



Image Processing Techniques and It's Applications-Review

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ABSTRACT

Current era of image processing the field of computer science, digital image processing and so on the use of computer is major and the computer algorithm to perform the given tasks the cost of the processing is high computer equipments of those era the work of processing digital image processing is the use of computer algorithm computer algorithm to perform image processing on digital image it follows range of algorithm to be applied to the data and can avoid problems as the The build-up of noise and signal of noise and signal during processing does signal image processing and GIS of Remote sensing it is the one of the famous moving processing and technique in the present and front 5 it's the main process of creating the program image processing method to perform some operations on an image point in our research research paper we have done the process where, how it is introduced and what are the components of it, how are the process accept and, the usage of the image processing and comma the all serving of the computer details studied and gone through the research, are all the major technique and Technology used in the image processing. The usage of these technology technology these technology technology is commercial 18% industrial 32%, hospitality 75%, usage and public 43%.

Keywords : Image Processing , GIS, Remote sensing

I. INTRODUCTION

IMAGE PROCESSING

This is a method in which we perform operations on an image, in order to get some useful information. In this process we put some useful image as input and we may get image as output or else we may get some useful characteristics features which are related to image[1], now a days this process is becoming vast and it is becoming a core research area for upcoming computer science students.

Basically it includes three steps.

1. Importing image by image acquisition tools.
2. Manipulating image and analysing the image.

3. Output in which result can be altered image or report that is based on image analysis.

The two types of image processing are Analog image processing and Digital image processing
Analog image processing can be used for the hard copies like printouts and photographs. Example for Analog image processing are television broadcasting in older days through dish antenna systems .

Digital image processing techniques help in manipulation of the digital images by using computers .example image data stored in digital logic gates.

II. PHASES OF IMAGE PROCESSING

- a. ACQUISITION – It is a simple process in which a image is given out which is in Digital form. The main

work involves scaling and color conversion[2] (RGB to GRAY or vice-versa)

b. IMAGE ENHANCEMENT-This phase is also simplest and most approaching area of image processing it is used extract some hidden details from an image.

c. IMAGE RESTORATION –It is an objective of restoration on mathematical or probabilistic model of image processing.

d. COLOR IMAGE PROCESSING –This process deals with pseudo color and full color.

e. WAVELETS AND MULTI – RESOLUTION PROCESSING – In this phase various degrees of images is represented.

f. IMAGE COMPRESSION- In this phase, it develops some functions to perform operation which mainly deals with image size or image resolution.

g. MORPHOLOGICAL PROCESSING- It extract image components which is useful in representing and describing shapes.

h. SEGMENTATION PROCEDURE- This process divides the image into different parts or objects and this is the most difficult task performed in image processing.

i. REPRESENTATION AND DESCRIPTION- Choosing the output of segmentation stage representation is only the part of solution for altering raw data into a processed data.

j. OBJECT DETECTION AND RECOGNITION- It is a process in which gives a label to an object based on its description.

DISCRIPTION

From the above image we can see four visions.

ACCORDING TO BLOCK 1-The input of an image is given and the output will be in the form of image and this is termed as digital image processing.

ACCORDING TO BLOCK 2- In this the input of an image is given and we get output in the form of description or information. This is termed as computer vision.

ACCORDING TO BLOCK 3- Input is given in the form of code or description and we get an image as output and this can be termed as computer graphics.

ACCORDING TO BLOCK 4- Input is in the form of keywords or code and we get keywords or some description as an output then it is termed as artificial intelligence.

III. ANALOG IMAGE PROCESSING

We can use analog image processing to take hard copies like for ex: printouts and photographs. Analysts of image use different basic interpretation[3] while using the visual techniques. Analog image processing is the image processing which is based on two dimensional analog signals by analog means. Fundamentally any information can be shown in two ways mainly named as:

- 1.) Analogue
- 2.) Digital

The analog wave which is represented in the form of pictures is called as analog image. For ex: television broadcasting system in older days through the dish antenna system. The analogue image processing is applied on analogue signals. Analogue signal is time-varying signals so the image formed under analogue image processing is a slower and costlier process. Analogue signal is real-world but not good quality of images. It is usually continuous and should not be broken into tiny pieces.

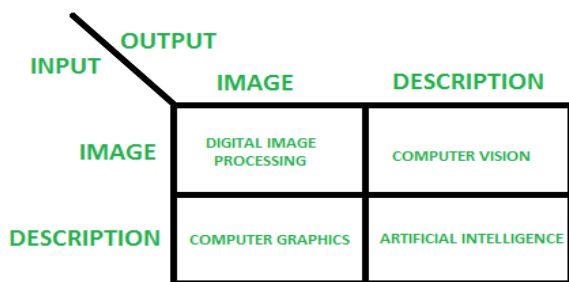


Fig.1. Overlapping Fields with Image Processing

IV. DIGITAL IMAGE PROCESSING

Digital images processed methods helps manipulation of the digital image by using computer. The 3 basic stages that all types of information will have to undergo while using digital technique, they are pre-processing, enhancement, display, information extraction. It is also used to enhance the images to get some important information from it.

For example: Adobe Photoshop, MATLAB, Computer graphics, Signals, Photography, Camera Mechanism, Pixels, etc.

It is used in the conversion of signals from an image[4] sensor into digital images. A certain number of algorithms are used in image enhancing, processing of analog and digital signals, image signals, voice signals etc.

Types of digital image processing formats:

TIFF (Tagged Image File Format) : This format can be called as lossy or lossless. It is a very flexible format, a part of files are included by the details of the image storage algorithm. There is no compression at all in lossless image storage format and this is exclusive. They have a quite[5] big file sizes. (LZW is also one of the names used for lossless compression algorithm but universally it is not supported.)

PNG (Portable Network Graphics): In contrast with usage of common TIFF, lossless storage is also a format. To compress

File size it looks for patterns in the image which can be compressed it is exactly a reversible compression by this the image is exactly recovered.

GIF (Graphics Interchange Format): From a pool of 16 million colours it creates a table of 256 colours. Exactly the image can be rendered by GIF if the image has fewer than 256 colours.

JPG (Joint Photographic Experts Group): Very high image quality is maintained by achieving astounding

compression ratios contains many colours for the tone of the image optimized for photographs. It works by discarding information that is least likely noticed by the eye analysing images.

RAW (Research and Analysis Wing): The better digital cameras has a raw images output. It is three or two times smaller than TIFF files. RAW formats can read some manufacturers graphic applications.

BMP (Bitmap): This format has no reason to be used. Microsoft has invented this uncompressed proprietary format called BMP.

PSD (Phot Shop Document):This format is called as working format. PSP image are profiles of paint shops used PSP and PSD extensions are used in photo shop's files. These images are used in all web pages but TIFF is not supported by web browsers.

Digital Image Processing allows users the following tasks:

- **Image sharpening and restoration:** The common applications of Image sharpening and restoration are zooming, blurring, sharpening, grey scale conversion, edges detecting, image recognition, and image retrieval etc.
- **Medical field:** The common applications of medical field are Gamma-ray imaging, PET scan, X-Ray imaging, Medical CT, UV imaging, etc.
- **Remote sensing:** It is the process of scanning the earth by the use of satellite and acknowledges all activities of space.
- **Machine/Robot vision:** It works on the vision of robots so that they can see things, identify them,etc.

Characteristics of Digital Image Processing

- It uses software, and some free of cost.
- It provides clear images.
- Digital Image Processing do image enhancement to recollect the data through images.
- It is used widely everywhere in many fields.

- It reduces the complexity of digital image processing.
- It is used to support a better experience of life.

Advantages of Digital Images Processing

- Image reconstruction (CT, MRI, SPECT, PET)
- Image reformatting (Multi-plane, multi-view reconstructions)
- Fast image storage and retrieval
- Fast and high-quality image distribution.
- Controlled viewing (windowing, zooming)

Disadvantages of Digital Image Processing

- It is very much time-consuming.
- It is very much costly depending on the particular system.
- Qualified persons can be used.

V. Applications of Digital Image Processing

Almost in every field, digital image processing puts a live effect on things and is growing with time to time and with new technologies.

1) Image sharpening and restoration

It refers to the process in which we can modify the look and feel of an image. It basically manipulates the images and achieves the desired output. It includes conversation, sharpening, blurring, detecting edges, retrieval, and recognition of images.



Fig.2. Image sharpening

2) Medical Field

There are several applications under medical field which depends on the functioning of digital image processing.

With a general use of digital imaging processing data in the hospitals, the size repository of medical image is increasing very instantly. This source of difficulty in managing & querying vast databases that leads to the content based on medical image retrieval (CBMIR) systems. The main challenge[6] is CBMIR system was that a semantic gap that is there between the low level visual data captured by image device & high level semantic data which is retrieved by human. Efficiency of such systems those are more difficult terms in feature representation which can characterize the high-level information wholly. By using deep convolutional neural network (CNN), in this paper we can clearly tell the framework of deep learning for CBMIR. This is trained for classification of medical image. The 24 classes and 5 modalities are used to train the network which is present in intermodal dataset. The strategized features and the different classification with results are needed to retrieve images of medical field. When we need best results of retrieved images, class based predictions are used. For retrieval task to be successful we need average classification of 99.77% and mean average precision of 0.69% have to be achieved. For different body organs the methods best suited to retrieve multimodal medical images are:

- a) Gamma-ray imaging
- b) PET scan
- c) X-Ray Imaging
- d) Medical CT scan
- e) UV imaging

3) Robot Vision

There are several robotic machines which work on the digital image processing. Through image processing

technique robot finds their ways, for example, hurdle detection robot and line follower robot.



Fig.4. Image of Robot vision

4) Pattern recognition

It involves the study of image processing, it is also combined with artificial intelligence such that computer-aided diagnosis, handwriting recognition and images recognition can be easily implemented.

Now a days, image processing is used for pattern recognition.

Figure 1. Overview of the steps constituting the KDD process

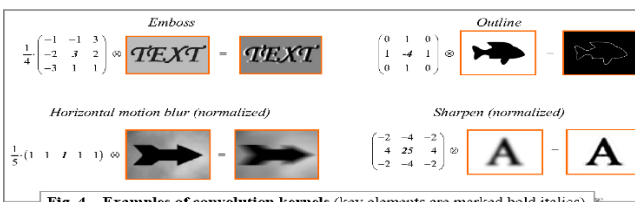
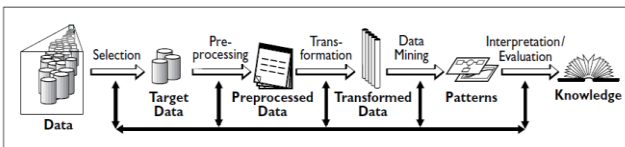


Fig.5. Image for pattern recognition

5) Video processing

It is also one of the applications of digital image processing. A collection of frames or pictures are arranged in such a way that it makes the fast movement of pictures. It involves frame rate conversion, motion detection, reduction of noise and colour space conversion etc.

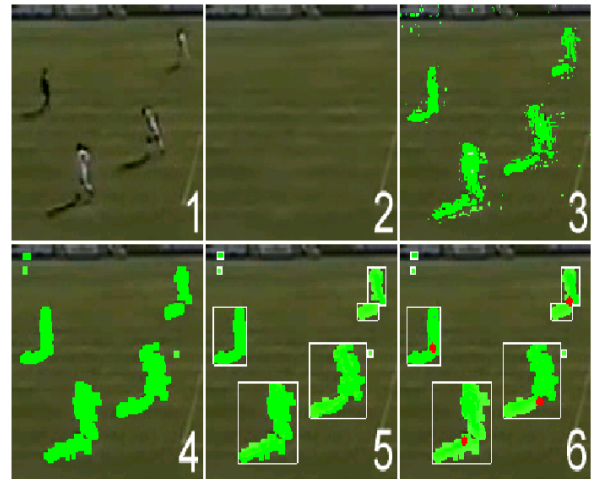


Fig.6. Image of how the video is processed

Conversion of the analog signal to a digital signal by digital image processing

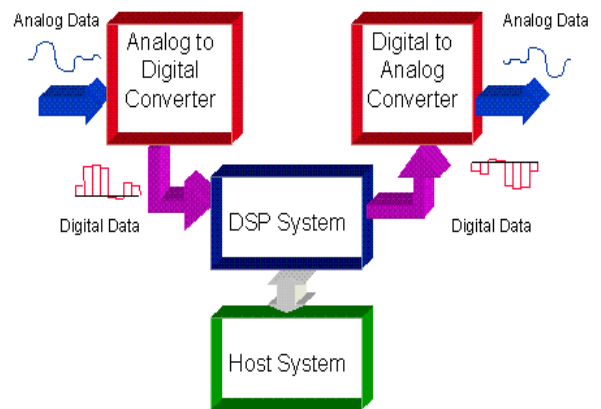


Fig.7 Image of converting analog signal to digital signal

Digital signal processing is all about processing analog signal or real-world signals which humans interact, for example, speech. DSP system converts digital signal to analog signal or vice-versa by the use of converters.

VI. CONCLUSION

Hence we conclude that it is very useful to understand the concept of the image processing in these days. Earlier people used to think that all image processing uses pattern recognition technology. These days many new technology came which uses the system of image processing like iris recognition, face recognition, biometric recognition.

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