**Lab 08**

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| Name: | 謝方智 |
| Student ID: | B08611010 |
| Total Score: |  |

**Note:**

Most of the explanations in this lab is mandatory, However, giving reasonable explanations to your answer or programs will earn you partial credits when your answer is incorrect.

1. **Multiple Choice (20 points)**

|  |  |  |  |
| --- | --- | --- | --- |
| # | Answer | Explanation (Please write codes to verify it.) | Score |
| 1 | b |  |  |

1. **Find the Contour (20 points)**

|  |  |  |
| --- | --- | --- |
| # | Description | Score |
| 1 |  |  |

1. **Image Enhancement (25 points)**

|  |  |  |
| --- | --- | --- |
| # | Description | Score |
| - | Paste your result from (a) to (g) here.  (a)  (b)    (c)    (d) have to set vmax to one to look like the image in the example    (e)    (f)    (g) gamma=0.5 |  |

1. **Fingerprint Analysis (35 points)**

|  |  |  |
| --- | --- | --- |
| # | Description | Score |
| - | Paste your result here and briefly describe your image processing procedure and approach. How do you think your results are?  First, I binarized the image using Souvola threshold and did some preprocessing to the image (in the order of left to right, top to bottom in the figure below). Then, I skeletonized the image.    Then, I performed minutiae extraction of the processed fingerprint image. This was done by implementing a function called “sections”, which gets the surrounding 8 pixels of a given pixel and calculate how many “sections” have the total 9 pixels (the given one and the surrounding eight) been divided into. This can be better illustrated with some graphic examples:    We define connected (not including diagonally) white pixels (ones) as a single “section”. We can see that the left image of nine pixels has one section, the image in the middle has two, and the right image has three sections.  A certain type of fingerprint minutiae can be determined by the number of sections in the 9-pixel window. For example, a pixel is a ridge ending if it has only one section in the surrounding nine-pixel window, a continuing ridge point if it has two sections, and a bifurcation point if it has three.  Using this algorithm, I successfully extracted the features in the center part of the skeletonized image, and here’s the result: |  |