Powdery Mildew Detection Using Spatial Domain Technique Of Image Enhancement

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***Abstract*— Managing diseases in plant is a challenging task. Diseases are mostly seen on the leaves or stem or fruits of the plant. Systematic disease identification should be undertaken so that crop yield can be maximized. Some diseases can be handled by the farmer before the disease spreads. Farmers will find automatic disease identification software easier with their occupation. A large of such diseases can be identified using the leaves of the plants. The proposed system automatically detects the patterns of diseases in their early stage. It serves as an efficient disease diagnosis system that focuses on plant disease identification by processing acquired digital images of lemon leaves, grape leaves and apple fruits. Principle objective of Image enhancement is to process an image so that result is more suitable than original image for specific application. Digital image enhancement techniques provide a multitude of choices for improving the visual quality of images. Appropriate choice of such techniques is greatly influenced by the imaging modality, task at hand and viewing conditions. This paper will provide an overview of underlying concepts, along with algorithms commonly used for image enhancement. The main aim is to focus on spatial domain techniques for image enhancement, with particular reference to point processing methods and histogram processing.**

***Index Terms*— Digital Image Processing, Geometric Corrections, Gray Scale Manipulation, Image Enhancement .**

I. INTRODUCTION

Antiquity of agriculture in India dates rear to the **Rigveda** .
In India, the agricultural segment gets a vigorous place in the overall budget of the country. Agriculture segment offers livelihood to 65 to 70 percent of the total inhabitants. Numerous large and minor scale trades are to be subjected on agriculture area for their raw-material which usually lie as some sugar factory, jute textile industries, food industries, pharmaceutical industries etc . All trades need good Fineness in raw-material. So, Study in agricultural sector is meant towards rise of efficiency and superiority. Herbal disease is one of the critical reasons that decreases amount and reduces quality of the agricultural production . Disease is an damage of wellbeing or a state of irregular working. Plant diseases are usually produced by microorganisms, worms and moulds. The rate of plant illnesses also rest on environmental disorder. Sickness needs cautious analysis and treatment at right time to defend the shrub from dense damages. Disease can be originated in dissimilar portions of the plant like fruit, leaves, vegetable, and stem. Observing sickness in a plant plays a main role in the ground of agriculture . Observing of health and discovery of disease in plants and trees is serious for maintainable agriculture.

Powdery mildew is a fungal illness which disturbs a large number of plants and fruits This illnesses are caused by dissimilar species of fungi like **Erysiphales**, with **Podosphaera xanthii** , said to be the maximum cause of the illness.

Erysiphe cichoracearum was the most prominent cause in the world many years back .This illness is said to be most easily recognized as the white patches that we see on the leaves are easily seen through our eyes .

The lower leaves are usually said to be very exaggerated, but the white patches appear on the surface of the leaves. They can be easily spotted as they are visually very prominent .

It grows well in the environment where rain fall is very frequent. The atmosphere undergoes wide change in the temperature , and thus it lead to the vital variation in the prominent regions .

However it does stress the plant and severe or repetitive infections will weaken the plant. If enough of the leaf surface becomes covered with powdery mildew, photosynthesis is impaired. Infected leaves often fall prematurely.

II. IMAGE ENHANCEMENT TECHNIQUES

Image enhancement is basically improving the interpretability or perception of information in images for human viewers and providing `better' input for other automated image processing techniques. The principal objective of image enhancement is to modify attributes of an image to make it more suitable for a given task and a specific observer. During this process, one or more attributes of the image are modified. The choice of attributes and the way they are modified are specific to a given task. Moreover, observer-specific factors, such as the human visual system and the observer's experience, will introduce a great deal of subjectivity into the choice of image enhancement methods. There exist many techniques that can enhance a digital image without spoiling it. The enhancement methods can broadly be divided in to the following two categories:

1. Spatial Domain Methods
2. Frequency Domain Methods

In spatial domain techniques, we directly deal with the image pixels. The pixel values are manipulated to achieve desired enhancement. In frequency domain methods, the image is first transferred in to frequency domain. It means that, the Fourier Transform of the image is computed first. All the

enhancement operations are performed on the Fourier transform of the image and then the Inverse Fourier transform is performed to get the resultant image. These enhancement operations are performed in order to modify the image brightness, contrast or the distribution of the grey levels. As a consequence the pixel value (intensities) of the output image will be modified according to the transformation function applied on the input values.

III. TYPES OF SPATIAL DOMAIN TECHNIQUES

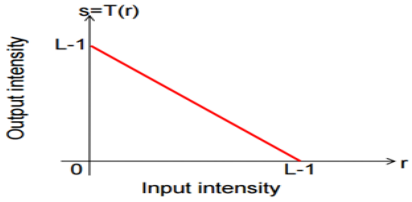
In spatial domain techniques , we directly deal with the image pixels. The pixel values are manipulated to achieve desired enhancement. Image enhancement is applied in every field where images are ought to be understood and analyzed. For example, medical image analysis, analysis of images from satellites etc. Image enhancement simply means, transforming an image f into image g using T. (Where T is the transformation. The values of pixels in images f and g are denoted by r and s, respectively. As said, the pixel values r and s are related by the expression,

s = T(r) **(1)**

Where T is a transformation that maps a pixel value r into a pixel value s. The results of this transformation are mapped into the grey scale range as we are dealing here only with grey scale digital images. So, the results are mapped back into the range [0, L-1], where L=2k, k being the number of bits in the image being considered. So, for instance, for an 8-bit image the range of pixel values will be [0, 255].

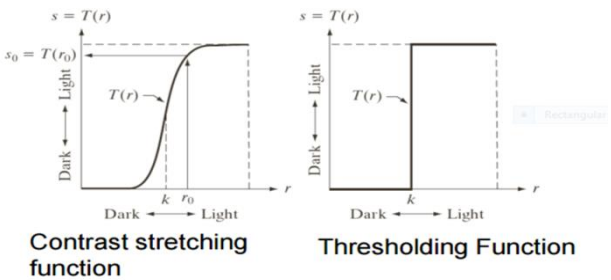
A .Image Negative

Negatives of digital images are needed in many of the applications, like in various medical appliances the devices which use monochrome rays and characteristics . Transformation T : G(X,y)=L-F(X,y), where L is said to be the maximum intensity level of an image.



B . Contrast Stretching

We get the images with very bad contrast can be mainly due to poor brightness,the dynamic range of the sensor is very inadequate and the aperture of the lens is very small . thus a proper corrective measures can be taken .



C . Logarithmic Operation

The expression of the logarithmic operation is given by

s = c log(1 + r) **(2)**

here *C* is the constant , with the value of r greater than or equal to zero .

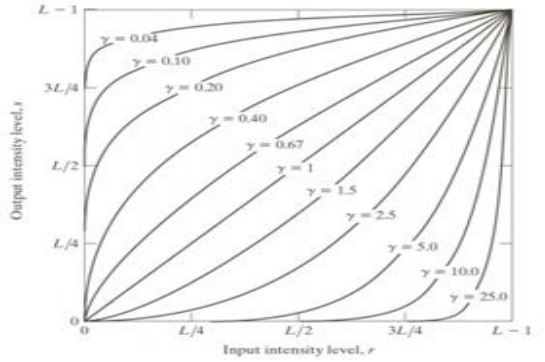
It shows that the input image with the low intensity level is mapped with the output image of high intensity level .

D. Powers-Law Transformations

The nth power and nth root curves shown in fig. A can be given by the expression,

s = cr^γ **(3)**

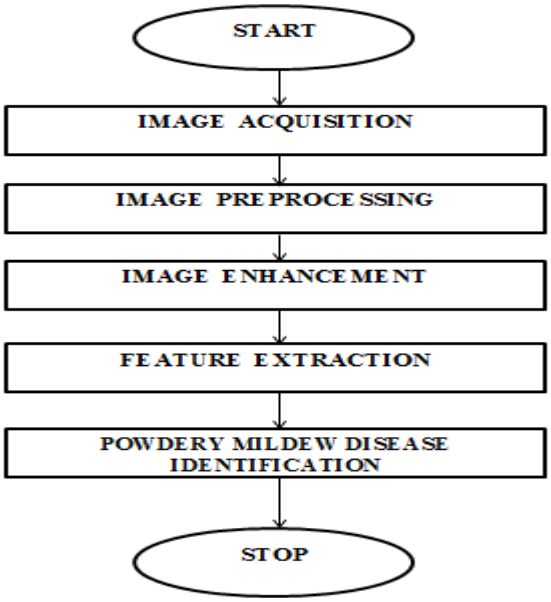
This transformation function is also called as gamma correction.For various values of γ different levels of enhancements can be obtained. This technique is quite commonly called as Gamma Correction.



D. Histogram Equalization

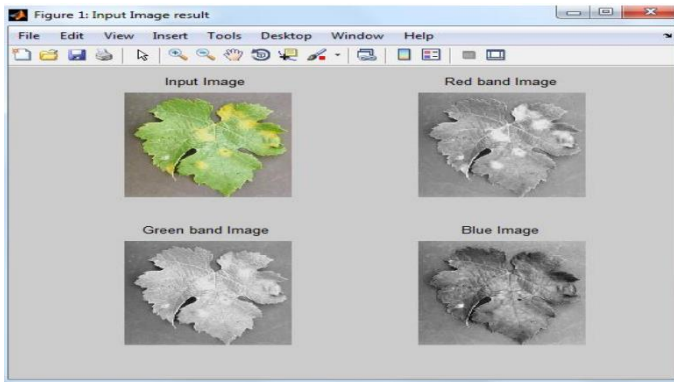
For the enhancement of the contrast of the image , we generally use Histogram Equalizations . It is not important or essential that the contrast of the image will always increase . When we say that the histogram is not effective and give appropriate result in all the conditions then the contrast is said to be decreased .

IV . DESIGN

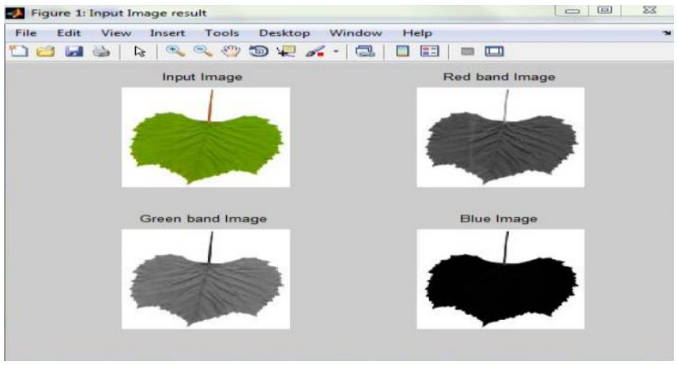


V . RESULTS

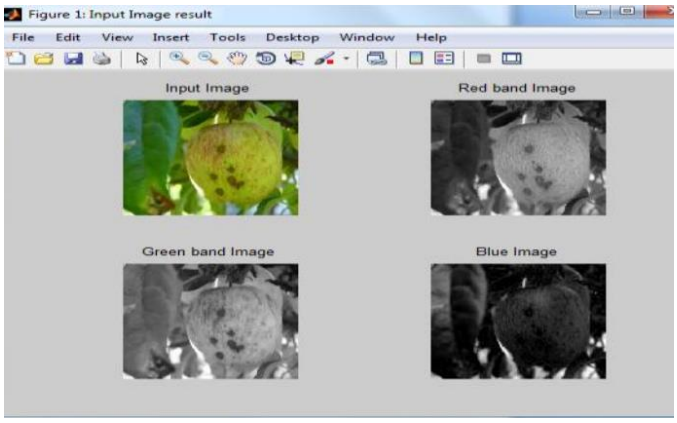
A .RGB IMAGE OF DISEASED LEMON LEAF



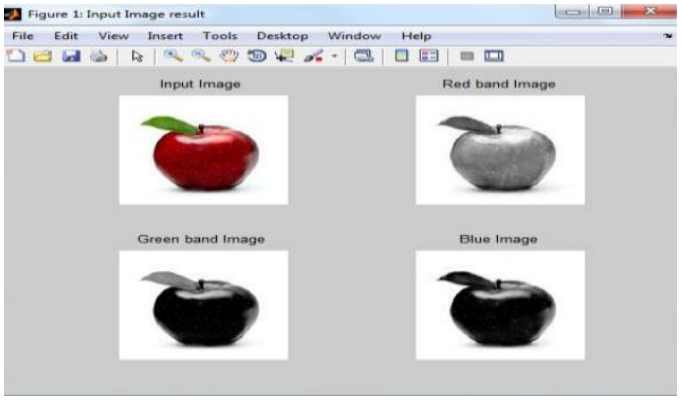
B.RGB IMAGE OF NON DISEASED LEMON LEAF



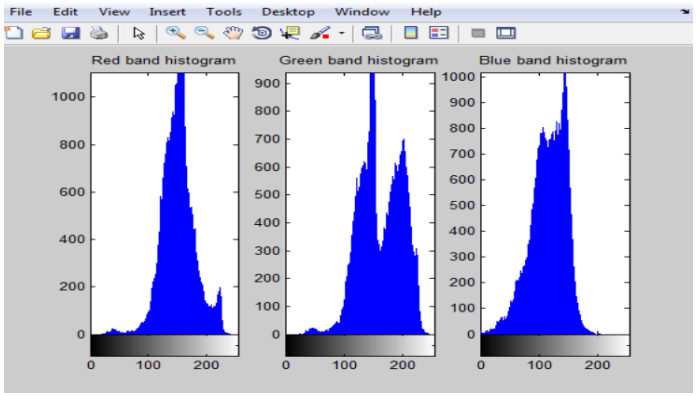
C .RGB IMAGE OF DISEASED APPLE FRUIT



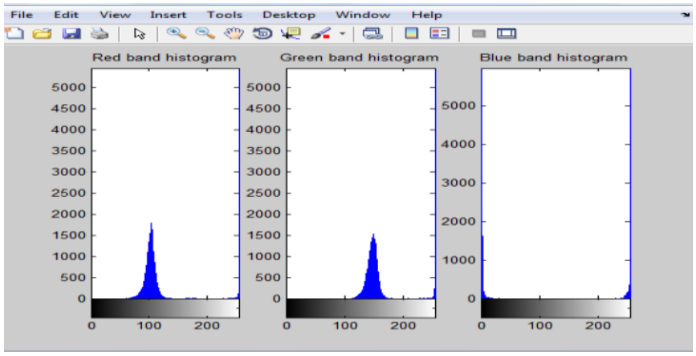
D .RGB IMAGE OF NON DISEASED APPLE FRUIT



E . HISTOGRAM OF DISEASED LEMON LEAF

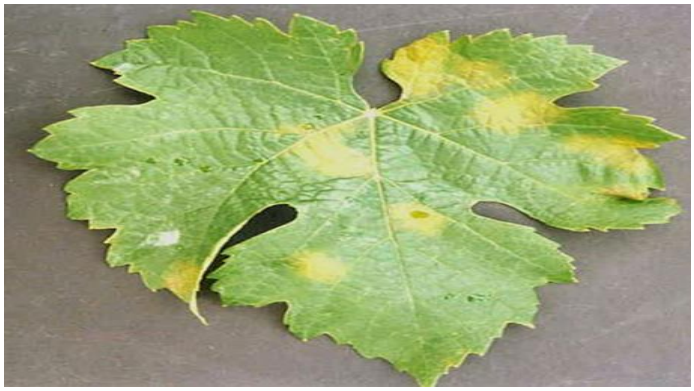


F .HISTOGRAM OF NON DISEASED LEMON LEAF

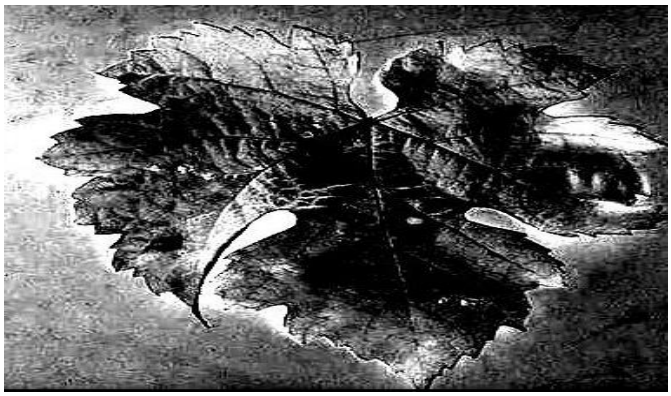


G .IMAGE NEGATIVE OF DISEASED GRAPE LEAF

a) Original image



b) Processed image

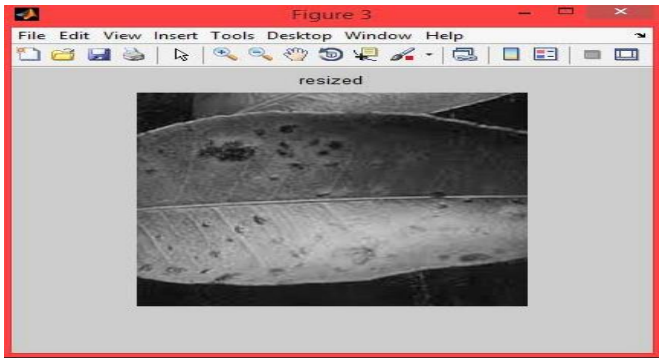


H .IMAGE CONTRASTING OF DISEASED LEMON LEAF

a) Original image

b) Processed image

I .POWER TRANSFORMATION OF DISEASED LEMON LEAF



J .LOGARITHMIC OPERATION OF DISEASED LEMON LEAF

VI . CONCLUSION

Image enhancement algorithms offer a wide variety of approaches for modifying images to achieve visually acceptable images. The choice of such techniques is a function of the specific task, image content, observer characteristics, and viewing conditions. The point processing methods are most primitive, yet essential image processing operations and are used primarily for contrast enhancement. Image Negative is suited for enhancing white detail embedded in dark regions and has applications in medical imaging. Power-law transformations are useful for general-purpose contrast manipulation. For a dark image, an expansion of gray levels is accomplished using a power-law transformation with a fractional exponent. Log Transformation is Useful for enhancing details in the darker regions of the image at the expense of detail in the brighter regions the higher-level values. For an image having a washed-out appearance, a compression of gray levels is obtained using a power-law transformation with γ greater than 1. Histogram equalization is a transformation that stretches the contrast by redistributing the gray-level values uniformly. Only the global histogram equalization can be done completely automatically

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