VNUHCM - UNIVERSITY OF SCIENCE

FACULTY OF INFORMATION TECHNOLOGY

MORPHOLOGICAL OPERATOR (CONT.)

ADVANCED DIGITAL IMAGE AND VIDEO PROCESSING

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6th April 2024

Contents

1 Assessment

Function	Level of completion	Assessment
Black-Hat	100%	Completed for grayscale image
Textual Segmentation	100%	Completed for grayscale image

2 Morphological operators function

The continue part of practice is implemented in the same file with the previous part, thus the supporting and some manual functions is keep unchanged. The new functions are implemented such as: **Black-Hat** and **Textual Segmentation** for grayscale images.

2.1 Black-Hat

The black-hat operator is defined as the difference between the closing of the input image and the input image. It is useful for detecting bright regions on a dark background.

def black_hat(img, kernel)

Input:

- **img**: input grayscale image.
- **kernel**: kernel for morphological operation or known as structuring element.

Output: image after applying black-hat operator.

This function is used to manually perform the black-hat operator on the input grayscale image. The closing operation is performed on the input image and then the input image is subtracted from the result of the closing operation. The result is the black-hat transformed image.

Result images:

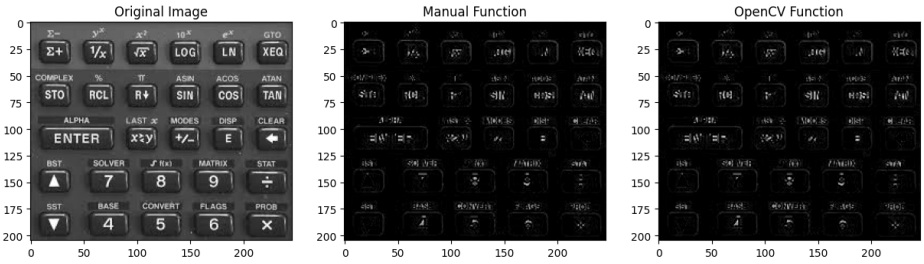

Figure 1: Black-hat on grayscale image with kernel size 3x3

As it can be seen from the result image, the black-hat operator is able to detect the bright regions on a dark background and keep it where as the darker part is almose removed. This is useful for detecting the text from the background in the image processing. The manual implementation of black-hat operator also shows the effectiveness when the difference with the OpenCV function is not significant.

2.2 Textual Segmentation

Textual segmentation is a process of segmenting text from the background. The morphological gradient is used to segment the text from the background.

def textual_segmentation(img, kernel)

Input:

- **img**: input grayscale image.
- **kernel**: kernel for morphological operation or known as structuring element.

Output: image after applying textual segmentation.

This function is used to manually perform the morphological textual segmentation on the input grayscale image. The opening is performed on the closing of the input image and then it is used in the morphological gradient operation. The result is the text segmented image.

Result images:

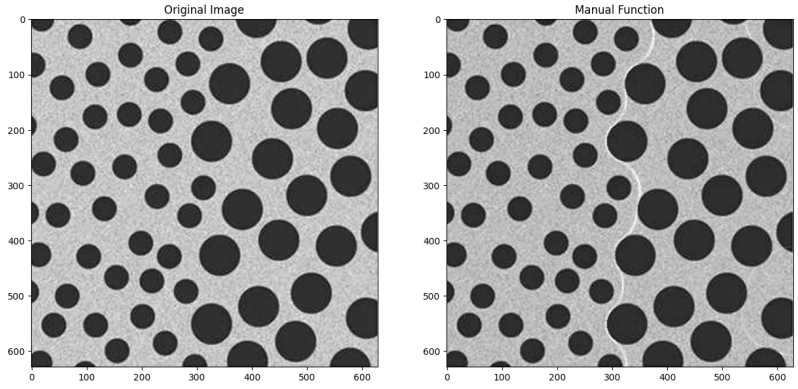

Figure 2: Textual segmentation on grayscale image with kernel size 3x3

The result image shows the white line which segments the large and small circle from the input image into 2 separated parts. This is useful for detecting the text from the background in the image processing.

3 References

Practice #01 sample code published on moodle.

Slides of theory lecture provided by Prof. Lý Quốc Ngọc.

Ideas of dilation and erosion operators

Ideas of opening and closing operators

Implementation of morphological operators with opencv in both binary and grayscale images

Implementation of morphological operators with opencv