**Exercise 5**

**Morphological image processing**

Mathematical morphology is a powerful tool that can be used to extract features and components

from an image. It is often used to pre-process or post-process images to facilitate analysis. In

morphology, a small shape (structuring element) is translated across the image during the course of processing. Certain mathematical logic operations are performed on the image using the structuring element to generate the processed image.

Ques. Explain dilation and erosion, two fundamental operations in mathematical

morphology.

Ques2. Load **'broken-text.tif'**. Dilate the image with different structuring elements. And see the different results.

2. Do the same with **noisy-fingerprint.tif**

**Ques3.** Load **noisy-fingerprint.tif** and **broken-text.tif**. Apply different erosions

**Opening and closing**

Combinations of morphological operations can be very useful and help remove many artifacts

present in images. This will become very useful after segmenting an image.

The first operation we will see is opening, which is an erosion followed by dilation. Opening

smoothes object contours, breaks thin connections and removes thin protrusions. After opening, all objects smaller than the structuring element will disappear.

Closing is a dilation followed by erosion. Closing smoothes object contours, joins narrow breaks,

fills long thin gulfs and fills holes smaller than the structuring element.

Ques 4. Reopen rice.png

Use imopen to eliminate all the rice grains.

Convert all numbers so that they are between 0 and 1

Use mesh to view image (see details of ‘mesh’ command in help section)

Use this new array to modify the original rice.png.

Is it easier or harder to correctly pick all the rice grains.? How

does the quantitation compare?

Ques5. Load and apply opening and closing to **noisy-fingerprint.tif** and **brokentext.tif**. Discuss the result