

An Overview of Image Processing Applications and Drawbacks to extent it's Future Scope

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Abstract — Image processing is a new technology by which we can process an image using some mathematical functions where input will be in the form of image and output also be in form of image. We can do the processing using the signals it could be analog or digital. It includes three steps to process an image --

1. **Importing an image through any acquisition application.**
2. **Second thing we need to analyze than according to that we have to manipulate that particular image.**
3. **After that output will be produced where the result can be altered image or a report which will be made based on image analysis**

Keywords— Image Processing, ImageJ, MIPAV, Gaussain Pyramid, Laplacian Pyramid

I. INTRODUCTION

At the recent availability of sophisticated advanced digital devices and powerful computers, coupled with advanced image processing algorithms, has brought digital image processing to the fore front. Digital image processing has a broad spectrum and applications, such as remote sensing via satellites and other spacecraft image transmission and storage for business applications, medical processing, robotics etc. In this paper will discuss about the image processing applications which is used in biomedical field and about their drawbacks so, that by eliminating those challenges in this field we can make it more efficient technology that will help in the area of medical science and at the same time in the research oriented field.

II. APPLICATIONS OF IMAGE PROCESSING

There are various field available where image processing is been used broadly. Some of the examples are –

A. IMAGEJ

By the name we can make out it is developed by Java. It is an open architecture provides extensibility through java plugins. Now a days the importance of image processing is rapidly growing in the field of medical science. ImageJ is a platform independent application developed using java. Generally it's used for the manipulation of an image. Which mainly focuses on relationship between the function and structures in biological and medical area. It supports almost every image formats of biomedical system. The features of ImageJ that we can display, analyze, process, and save an image and can print 8 bit color.

Along with the features there are certain limitations present at ImageJ software though it is very minor but still it is necessary to overcome those limitations. ImageJ it does not work with large number of images ex: CT Scan We can use this tool for manipulation and analysis of an image but editing not possible. And also it does not support all kinds of image formats of bio medical.

B. MIPAV

It stands for Medical Image Processing Analysis and Visualization. It is mainly use to analyze and visualize in few sectors such as PET, MRI, CT, and Microscopy. Through image processing biologist can give the brief about the cell using 3D constructions. It is possible to represent virus also through micrograph. The application MIV is used to analysis on medical images over internet. That helps basically to the urban areas. Researcher can access it through internet and can do analysis and visualization. The main goal of this application is to develop computation functions and algorithm for analysis and visualization purpose of biomedical data which will help to support advancement and discovery of new concept of biomedical field.

The future enhancement of this particular technology will include volume rendering, more compact algorithm, plus it will allow users to do task automatically that are frequently repeated. It has a limitation of memory as well, when we run this application it uses RAM to perform tasks. Initially we need to allocate memory for

this application. By default it takes 1000 MB memory so, it is difficult for those users who uses limited amount of RAM on their system.

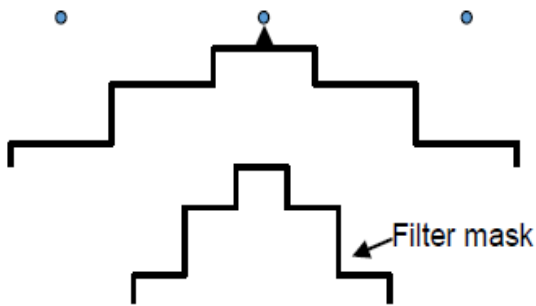
C. IMAGE PYRAMID

In this we can decompose the image into different segments into various scale.

With this we can get the particular structure of an image in multiple scales. The main advantage of this we can minimize the redundancy of an image in terms of coding, manipulation, enhancement, analysis etc. There are two different pyramids through which we can achieve the goal.

A. Gaussain Pyramid

With this we can estimate multi scales of edges from an image. This process is very efficient to compute scale of an image. The main goal of this is to blur any image by sampling.

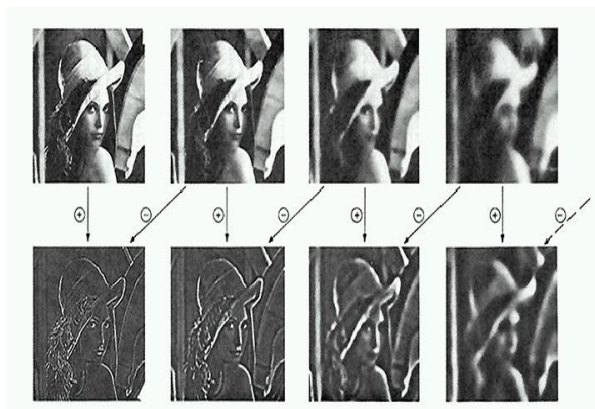


We need to follow the mentioned steps to blur an image.

- Filtering
- Subsampling

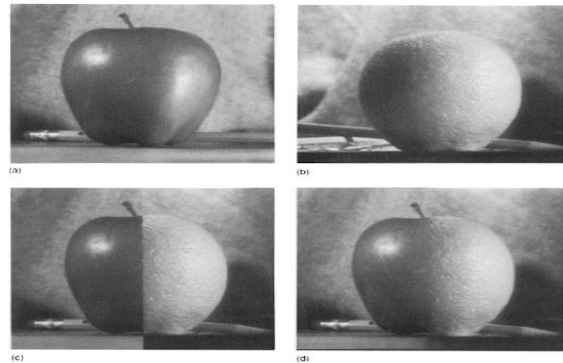
Until we reach to the minimum level of resolution.

We can mention the number of levels we require.



B. Laplacian Pyramid:

Decomposition of images is possible through low pass filters and high pass band. We can do multi scale image representation by the coding and transmission of an image. The main goal of this process that we can merge any two different objects into a single image.



We need to follow the following steps and the Mathematical function to blend two different objects into a single object.

- Build Laplacian pyramids LA and LB from images A and B
- Build a Gaussian pyramid GR from selected region R (black white corresponding images)
- Form a combined pyramid LS from LA and LB using nodes of GR as weights:

$$LS(i,j) = GR(I,j)*LA(I,j) + (1-GR(I,j))*LB(I,j)$$

- Collapse the LS pyramid to get the final blended image.

Here the major drawback is the editing is possible only on white or black background nothing apart from that.

D. CONCLUSION

We have seen a few of the applications and their features of a good introductory image processing program. There are many more limitations that exists in this area which needs complex modifications that can make to the images. For example, we can apply a variety of filters and editing options to the image. The filters use mathematical algorithms to modify the image, we should look after on their formats so that it supports on any kind of devices or any applications. The software also will calculate the RA, DEC, and magnitude of all objects in the field if we have a star catalog such as the Hubble Guide Star Catalog.

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