

BACKGROUND MODELING USING INPAINTING FOR VIDEO MOTION ANALYSIS

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Abstract - Cameras are used in most recent robotic system used for selection of applications such as gaming, facilitation of communication and health care for intensity measurement of an environment under scanning at a higher frame rate. The Kinect sensor normally use infrared light as a source of scanning the object, So the problem in the system comes from the fact that if the infrared light hit the object like glass, plastics or other infrared light absorbing materials the rays will be deflected rather than being reflected, so it will get a empty data in that part of an image containing those objects while acquiring images at higher frame rate (Video).It is very important to fill up the empty area in each frame so that neighboring regions does not gets affected along with foreground and the background of an image. This process is called as Inpainting. Here it proposes a more efficient Inpainting algorithm based on the background estimation of an image.

Index Terms – Kinect, lost values, real-time, background estimation.

I.INTRODUCTION

Image inpainting refers to the process of restoring lost or damaged areas of an image. The work is dealing with disocclusion has been provided the term inpainting first appeared in analogy with a process used in art restoration. Image inpainting is an ill-posed inverse problem that has no well-defined unique solution. To solve the problem, it is therefore necessary to introduce image priors. All methods are guided by the assumption that

pixels in the known and unknown parts of the image share the same statistical properties or geometrical structures.

Recent advances in sensors and computers have inspired the application of computer systems in increasingly complex tasks and situations, often containing aspects of human computer interaction. Optical sensors are attractive for such scenarios because they allow for a contactless, non-intrusive sensing of the environment. Microsoft's Kinect sensor has probably been the sensor with the highest influence on the robotics and mechatronics communities in the last three years. Originally proposed as a game controller, many researchers have explored additional applications in healthcare robotics, video surveillance, or the facilitation of communication.

It is primarily the low price of the device that motivates researchers to explore the Kinect device in applications that have formerly been solved even by non-optical sensors, although alternative depth sensors with comparable performance exist.

II.RELATED WORK

Inpainting [1] is the process of reconstructing lost or deteriorated part of images based on the background information. Image Inpainting fills the missing or damaged region in an image utilizing spatial information of its neighboring region. Inpainting algorithm have numerous applications. It is helpfully used for restoration of old films and object removal in digital photographs. Super resolution reconstruction produces high resolution image from sequence of low

resolution images. The main aim of super resolution is to improve visual quality of available low resolution image.

Layered Depth Video (LDV) [2] is recognized as a promising 3D video data representation for supporting advanced 3D video services required in Multi View Video (MVV) systems such as Three-Dimensional Television (3DTV). The addressed problem of residual layer generation in LDV data representation by proposing the use of a post-process on the disoccluded areas based on inpainting techniques, which are well-known for their ability to propagate texture and structure along the contours of 'holes'.

Video de-fencing [3] is provided an initial solution to a novel video editing task. It targets automatic restoration of the video clips that are corrupted by fence-like occlusions during capture. The key observation lies in the visual parallax between fences and background scenes, which is caused by the fact that the former are typically closer to the camera.

The DIBR algorithm [4] can be used in 3-D video applications to synthesize a number of different perspectives of the same scene, e.g., from a Multiview-video-plus-depth (MVD) representation. This MVD format consists of video and depth sequences for a limited number of original camera views of the same natural scene. Here, DIBR methods allow the computation of additional new views.

III. INPAINTING USING BACKGROUND ESTIMATION

In basic terms, it defines the background as the stationary portion of a scene. Many applications simply require that there be introductory frames in the sequence which contain only background elements. If pure background frames are available, pixel-wise statistics in color and depth can be computed directly. The more difficult case is computing the background

model in sequences which always contain foreground elements.

The model of each pixel as an independent statistical process. It records the (R,G,B,Z) observations at each pixel over a sequence of frames in a multidimensional histogram. Then use a clustering method to fit the data with an approximation of a Mixture of Gaussians. For ease of computation, it assumes a covariance matrix of the form $\Sigma = \sigma^2 I$. At each pixel one of the cluster is selected as the background process. The others are considered to be caused by foreground processes. In the general case where depth measurements at the pixel are largely valid, the background is simply represented by the mode which is farthest in range and covers at least T% of the data temporally. Fig 1. explained about the background estimation of an image.

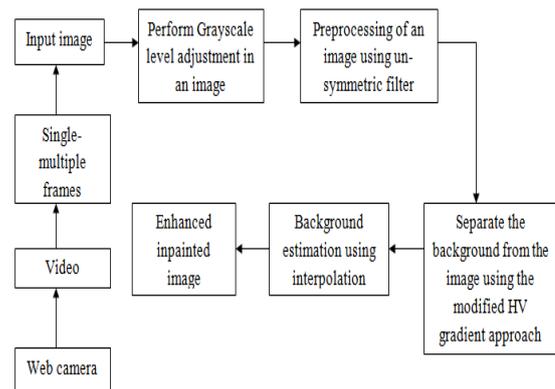


Fig 1. Block Diagram

Web Camera

A Web camera is a video camera that feeds or streams its image in real time to or through a computer to computer network. When "captured" by the computer, the video stream may be saved, viewed or sent on to other networks via systems such as the internet, and email as an attachment. When sent to a remote location, the video stream may be saved, viewed or on sent there. Unlike an IP camera (which connects using Ethernet or Wi-Fi), a webcam is generally connected by a USB cable, or similar cable, or built into computer hardware, such as laptops.

The most popular use is the establishment of video links, permitting

computers to act as videophones or videoconference stations. Other popular uses include security surveillance, computer_vision, video broadcasting, and for recording social videos. Web cameras are known for their low manufacturing cost and flexibility, making them the lowest cost form of video_telephony. It has also become a source of security and privacy issues, as some built-in webcams can be remotely activated via spyware.

Using frame differencing

A motion detection algorithm begins with the segmentation part where foreground or moving objects are segmented from the background. The simplest way to implement this is to take an image as background and take the frames obtained at the time t , denoted by $I(t)$ to compare with the background image denoted by B .

Gray scale

In photography and computing, a grayscale digital image is an image in which the value of each pixel is a single sample, that is, it carries only intensity information. Images of this sort, also known as black-and-white, are composed exclusively of shades of gray, varying from black at the weakest intensity to white at the strongest.

Preprocessing range of data

Video from a pair of cameras are used to estimate the distance of the objects in the scene using the census stereo algorithm. It has implemented the census algorithm on a single PCI card, multi-FPGA reconfigurable computing engine. This stereo system is capable of computing 32 stereo disparities on 320 by 240 images at 57 frames per second, or approximately 140 million pixel-disparities per second. Using a commercial PCI frame-grabber, the system runs at 30 frames per second and 73 million pixel-disparities per second. These processing speeds compare quite favorably with other real-time stereo implementations.

Interpolation

Interpolation is the process is used to estimate the known values at unknown locations.

An image $f(x,y)$ tells us the intensity values at the integral lattice locations, i.e., when x and y are both integers. Image interpolation refers to the "guess" of intensity values at missing locations, i.e., x and y can be arbitrary.

IV.FILTERING TECHNIQUES

Gaussian filter

A Gaussian filter is a filter whose impulse response is Gaussian function. Gaussian filters have the properties of having no overshoot to a step function input while minimizing the rise and fall time. This behavior is closely connected to the fact that the Gaussian filter has the minimum possible group delay. It is considered the ideal time domain filter, just as the sinc is the ideal frequency domain filter. These properties are important in areas such as oscilloscopes and digital telecommunication systems.

Mathematically, a Gaussian filter modifies the input signal by convolution with a Gaussian function; this transformation is also known as the Weierstrass transform.

Wiener filter

Wiener filters play a central role in a wide range of applications such as linear prediction, echo cancellation, signal restoration, channel equalization and system identification. The coefficients of a Wiener filter are calculated to minimize the average squared distance between the filter output and a desired signal. In its basic form, the Wiener theory assumes that the signals are stationary processes.

Discrete Wavelet Transform

A discrete wavelet transform (DWT) is any wavelet transform for which the wavelets are discretely sampled. As with other wavelet transforms, a key advantage it has

over Fourier transforms is temporal resolution: it captures both frequency and location information (location in time).

Hamming window

It is a mathematical function that is zero-valued outside of some chosen interval. For instance, a function that is constant inside the interval and zero elsewhere is called a rectangular window, which describes the shape of its graphical representation. When another function is multiplied by a window function, the product is also zero-valued outside the interval: all that is left is the part where they overlap, the "view through the window". The output of the hamming window is shown in Fig.2

Symmetric neighborhood filter

Due to noise and blur, regions in real images are seldom homogeneous in grey level and sharp along their borders. Preprocessing the image with an enhancement filter that reduces these effects will yield better segmentation results.

Peak Signal to Noise Ratio

Peak signal-to-noise ratio, often abbreviated PSNR, is the ratio between the maximum possible power of a signal and the power of corrupting noise that affects the fidelity of its representation. Because many signals have a very wide dynamic range, PSNR is usually expressed in terms of the logarithmic decibel scale. The output or the PSNR is shown in Fig 3.

Median filter

Median filtering is a nonlinear method used to remove noise from images. It is widely used as it is very effective at removing noise while preserving edges. It is particularly effective at removing 'salt and pepper' type noise. The median filter works by moving through the image pixel by pixel, replacing each value with the median value of neighboring pixels. The pattern of neighbors is called the "window", which slides, pixel by pixel over the entire image pixel, image. The median is calculated by first sorting all the

pixel values from the window into numerical order, and then replacing the pixel being considered with the middle (median) pixel value. The output of the median filter is shown in Fig 4.

V.RESULT ANALYSIS

MATLAB

MATLAB is a modern programming language environment: it has sophisticated data structures, contains built-in editing and debugging tools, and supports object-oriented programming. MATLAB is an interactive system whose basic data element is an array that does not require dimensioning.

MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming environment.

The simulation has completed with the help of MATLAB software.

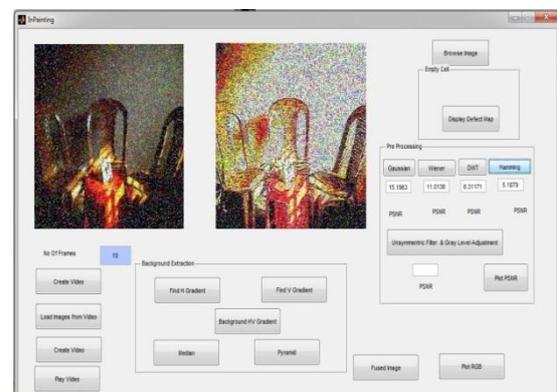


Fig 2.Hamming Window

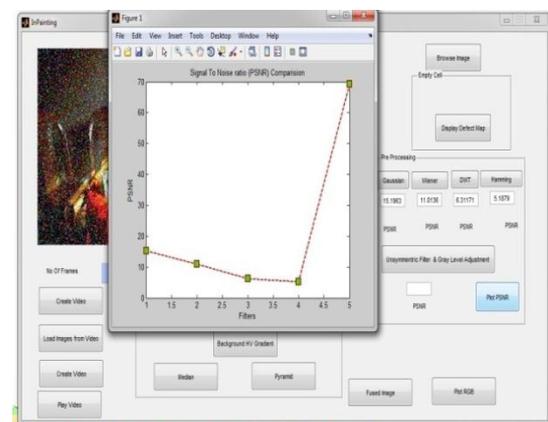


Fig 3.PSNR

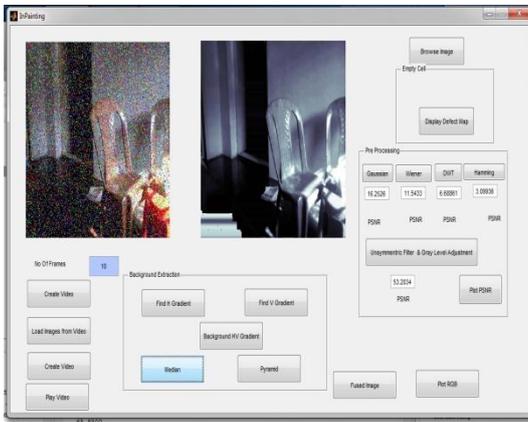


Fig 4. Median Filter

VI.CONCLUSION

As a method for the inpainting of lost values in the intensity maps obtained from related sensors. By using background estimates of the unoccluded scene, huge gaps could be inpainted without blurring between foreground and background. The high amount of outliers found in realistic measurements be handled in real-time by means of robust information, an inadequate Gaussian model.

VII.REFERENCES

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