent line to replace the even-numbered pixel rows in the frame, which lead to an unchanging result to eliminate the shaking of motion image sequence.

MAIN PROGRAM SOURCE CODE

```

for( m=0;m<height-1;)//
{
for(int n=0;n<wide;n++)
{
temp1=temp+dwWidthBytes*(height-1-m)+3*n;//m
temp2=temp+dwWidthBytes*(height-2-m)+3*n;//m+1
for(int a=0;a<3;a++)
{
unsigned char grey=*temp2++;
*temp1=grey;
temp1++;
}
temp1=pData+dwWidthBytes*(height-1-m)+3*n;
temp2=pData+dwWidthBytes*(height-2-m)+3*n;
for( a=0;a<3;a++)
{
unsigned char grey=*temp2++;
*temp1=grey;
temp1++;
}
}
m+=2;
}
for(int m=0;m<height-1;m++)//
{
for(int n=0;n<wide;n++)
{
temp2=pData+dwWidthBytes*(height-1-m)+3*n;//m
temp1=pData+dwWidthBytes*(height-2-m)+3*n;//m+1
*temp2=*temp1;

```



```

*(temp2+1)=*(temp1+1);
*(temp2+2)=*(temp1+2);
}
}

```

FINAL RENDERINGS

Figure 9 is a motion image sequence extracted from the national track and field trials Women's 10,000 m race in Shijiazhuang.



Figure 9 : Final renderings

CONCLUSION

This paper uses the method of separately putting the single and dual scan lines of the repeated frame in two images and filling the missing part with the color of its adjacent line to eliminate the same adjacent parity and ghosting image in image sequence.

This paper bases on the regularity of two adjacent images produce the shaking of vertical lines of pixels, and uses the method of using the odd-numbered frame image of the next pixel on an adjacent line to replace the even-numbered pixel rows in the frame, which lead to an unchanging result to eliminate the shaking of motion image sequence.

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