Image Processing

Saisha Pai Angle[1] Srushti Prabhu Khope[2] Pranav Raut Dessai[3] Ashika Verenkar[4] Prof. Anisha Cotta[5]
[1,2,3,4]Student [5]Assistant Professor
[1,2,3,4,5]Department of Computer Engineering
[1,2,3,4,5]Don Bosco College of Engineering Fatorda, India

Abstract— Image processing is rapidly evolving field with growing application on science and engineering. During the last two decades, image processing has grown into a subject in its own right with application spanning all areas of human endeavour, from documents to astronomy and theory utilizing all branches of mathematics. Main aim of image processing is to extract important data from images. Using this extracted information description, interpretation and understanding of the scene can be provided by the machine.
Key words: OBIA, Image Processing

I. INTRODUCTION

Image processing is the use of algorithms to perform image processing images. Most image-processing techniques involve treating the image as a two-dimensional signal and applying standard signal-processing techniques to it. Images are also processed as three-dimensional signals with the third-dimension being time or the z-axis. Image processing usually refers to digital image processing, but optical and analog image processing also are possible.

II. IMAGE ANALYSIS

Image analysis is the extraction of meaningful information from images; mainly from digital images by means of digital image processing techniques. Image analysis tasks can be as simple as reading bar coded tags or as sophisticated as identifying a person from their face.

Computers are indispensable for the analysis of large amounts of data, for tasks that require complex computation, or for the extraction of quantitative information. On the other hand, the human visual cortex is an excellent image analysis apparatus, especially for extracting higher-level information, and for many applications — including medicine, security, and remote sensing — human analysts still cannot be replaced by computers. For this reason, many important image analysis tools such as edge detectors and neural networks are inspired by human visual perception models.

There are many different techniques used in automatically analyzing images. Each technique may be useful for a small range of tasks, however there still aren't any known methods of image analysis that are generic enough for wide ranges of tasks, compared to the abilities of a human's image analyzing capabilities. Examples of image analysis techniques in different fields include:

- 2D and 3D object recognition,
- Image segmentation,
- Motion detection e.g. Single particle tracking,
- Video tracking,
- Optical flow,
- Medical scan analysis,
- 3D Pose Estimation
- Automatic number plate recognition.

A. *Object-Based Image Analysis (OBIA)*

Object-Based Image Analysis employs two main processes, segmentation and classification. Traditional image segmentation is on a per-pixel basis. However, OBIA groups pixels into homogeneous objects. These objects can have different shapes and scale. Objects also have statistics associated with them which can be used to classify objects. Statistics can include geometry, context and texture of image objects. The analyst defines statistics in the classification process to generate for example land cover. The technique is implemented in software such as e-Cognition.

III. IMAGE EDITING

Image editing encompasses the processes of altering images, whether they are digital photographs, traditional photochemical photographs, or illustrations. Traditional analog image editing is known as photo retouching, using tools such as an airbrush to modify photographs, or editing illustrations with any traditional art medium. Graphic software programs, which can be broadly grouped into vector graphics editors, raster graphics editors, and 3D modellers, are the primary tools with which a user may manipulate, enhance, and transform images. Many image editing programs are also used to render or create computer art from scratch.

IV. SHARPENING AND SOFTENING IMAGES

Graphics programs can be used to both sharpen and blur images in a number of ways, such as unsharp masking or deconvolution. Portraits often appear more pleasing when selectively softened (particularly the skin and the background) to better make the subject stand out. This can be achieved with a camera or in the image editor by making a selection and then blurring it. Edge enhancement is an extremely common technique used to make images appear sharper, although purists frown on the result as appearing unnatural. Another form of image sharpening involves a form of contrast. This is done by finding the average color of the pixels around each pixel in a specified radius, and then contrasting that pixel from that average color. This effect makes the image seem clearer, seemingly adding details. It is widely used in the printing and photographic industries for increasing the local contrasts and sharpening the images.

V. NOISE REDUCTION

Mage editors may feature a number of algorithms which can add or remove noise in an image. Some JPEG artifacts can be removed; dust and scratches can be removed and an image

can be de-speckled. Noise reduction merely estimates the state of the scene without the noise and is not a substitute for obtaining a "cleaner" image. Excessive noise reduction leads to a loss of detail, and its application is hence subject to a trade-off between the undesirability of the noise itself and that of the reduction artifacts.

VI. REMOVAL OF UNWANTED ELEMENTS

Most image editors can be used to remove unwanted branches, etc., using a "clone" tool. Removing these distracting elements draws focus to the subject, improving overall composition.

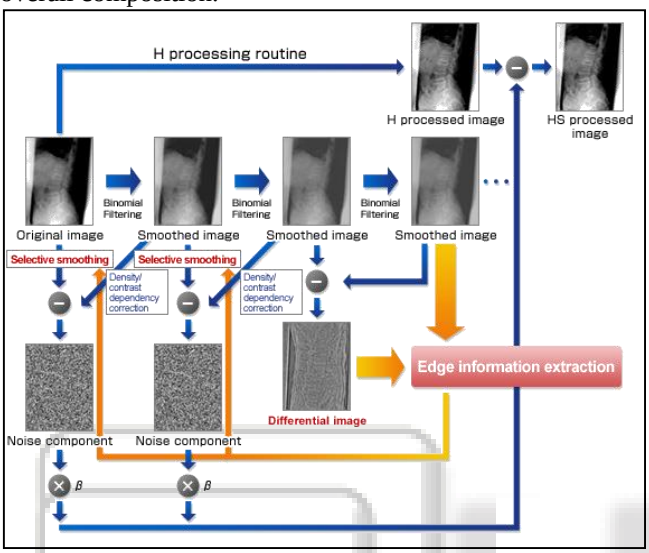

Fig. 1: Removal of Unwanted Elements

VII. MULTIDIMENSIONAL SYSTEM

In mathematical systems theory, a multidimensional system or m-D system is a system in which not only one independent variable exists (like time), but there are several independent variables. Important problems such as factorization and stability of m-D systems (m > 1) have recently attracted the interest of many researchers and practitioners. The reason is that the factorization and stability is not a straightforward extension of the factorization and stability of 1-D systems because, for example, the fundamental theorem of algebra does not exist in the ring of m-D (m > 1) polynomials.

VIII. NEAR SETS

Near sets are spatially close sets have nonempty intersection. In other words, spatially close sets are not disjoint sets, since they always have at least one element in common. Descriptively close sets contain elements that have matching descriptions. Such sets can be either disjoint or non-disjoint sets. Spatially near sets are also descriptively near sets.

The underlying assumption with descriptively close sets is that such sets contain elements that have location and measurable features such as color and frequency of occurrence. The description of the element of a set is defined by a feature vector. Comparison of feature vectors provides a basis for measuring the closeness of descriptively near sets. Near set theory provides a formal basis for the observation, comparison, and classification of elements in sets based on their closeness, either spatially or descriptively. Near sets offer a framework for solving problems based on human perception that arise in areas such as image processing, computer vision as well as engineering and science problems.

IX. PHOTO MANIPULATION

Photo manipulation involves transforming or altering a photograph using various methods and techniques to achieve desired results. Some photo manipulations are considered skillful artwork while others are frowned upon as unethical practices, especially when used to deceive the public, such as that used for political propaganda, or to make a product or person look better.

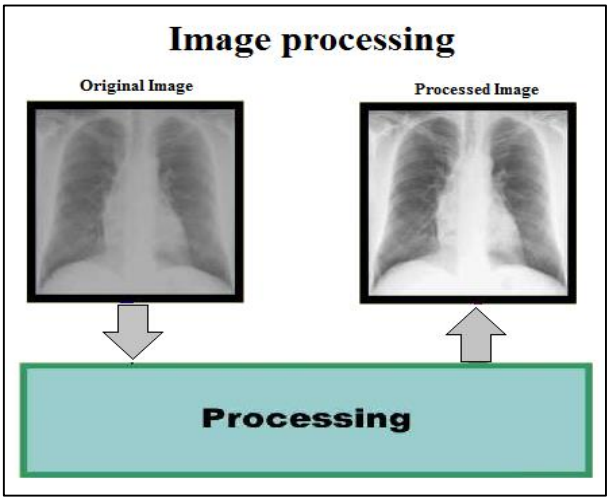

Fig. 2: Image Processing

X. CONCLUSION

The processing of images is faster and cost effective. One requires less time for processing as well as less photographic equipment. It is more ecological to process images. No processing or fixing chemicals are needed to take and process images. Copying of the image is easy, and the quality of the image stays good until compressed. However there are a number of disadvantages. A digital file of certain size cannot be enlarged with good quality. For example, a good poster cannot be made of an image file of 500kb. However it is easy to make an image smaller.

ACKNOWLEDGMENT

We acknowledge the advice of our beloved professors and those who previously worked on this concept. We also acknowledge the efforts of the critics of the journal for the modifications and suggestions to improve the quality of the paper.

REFERENCES

[1] https://en.wikipedia.org;
[2] Pattern Recognition and Image Processing KING-SUN FU, FELLOW, IEEE, AND AZRIEL ROSENFELD, FELLOW, IEEE
[3] J. K. Aggarwal and R. 0. Duda, Eds., "Special issue on digital filtering and image processing," IEEE Trans. Circuits Syst., vol. CAS-2 pp. 161-304,1975.
[4] Digital image processing by Rafael C. Gonzalez and Richard E. Woods
[5] Digital Image Processing by S Jayaraman and S Esakkirajan

