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IMAGE PROCESSING IN MULTIMEDIA APPLICATIONS

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Abstract- Image Processing in Multimedia Applications treats a number of critical topics in multimedia systems, with respect to image and video processing techniques and their implementations. These techniques include the Image and video compression techniques and standards, and Image and video indexing and retrieval techniques. Image Processing is an important tool to develop a Multimedia Application.

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In electrical engineering and computer science, image processing is any form of signal processing for which the input is an image, such as a photograph or video frame; the output of image processing may be either an image or, a set of characteristics or parameters related to the image. Most image-processing techniques involve treating the image as a two-dimensional signal and applying standard signal-processing techniques to it.Image processing usually refers to digital image processing, but optical and analog image processing also are possible. This article is about general techniques that apply to all of them. The *acquisition* of images (producing the input image in the first place) is referred to as imaging. The Digital image processing is the use of computer algorithms to perform image processing on digital images. As a subcategory or field of digital signal processing, digital image processing has many advantages over analog image processing. It allows a much wider range of algorithms to be applied to the input data and can avoid problems such as the build-up of noise and signal distortion during processing. Since images are defined over two dimensions (perhaps more) digital image processing may be modeled in the form of multidimensional systems. Many of the techniques of digital image processing, or digital picture processing as it often was called, were developed in the 1960s at the Jet Propulsion Laboratory, Massachusetts Institute of Technology, Bell Laboratories, University of Maryland, and a few other research facilities, with application to satellite imagery, wire-photo standards conversion, medical imaging, videophone, character recognition, and photograph enhancement.[1] The cost of processing was fairly high, however, with the computing equipment of that era. That changed in the 1970s, when digital image processing proliferated as cheaper computers and dedicated hardware became available. Images then could be processed in real time, for some dedicated problems such as television standards conversion. As general-purpose computers became faster, they started to take over the role of dedicated hardware for all but the most specialized and computer-intensive operations.With the fast computers and signal processors available in the 2000s, digital image processing has become the most common form of image processing and generally, is used because it is not only the most versatile method, but also the cheapest.Digital image processing technology for medical applications was inducted into the Space Foundation Space Technology Hall of Fame in 1994. A digital image processing allows the use of much more complex algorithms for image processing, and hence, can offer both more sophisticated performance at simple tasks, and the implementation of methods which would be impossible by analog meansIn particular, digital image processing is the only practical technology for Classification, extraction Pattern, Projection,Multi -scale signal analysis.Some techniques which are used in digital image processing includes-Pixelization,Linear filtering,Principal components analysis,Independent component analysis,models, Anisotropic,Partial differential equations,Self-organizing maps,Neural networks,Wavelets.

Some greyscale images have more greyscales, for instance 16 bit = 65536 greyscales. In principle three greyscale images can be combined to form an image with 281,474,976,710,656 greyscales.

There are two general groups of 'images': vector graphics (or line art) and bitmaps (pixel-based or 'images'). Some of the most common file formats are:

GIF — an 8-bit (256 colour), non-destructively compressed bitmap format. Mostly used for web. Has several sub-standards one of which is the animated GIF.

JPEG — a very efficient (i.e. much information per byte) destructively compressed 24 bit (16 million colours) bitmap format. Widely used, especially for web and Internet (bandwidth-limited).

TIFF — the standard 24 bit publication bitmap format. Compresses non-destructively with, for instance, Lempel-Ziv-Welch (LZW) compression.

PS — Postscript, a standard vector format. Has numerous sub-standards and can be difficult to transport across platforms and operating systems.

PSD – a dedicated Photoshop format that keeps all the information in an image including all the layers.

Multimedia stands as one of the most challenging and exciting aspects of the information era. Although there are books available that deal with various facets of multimedia, the field has urgently needed a comprehensive look at recent developments in the systems, processing, and applications of image and video data in a multimedia environment .

Multimedia Image and Video Processing fills that need. Beginning with existing standards and their impact on multimedia image and video processing, experts from around the world address a broad spectrum of topics in a tutorial style. Their authoritative contributions cover the pros and cons of current and new architectures, conventional and intelligent image processing techniques, new developments in the compression and coding of video and images, and content-based image and video retrieval. The book's final chapters examine recent results in multimedia applications, including transcoding for multipoint video conferencing, distance education, video-on-demand and telemedicine.The extremely rapid growth of this field means that books even just a few years old may offer information that is already obsolete. Multimedia Image and Video Processing offers not only recent research and developments, but does so in a way that provides a solid introduction to each topic and builds a basis for future study, research, and development. Information has become one of the most valuable assets in the modern era. Within the last 5-10 years, the demand for multimedia applications has increased enormously. Like many other recent developments, the materialization of image and video encoding is due to the contribution from major areas like good network access, good amount of fast processors e.t.c. Many standardization procedures were carrried out for the development of image and video coding. The advancement of computer storage technology continues at a rapid pace as a means of reducing storage requirements of an image and video as most situation warrants. Thus, the science of digital video compression/coding has emerged. This storage capacity seems to be more impressive when it is realized that the intent is to deliver very high quality video to the end user with as few visible artifacts as possible. Current methods of video compression such as Moving Pictures Experts Group (MPEG) standard provide good performance in terms of retaining video quality while reducing the storage requirements. Many books are available for video coding fundamentals.This book is the research outcome of various Researchers and Professors who have contributed a might in this field. This book suits researchers doing their research in the area of video coding.The understanding of fundamentals of video coding is essential for the reader before reading this book. The book revolves around three different challenges namely (i) Coding strategies (coding efficiency and computational complexity), (ii) Video compression and (iii) Error resilience. The complete efficient video system depends upon source coding, proper inter and intra frame coding, emerging newer transform, quantization techniques and proper error concealmentA familiar example of pixelization can be found in television news and documentary productions, in which vehicle license plates and faces of suspects at crime scenes are routinely obscured to maintain the presumption of innocence, as in the television series *COPS*. Bystanders and others who do not sign release forms are also customarily pixelized. Footage of nudity (including genitalia, buttocks, or breasts) is likewise obscured in some media: before the watershed in many countries, in newspapers or general magazines, or in places in which the public cannot avoid seeing the image (such as on billboards). Drug references, as well as gestures considered obscene (such as the finger) may also be censored in this manner. Pixelization is not usually used for this purpose in films, DVDs, subscription television services, pornography (except for countries in which the law requires it). When obscene language is censored by an audible bleep, the mouth of the speaker may be pixelized to prevent lip reading, often as in *COPS* graphic injuries and excess blood will be pixelized.

Pixelization may also be used to avoid unintentional product placement, or to hide elements that would date a broadcast, such as date and time stamps on home video submissions. Censorship for such purposes is most common on reality television series.[*citation needed*]

Pixelization in Media

Pixelization has also been used for artistic effect, notably in the art print *The Wave of the Future*, a reinterpretation of Katsushika Hokusai's *The Great Wave at Kanagawa*. In this updated print, the image of the large ocean wave shifts from the traditional style of the Japanese woodcut print to a pixelized image and finally to a wireframe model computer graphics image.[1][2] *Westworld* (1973) was the first feature film to use digital image processing to pixelize photography to simulate an android's point of view.

Alternative techniques

Marshall B. Webb, an American general, sits in the White House Situation Room during Operation Geronimo. A classified document on the desk in front of him was pixelized by the government of the United States before the photo was released.

For many censorship purposes, pixelization has been supplanted by blurring the image, or black rectangular or square boxes (known as censor bars) may be used to cover parts of images completely (for example, a black box inserted over the eyes rather than pixelization of the entire face).

A drawback of pixelization is that any differences between the large pixels can be exploited in moving images to reconstruct the original, unpixelized images quinting at a pixelized, moving image can sometimes achieve a similar result. In both cases, integration of the large pixels over time allows smaller, more accurate pixels to be constructed in a still image result. Completely obscuring the censored area with pixels of a constant color or pixels of random colors escapes this drawback but can be more aesthetically jarring.

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