Implementing Morphology on Images And Its Applications Using Gui

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ABSTRACT:

Morphology is a proficient instrument for picture handling. Morphology is a wide arrangement of activities utilized in image handling which dependent on various shapes of images. The fundamental point of Morphological tasks is to evacuate the flaw in structure of pictures. This is generally utilized in our genuine application . In this paper we utilized two procedures they are Erosion, Dilation utilizing an structuring element(stel) and utilizations of morphology like boundary extraction ,thicknening and Thinning(diminishing). In Morphological activity the yield picture is gotten by contrasting and every pixel in input picture and structuring element. Here we utilize diverse structuring components of various size and various shapes and procedures distinctive morphological procedure on pictures. Matlab GUI is utilized for these activities in this paper.

Keywords : *Morphological tasks, Structuring Element(stel) , Erosion, Dilation, Opening, Closing, Thickening, Thinning, GUI.*

I. INTRODUCTION

Morphology is an broad arrangement of tasks in picture preparing which procedure pictures dependent on shapes. Boundary extraction is a first procedure in pre-processing of highlights of a picture. These tasks depend on the general requesting of pixel esteems yet not on their numerical values[1], so they are suit for preparing of binary image. It can likewise be applied to gray(dark) scale images[2].

Morphological tasks are finished utilizing an organizing component. The Structuring component is a little lattice which recognizes pixels in picture which is being handled. The Structuring component is of various shapes and sizes accessible through which we can pick one shape and procedure the image[3]. To upgrade the presentation the "strel", "offsetstrel" are two capacities which will break organizing component into smaller pieces which is known as organizing component disintegration.

The paper is organised as follows, section II consists of Literature review , section III consists system model or proposed system, section IV applications of morphology, section V discuss about results obtained from test images, section VI consists of conclusion.

II. LITERATURE REVIEW

X.C.Jin, S.H.Ong and Jayasooriah authors proposed their work using morphological operators for binary images.They also proposed noise reduction , edge detection etc in their paper .By using domain operator the weights are determined on different index functions of fuzzy sets.[4]

Su Chen and Robert M.Haralick, authors proposed their work on recursive morphological transforms on discrete space has been done. The timing performance of set of recursive algorithms are measured . They generate random tests on different images, run recursive morphological algorithms and compared the results.[5]

Meihua Bao ,Siyu Guo, Yaonan Wang,Qiu Tang authors introduced a status matrix storing the category of each pixel and manipulate open pixel using dilation or erosion on those pixels. They eliminate redundant and unnecessary computations in this paper[6].

Priya M.S ,Dr. G.M.Kadhar Nawaz , these authors proposed work for removal or attenuate both bright and dark artifacts and noise.they used dilation and erosion for removal of artifacts. They also proposed gray-level transitions in an image.[7]

K.Sreedhar and B.Panlal these authors proposed enchancement of images with poor contrast and detection of background. They proposed a method based on Weber's law motion. This method used to detect image background using morphological transformations.[8]

III. PROPOSED SYSTEM

Morphology is a wide arrangement of tasks in picture preparing which procedure pictures dependent on shapes. There are distinctive morphological activities applied utilizing organizing component to an info picture. In morphological activities every single pixel of yield picture is contrasted and input picture and organizing element(stel).

In our paper we made a Graphical User Interface(GUI) for doing morphological activities. We have utilized diverse morphological activities like Dilation ,Erosion and so on., and various uses of morphology like thickening and diminishing of a picture and furthermore boundary extraction of a pictures. Separating the limit is the significant procedure to pick up in the data and comprehend the element of a picture. Limit extraction is the main procedure in pre-processing so as to introduce the highlights of the picture. The procedure can assist the analyst with gaining the information from the picture. For all these we have utilized an administrator known as structuring component is utilized.

(a)*GRAPHICAL USER INTERFACE(GUI)*:
In our paper we favor GUI since it makes things straightforward for the end clients of the program. we can get to effectively through this GUI.

Step 1: open Matlab, go to command window and type GUIDE, then it appears like below Fig(1)
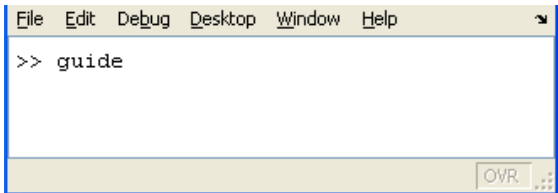
Fig(1) Command window

Step 2: choose first option i.e., Blank GUI(default) as shown in Fig(2)

Fig(2) Blank GUI

Step 3: Now the screen appear like below Fig (3),before adding components blindly, it is good to have rough idea about how we want design GUI to look like, then we create visual aspect of the GUI by selecting components
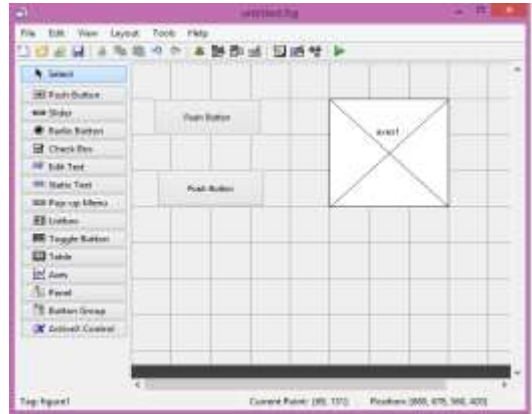
Fig(3) Basic screen of GUI with components

Step 4: Edit the properties of components by double clicking on component then we get property inspector as shown in Fig (4)

Fig(4) Property inspector

Step 5: Now save GUI with any file name , when you save the file Matlab automatically generates two files
- filename.fig : .fig means it contains GUI and
- filename.m : .m means file contains all code for GUI ,here we have to write code for all components in GUI and annotated with red box as shown in fig(5).
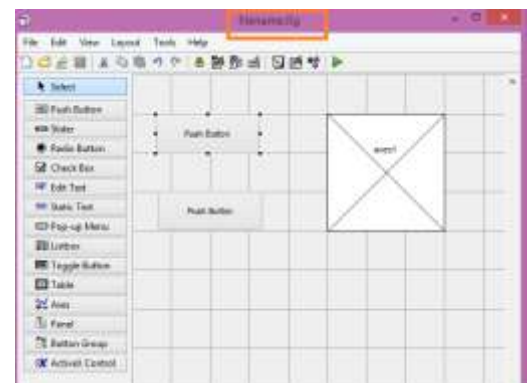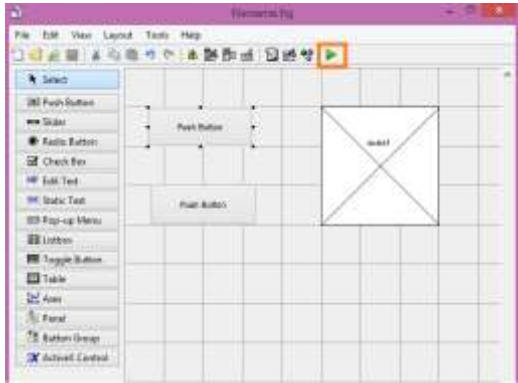
Fig(5) Saving file with name

Step 6: After writing code for GUI ,now we have to run GUI in two ways , they are

First method: press run button in GUI editor

Second method : Launch the GUI from the matlab command prompt ,type the name of GUI at command prompt.GUI start run immediately and the screen will appear as shown in Fig(6)

Fig(6) Execution of GUI

(b)STRUCTURING ELEMENT:

The structuring component is a lattice shape which communicate with an input(given) picture. It is normally utilized in morphological activities like Dilation , Erosion, Opening, and Closing and so forth., The structuring element are two sorts they are Flat, Non Flat as appeared in Fig(7). The 'strel' work is utilized for Flat structuring component. 'Offsetstrel' work is utilized for non flat structuring element.
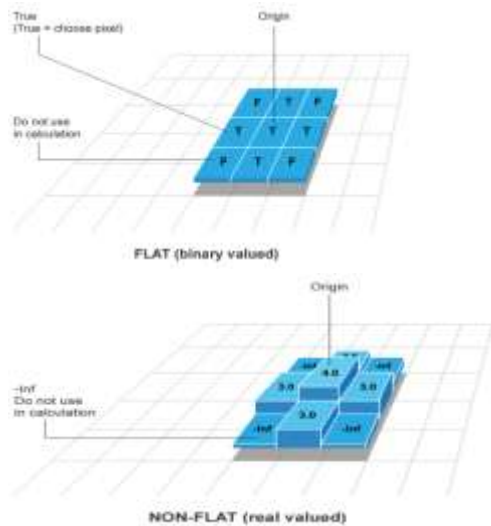
Fig(7)Types of structuring elements

There are various sorts of structuring component shapes they are Disk, Square, Rectangle, Line, etc., structuring component and of various sizes.

(c)DILATION:

Dilation is one of the essential operator in morphology and it is represented as $\oplus$.Dilation add pixels to the boundaries of articles in a picture. The quantity of pixels included or expelled from objects in a picture relies upon the size and state of the organizing component used to process the image. To widen a picture ,it utilizes syntax structure *imdilate* work .It acknowledges two essential contention they are input picture and structuring component . To widen picture first we need to pass input image(BW) and organizing component (SE) to imdilate function now enlargement happens by adding all 1's to all sides of closer view object.

BW1=imdilate(BW,SE)

where   BW=input image

SE= structuring element

Fig(8) Example of Original image and Dilated image

(d)EROSION:

Erosion is an essential operator in morphology and it is spoken to as $\ominus$. Erosion take away pixels in boundaries of items in a picture. The quantity of pixels expel from objects in a picture relies upon size and state of organizing component used to process the picture. To erode a picture it utilizes syntax of *imerode* work. It acknowledges two primary componenets they are input picture and structuring component.

BW2= imerode(BW,SE)

Where BW= input picture

SE= structuring component

The erode picture is gotten by passing information image(BW) and structuring element(SE) to imerode syntax and erosion happens.

Fig(9) Example of Original image and Eroded image

(e) OPENING:

The activity of Opening is a blend of Dilation and Erosion. Opening of a picture is a disintegration followed by dilation, using structuring element for the two activities. That implies , the initial activity disintegrates a picture and afterward widens dissolved picture utilizing stel. Opening function helps in removing small objects from a picture while it preserve its size and shape of larger objects in picture.

(f) CLOSING:

The activity of closing is likewise a blend of Dilation and Erosion .The Closing activity expands a picture and afterward disintegrates the enlarged picture utilizing same structuring component for the two tasks. It is valuable for filling small openings from a picture while preserving size and state of articles in the picture. Both opening and closing capacities are inverse to one another.

IV APPLICATIONS OF MORPHOLOGY

(a)BOUNDARY EXTRACTION:

Boundaries are connected edges that portray the state of an item. It is helpful for getting geometry highlights of a picture like size, direction ,external piece of a picture etc., we can follow limits of a picture by utilizing diverse sentence structure accessible. They are
B= bwboundaries(BW) , implies it follows external limits of a picture or items and it likewise follows boundaries of gaps inside the articles.

B= bwboundaries(BW,conn) implies it follows external limits and it determines a connectivity among parent and child boundaries.
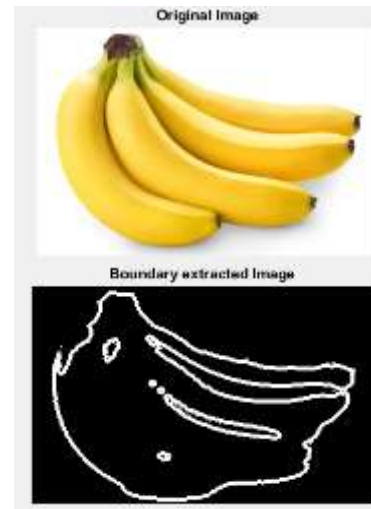
Fig(10) Example of Boundary extracted image

(B)THICKENING:

It is one of the application of morphological function ,it is utilized to develop selected regions of closer view pixels in images(binary pictures). It is regularly applied to binary pictures and creates binary picture as output. Thickening is the dual of thinning and is proportional to thinning procedure on the background.
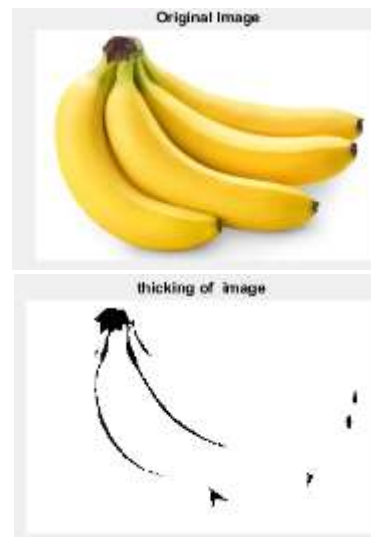

Fig(11) Example of Thickning of an image

(C)THINNING:

Thinning is an another application of morphological function and it is utilized to remove selected closer view pixels from binary pictures. It is mainly used for skeletonization which fill in as picture descriptor and for decreasing the output of edge detectors to a one pixel thickness and so forth.,
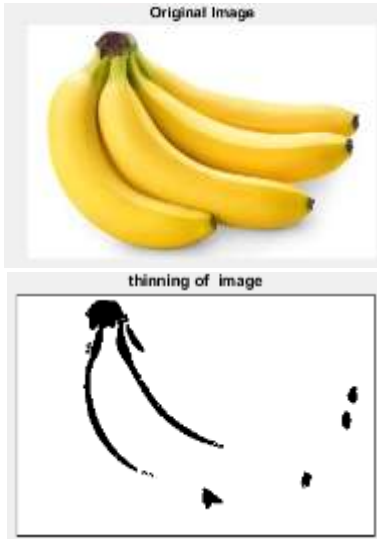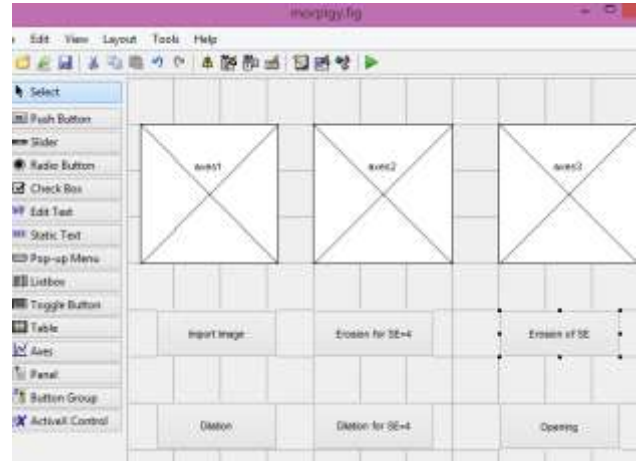

Fig(12) Example of Thinning of an image

PROPOSED SYSTEM: FLOW CHART
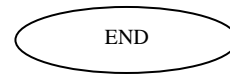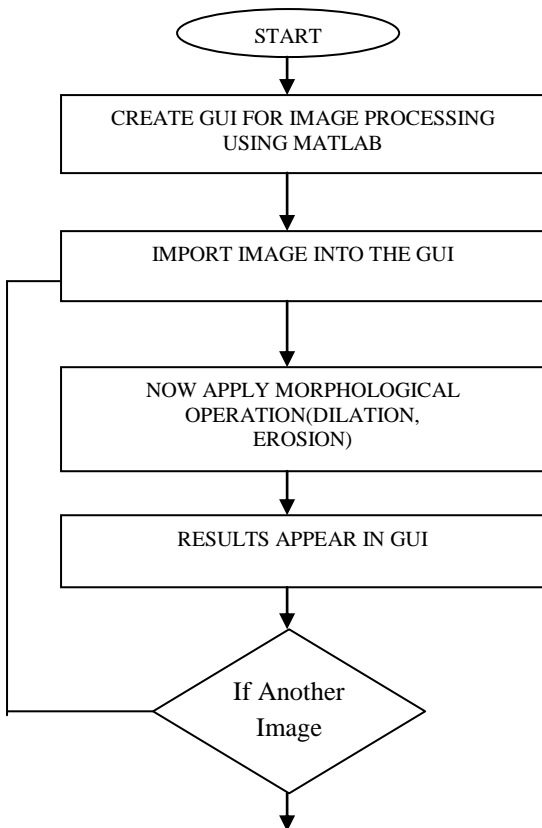
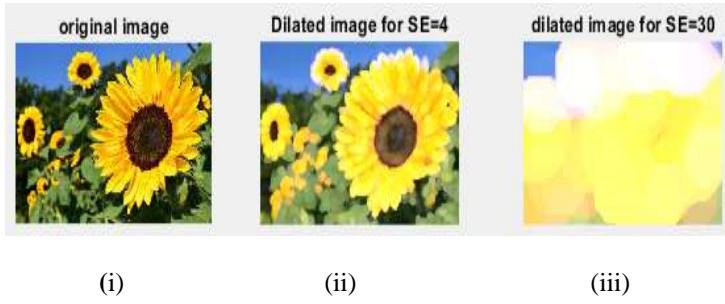Fig(a) Flow Chart

V RESULTS

Fig(13) GUI of proposed system

The below figures shows the results of morphological operator using structuring element(Disk) of different sizes on different images.

(i)   (ii)

(iii)

(i)Original image   (ii)Eroded image for SE=4
(iii)Eroded image for SE=30

(i) Original image   (ii)Dilated image for SE=4
(iii)Dilated image for SE=30
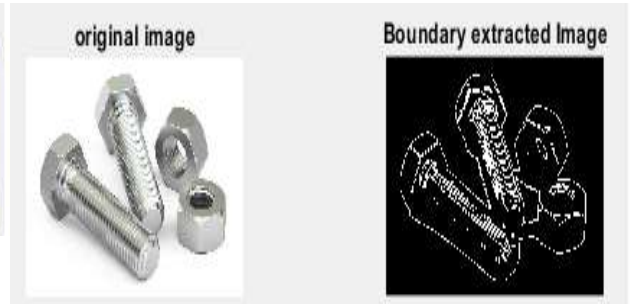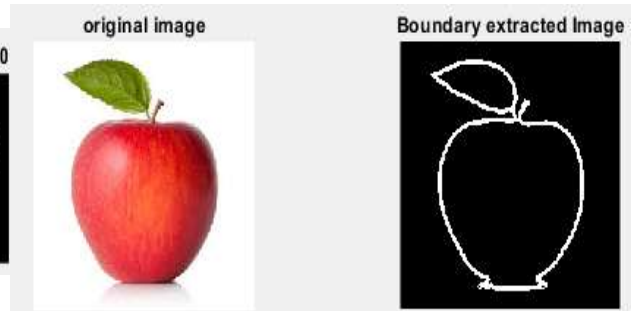

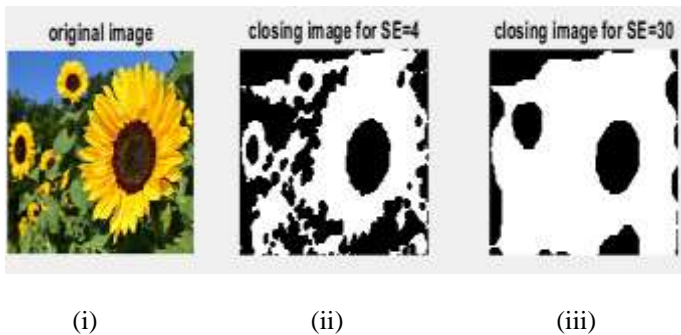
(i)Original image   (ii) Opening image for SE=4
(iii)Opening image for SE=30

(i)Original image   (ii)Closing image for SE=4
(iii)Closing image for SE=30

Results of Application of Morphology

Morphological operators are used in different applications some of the examples using morphological operator with structuring element of disk type is used.

Fig (i)

Fig(ii)

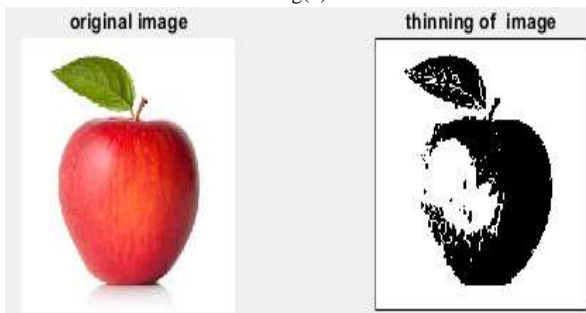Fig(i)Boundary extracted image using Nutbolts
Fig (ii)Boundary extracted image using apple
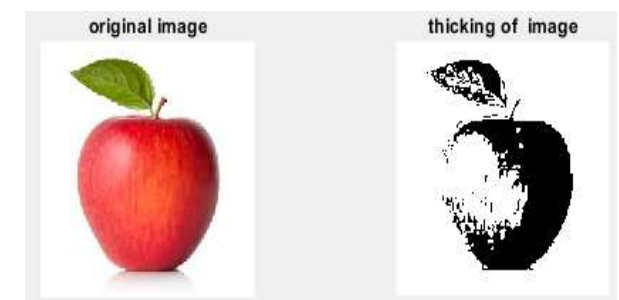
Fig(iii)

Fig(iv)

Fig(iii)Example of Thickning of an image
Fig(iv)Example of Thickning of an image

Fig(v)

Fig(vi)

Fig (v)Example of Thinning of an image
Fig (vi)Exampl of Thinning of an image

VI. CONCULSION

In this paper , we utilize various pictures and applied diverse morphological tasks using structuring component of various sizes of "Disk" as appeared in above outcomes . Utilizing structuring element(stel) of various sizes(SE=4,SE=30) have been used in this paper to extract a original picture represented as eroded image, dilated image, opening and closing of a picture. This morphological activities are utilized in numerous applications like boundary extraction of objects, thinning and thickening, hole filling and so on., The structuring component (stel) assumes a major role. In this paper MATLAB GUI has been utilized for this procedure.

We infer that morphological operationas are easy to use for exrtracting boundary of an image , and significant intriguing utilization of morphological activities are extremely effective in cleaning noisy image, and different properties in a picture utilizing structuring component(stel).

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