# **CVI620/DPS920- Lab 6**

# **Morphology & Geometric Transformations**

| Total Mark: | 10 marks (2.5% of the total course grade)   * 7 out of 10: Blackboard submission * 3 out of 10: Lab demo |
| --- | --- |
| Submission file(s): | * Lab06\_1.cpp * Lab06\_2.cpp * Lab06.docx including the **result images and answers** |

Please work in **groups** to complete this lab. This lab is worth 2.5% of the total course grade and will be evaluated through your written submission, as well as the lab demo. During the lab demo, group members are *randomly* selected to explain the submitted solution. Group members not present during the lab demo will lose the demo mark.

## **Part I: Morphology**

1. Write code (save as Lab06\_1.cpp) that
   1. Open an image and convert to greyscale. Display (and paste here) the converted image.
   2. Convert the greyscale image to a binary image. Use 128 as the threshold. (Paste image here)
   3. Apply morphological opening to the binary image using a 3x3 square kernel (all set to 255). Display (and paste here) the opened image.
   4. Apply morphological closing to the binary image using a 3x3 square kernel. Display (and paste here) the closed image.
   5. Repeat steps (c) and (d) using a 7x7 square kernel.
   6. Explain the effect of opening and closing on your image. Which kernel size is more effective? Hint: Use an image that allows you to see the effects.
      1. The image with the higher kernel is more effective, it morphs the image more than the smaller kernel

## **Part II: Geometric transformations**

1. Write code (save as Lab06\_2.cpp) that
   1. Open an image (and paste here).
   2. In a loop, asks the user whether he wants to rotate, resize, apply perspective transformation, or exit.
   3. If rotation is selected, asks for an angle (in degrees). Then rotates the image around the center of the image with the given angle and displays the rotated image. Run the code with
      1. Rotate for 20 degrees clockwise (and paste here).
      2. Rotate for 10 degrees counter clockwise (and paste here).
      3. Manually calculate the transformation matrix for 10 degrees CCW. Show your work here:
      4. Output the matrix calculated by OpenCV and compare with your work. Did you get the same answer?
   4. If resizing is selected, asks for the resizing factors along each axis and resizes the image. Run the code resizing the image to double the width and half the height (and paste here).
   5. If perspective transformation is selected, apply the transform with the following homography matrix (and paste here):
2. Add this declaration to your file:

We, Jason, Muqing, Matteo, declare that the attached assignment is our own work in accordance with the Seneca Academic Policy. We have not copied any part of this assignment, manually or electronically, from any other source including web sites, unless specified as references. We have not distributed our work to other students.

1. Specify what each member has done towards the completion of this work:

|  | Name | Task(s) |
| --- | --- | --- |
| 1 | Jason |  |
| 2 | Muqing |  |
| 3 | Matteo |  |