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Android Based Video Enhancement

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Abstract- Video enhancement is one of the most important and difficult components in video research. The aim of video enhancement in android system is to improve the visual appearance of the video, or to provide a "better" transform representation for future automated video processing, such as surveillance system, traffic, criminal justice system. This paper gives an innovative approach in android devices for video enhancement. The whole system is divided in different modules. Various problems related video enhancement in android devices are also described in this paper. This paper describes various method required for video enhancement.

Index Terms- video enhancement, video research, future automated video processing, surveillance system, traffic, criminal justice system

1. INTRODUCTION

Most of the time digital video has become an integral part in life. It is well known that in android deviced video enhancement as an active topic in computer vision has received much attention. The main aim to improve a poor quality video is for making the frames in the video clearer. By making the frames clear we can make high quality video. This can be used in surveillance system. It can also help for analyses background information that is essential for object behaviour without human inspection.

Carrying out video enhancement understanding under low quality video is a challenging problem because of the following reasons. (i)Due to low contrast, we cannot clearly extract moving objects from the dark background. (ii) The signal to noise ratio is usually very low due to high ISO. Sharpening of frames in video can emphasizing texture and drawing viewer focus. [1] By increasing the video quality in surveillance system most of the cases can be solved this can be used in other areas also.

2. BACKGROUND AND MOTIVATION

In android devices video enhancement is difficult as there are different apps that has to be downloaded for video editing and enhancement. To overcome this problem we are making an app which will include all modules of video enhancement in one.

3. PROBLEM STATEMENT

It is difficult to perform video enhancement in android devices because in play store there does not exist an application which gives the high quality video. To enhance video user need to download different applications. The low resolution of android camera makes the video quality worse. If the video is too long then it is difficult to edit the video and make it clear. For cropping a video there is a different application, for taking screenshot, an application called screenshot can be used and so on. This approach consumes more space as we have to download different applications. The more time is wasted in downloading many applications.

4. LITERATURE REVIEW

1. Fast Digital Image Contrast Enhancement, Gabriel Thomas, Daniel Flores-Tapia and Stephen Pistorius [2]
One of the problems that some inexpensive digital cameras have is the long time delay that exists when one presses the shutter and the time it takes to see an image captured in the camera's display. With this in mind, the contrast enhancement method proposed in this paper relies on an approach that can improve the contrast based on a simple and fast algorithm.

Histogram equalization

Modifying an image such that its histogram has a uniform distribution usually yields better contrast. The technique is known as histogram equalization and the transformation T(r) needed to obtain this equalization can be formulated as:

$$s = T(r) = \int_0^r p_r(w)dw \quad \text{.....(1)}$$

where r is the intensity value of the original pixel, s is the pixel value of the transformed image, and pr(r) is the Probability Density Function associated to the original image. It is assumed that the image is the outcome of a continuous random variable and that the histogram resembles its PDF.

In this paper, PDF refers to a histogram that has been normalizes so that the area equal to one. Histogram equalization is then calculated by using the Cumulative Density Function of the original image as the transformation function as expressed in (1). It can be easily shown that the PDF of the transformed image is indeed distributed uniform.

In its discrete form, (1) becomes

$$s_k=T(r_k)= \sum_{j=0}^{k} p_r(r_j) \text{ for } k=0,1,\ldots\ldots,L-1$$

for an image with *L* gray level values.

Contrast enhancement by a piecewise linear transformation

Recently, Tsai and Yeh [4] developed a contrast enhancement technique based on a Piecewise Linear Transformation (PLT) function *T*(*ri*) described as

$T_{k-1}(r_i)=\frac{(s_k-s_{k-1})}{(v_k-v_{k-1})}(r_i-v_{k-1})+S_{k-1}$ for $k = 1,2, \ldots,V$ where

for $k = 1,2, \ldots,V$ where
V is the total number of segments that is equal to the total number of valleys minus one found in a smooth version of the original histogram, the *vk*'s are the valley locations of the different modes found in the histogram *rio*e[*vk-1*,*vk*], and the *sk*'s are computed as

$S_k=\sum_{k=0}^{v_k} f_R(r_k)$ for $k=0,1/(L-1), 2/(L-1),\ldots,vk$.

2. Gaussian Blurring-Deblurring for Improved Image Compression, Moi Hoon Yap, Michel Bister, Hong Tat Ewe Multimedia University (MMU) [3]

In the present paper, we are not necessarily interested in the absolute performance of the compression algorithm, but in the improvement that the proposed pre- and post-processing step (blurring and de-blurring) could bring about. Hence, we chose for two very basic compression schemes. The first one consists of calculating the Discrete Cosine Transform (DCT) of the image and thresholding the coefficients. The ratio of image size to number of non-zero coefficients can be taken as an approximation to the *CR*. The second one is the plain JPEG compression algorithm from Independent JPEG Group (IJG) [4], with a quality factor *Q* to tune the *CR*. Taking into account that most processing was done in Matlab®, all the images were converted to floating-point representation and rescaled to values between 0 and 1.

First premise: smooth images can be compressed much more efficiently than images with a lot of (high-frequency) details. This makes a lot of sense, since the sharp details in the image produce many high-frequency components in the transformed domain (be it DCT or DWT(Discrete Wavelets Transform)), hence many significant coefficients which all have to be encoded.

Second premise: high-frequency details can be removed with appropriate lowpass filtering, but of course this introduces blurring errors. Simply put, low-pass filtering removes exactly the high frequencies that take up a lot of cost to encode.

Third premise: Gaussian blurring can efficiently be de-blurred. The approach proposed in [1] and [2] is based on a Taylor expansion of the image along the scale axis, and following the expansion in for negative scales, i.e. de-blurring. This Taylor expansion has the following shape:

$$L_{(x,y;t)}=L_{(x,y;0)}+t\frac{\partial L_{(x,y;0)}}{\partial t}+\frac{t^2}{2}\frac{\partial^2 L_{(x,y;0)}}{\partial t^2}+\frac{t^3}{6}\frac{\partial^3 L_{(x,y;0)}}{\partial t^3}+O(t^4)$$

…….(1)

whereby $L(x, y; t)$ is the image, with *x* and *y* the spatial coordinates and *t* the scaling parameter. The derivatives to the scale can easily be calculated using the diffusion equation:

$$\frac{\partial L}{\partial t}=\frac{\partial^2 L}{\partial x^2}+\frac{\partial^2 L}{\partial y^2} \quad \ldots\ldots\ldots(2)$$

Hence, the scale derivatives can easily be calculated as combinations of spatial derivatives, which, in turn, can be calculated as convolutions of the input image with the derivative of the Gaussian:

$$\frac{\partial(L\otimes G)}{\partial x}=\Im^{-1}\left(\Im\left(\frac{\partial(L\otimes G)}{\partial x}\right)\right)=\Im^{-1}(\Im(L\otimes G)i\omega)=\Im^{-1}(\Im(L)\Im(G)i\omega)$$

$$=\Im^{-1}(\Im(L)\{\Im(G)i\omega\})=\Im^{-1}\left(\Im(L)\left\{\Im\left(\frac{\partial G}{\partial x}\right)\right\}\right)=L\otimes\frac{\partial G}{\partial x}$$

…….(3)

The deblurring process depends on two parameters: the amount of blurring used to calculate the derivative operators (which should logically be as small as possible), and the order to which the Taylor expansion is carried. In the case of 3rd order expansion ($R = 3$), we come to following expression, with derivatives up till the 6th order (from the diffusion equation we notice that an *n*th order derivative along the scale corresponds to a combination of spatial derivatives of order 2n):

$$L(x,y;t)=L(x,y;0)+t\left(\frac{\partial^2 L(x,y;0)}{\partial x^2}+\frac{\partial^2 L(x,y;0)}{\partial y^2}\right)+\frac{t^2}{2}\left(\frac{\partial^4 L(x,y;0)}{\partial x^4}+2\frac{\partial^4 L(x,y;0)}{\partial x^2\partial y^2}+\frac{\partial^4 L(x,y;0)}{\partial y^4}\right)$$

$$+\frac{t^3}{6}\left(\frac{\partial^6 L(x,y;0)}{\partial x^6}+3\frac{\partial^6 L(x,y;0)}{\partial x^4\partial y^2}+3\frac{\partial^6 L(x,y;0)}{\partial x^2\partial y^4}+\frac{\partial^6 L(x,y;0)}{\partial y^6}\right)$$

…….(4)

3. PIXLREXPRESS

PixlrExpress is an android app which lets you edit images. This app can perform blurring, shrpening, contrast, brightness and has many filters that can be applied on images. [4]

4. SCREENSHOT

This is an android app used to capture screen. User has to give a time interval after which user wants to capture a screenshot. Files can be saved in Bmp, PNG or JPG format. [5]

5. SOLUTION METHODOLOGIES

The problem of downloading various applications for video editing will be solved if there exist one application which combines cropping, taking frames from video, editing frames, and combining frames. This application will first crop the video then it will take frames from video. After taking the frames, image processing will be done to make the frames more clear and in the last it will combine the images to create the video.

6. DESIGN

As there exists different applications to perform video enhancement we are making an app which combines

modules which will used to enhance video. We have divided the app in different modules such as video cropping, screen capturing, image editing, image clubbing. In video cropping a video will be taken as an input and will be cropped according to user requirements. In the next module screenshot is taken as an input and screen will be captured according to time specified by the user. These captured images will be edited in image processing module and will be saved. In the last stage the images are combined to create a high quality video.

7. PROPOSED SYSTEM

The main of our system is to crop videos and save the videos in frames. The frames can be edited in various ways to get the clear picture. To edit the pictures various options like blurring, sharpening, rotate, flip, brightness, contrast etc. will be provided. These pictures are then merged to form a video. At the end if user wants to change the format of the video, they can do that with the help of converter.

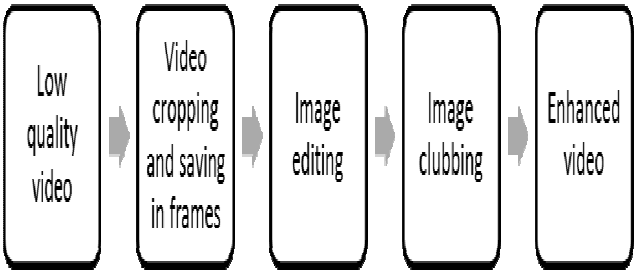

Fig 1. Prosposed System

8. DEVELOPMENT METHODOLOGY

Our system is divided into 3 modules.

1) Video cropping:
   In this module frame extraction from the given low quality video will be done. User will give start time, end time and the time interval.
2) Image editing:[7]
   In this module the frames extracted from the video will be edited with various options like blurring, sharpening, rotate, flip, brightness, contrast.
3) Image clubbing[6]
   The edited images are clubbed to form the enhanced video.

9. CONCLUSION

Low quality video of most surveillance cameras is not satisfied and difficult to understand because they lack surrounding scene context due to poor illumination [1]. Many applications need to be downloaded in android to perform video enhancement. This system combines all this application so it will reduce memory usage in android. This proposed system will make frames clear so that the frames in the video would be clearer and the edited video will be high quality video. It can be used by the surveillance, traffic, criminal justice systems etc.

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