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Segmentation in Manganethi Plant using Mathematical Morphology

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Abstract: Weeds is a widely procedure to be remove in agriculture field. Often for the subsequent analysis of the weeds it is needed to measure the roots and size of the plant in terms of length. For this purpose segmentation and filtering techniques are used in a noise captured image.

Keywords: Filters, Segmentation, Noise, Weeds, Agriculture

I. INTRODUCTION

Segmentation of weed plant is one of the essential tool agriculture sectors. It is a process of unwanted plants in and around the agriculture field. The weed will affect the trees and plants growth. The weed also takes in all the nutrients in the soil and water content. To eradicate the weed is the challenging task for farmers. Detecting the harmful weeds is the challenging task for the farmers. It is the process of partitioning the unwanted plants otherwise called weeds based on the separation of weed result, surface of plants and roots can be extracted, modeled, manipulated measured and visualized. Edge detection is an essential task in computer vision. It covers wide range of application from segmentation to pattern matching. It reduces the complexity of the image allowing more costly algorithm like object recognition. The edge measure parameters related to the plant stem and the roots are the first step before registration conventionally edge is detected according to same early brought forward algorithm like sobel and laplacian of Gaussian operator(10). But high pass filtering which are not fit for noise agriculture image edge detection because noise and edge belong to the scope of high frequency. In real world applications agriculture images contain object boundaries and object shadows and noise. Therefore, they may be difficult to distinguish the extract edge from noise or trival geometric.

The below proposed process can be applied to the agriculture image.

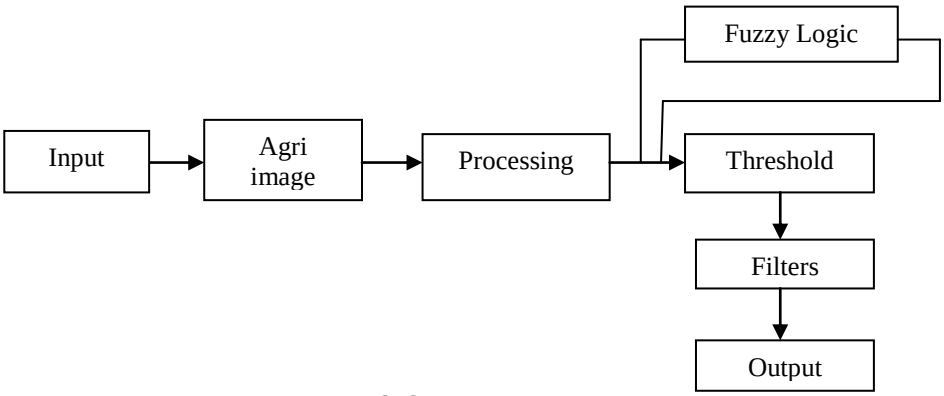
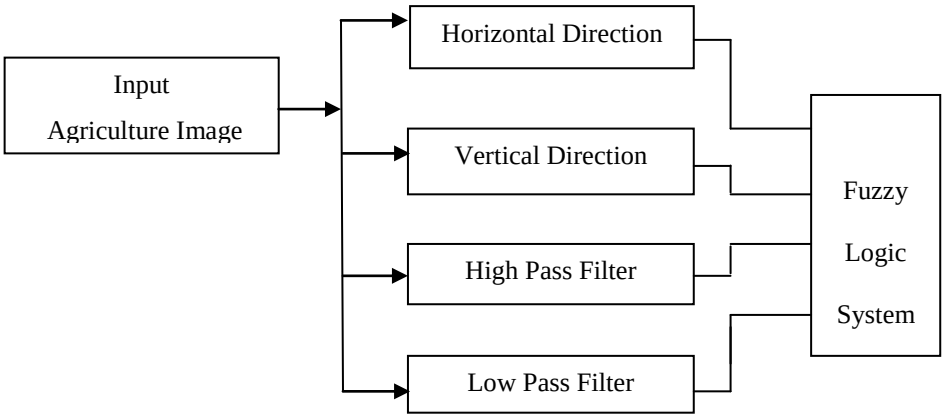


Fig 1 Weed Plant Segmentation System



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Four Linear filters are employed to find the derivative of input agriculture image in HD, VD, HF and LF.
The kernels with 3X3 elements is given by

$$HD=\begin{bmatrix} -1 & 0 & 1 \\ -2 & 0 & 2 \\ -1 & 0 & 1 \end{bmatrix}$$

$$VD=\begin{bmatrix} 1 & 2 & 1 \\ 0 & 0 & 0 \\ -1 & -2 & -1 \end{bmatrix}$$

For high pass filter the 3X3 kernel is given as

$$HP=\begin{bmatrix} \frac{-1}{16} & \frac{-1}{8} & \frac{-1}{16} \\ \frac{-1}{8} & \frac{3}{4} & \frac{-1}{8} \\ \frac{-1}{16} & \frac{-1}{8} & \frac{-1}{16} \end{bmatrix}$$

From the input image the arithmetic mean is calculated from gray levels is an 3x3 neighbourhood of same pixel. Which gives the o/p image is chosen as mean filter m/n.

The output image of a mean filter m/n is again filtered through a bidirectional convolution operation.
$HD=h_{HD}*I$

$VD= h_{VD}*I$

$HP= h_{HP}*I$

$G= h_G*I$

Where G is a Gaussian filter and described by

$G(x,y, \sigma)= e^{\frac{-(x^2+y)^2}{2\sigma^2}}$
Where $\sigma=1$

II. FUZZY SETS

The implementation was carried out by taking the input image I and the output image obtained after quantized where the grey levels are always between 0 to 255. The fuzzy sets has to be set as low, medium and high. The values for low as 0, medium as 255 is obtained from the gausian filter. The input values should be restricted to 0 -255.

III. FUZZY RULES

The rule is defined as the high values are set only for edges pixels in the input image. The rule has to apply also for the light variations and contrast in the input image I.

1. (HD Low) and (VD Low) gives (Edge Low)
2. (HD Medium) and (VD Medium) gives (Edge High)
3. (HD High) or (VD High) gives (Edge High)
4. (HD Medium) and (HP Low) gives (Edge High)
5. (VD Medium) and (HP Low) gives (Edge High)
6. (VD Medium) and (G Low) gives (Edge Low)
7. (HP Medium) and (G Low) gives (Edge Low)

IV. MORPHOLOGY FILTERS

The morphology operators are dilation and erosion.

Let F(u,v) denote grey-scale two dimensional image, E denote structuring element, Dilation of grey scale image F(u,v) by grey-scale structuring element E(x,y) is denoted by

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$$(F \oplus E)(u,v) = \max[f(u-x, v-y) + f(x,y)] \text{----------1}$$

Erosion of a grey scale image F(u,v) by a grey-scale structuring element E(x,y) is denoted by

$$(F \oplus E)(u,v) = \min[f(u+x, v+y) - E(x,y)] \text{----------2}$$

Opening and closing of grey-scale image F(u,v) by grey-scale structuring element E(x,y) are denoted by

F O E= (F-E) +E
F C E= (F+E)-E

O denote opening and C denote closing operators

Erosion is a transformation of shrinking, which decreases the grey-scale value of the image, which dilation is a transformation of expanding, which increases the grey-scale value of the image. But both of than are sensitive to the image edge whose grey-scale value changes. Opening is erosion followed by dilation and closing is dilation and closing is dilation followed by erosion. As a result the morphological is used to detect image edge and at the same time it denoised the image. Opening-Closing operation is firstly used to preprocess and to filter the noise. Smoothing the image by applying the dilation property by closing. The perfect image will be the result by performing the difference between the processed image by above process and the image before dilation.

V. CONCLUSION

In this paper a novel morphology filter algorithm is proposed to segmentation of manganethi plant image and noise cancelling than other methods such as canny method.

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