

**ESSAY:** Introduction to Digital Image Processing

**CODE:** 505060

**I. Rules**

- Each essay is conducted by a group of **one or two students**.
- The essay consists of 2 parts: the Programming part and the Report part.
- Only use OpenCV library and some basic Python libraries in the Programming part.

**II. Programming part**

This part is consist of a programing task:

- Filename of the source code must be the Student ID, for ex., a student with student ID 521H1495 will submit the source file named **521H1495.py**

Here are the contents of the part:

**Programing Task:** Given an input image as follows:



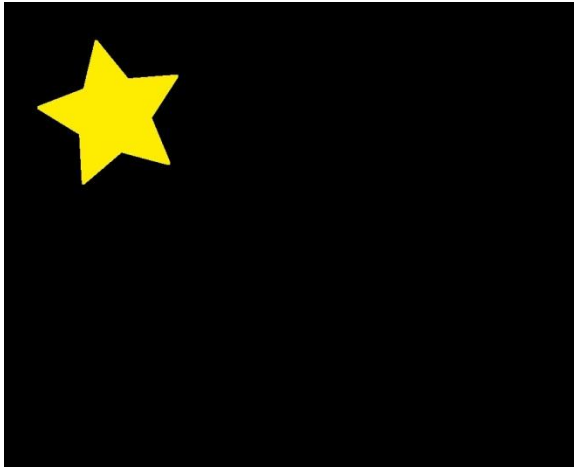
Filename: **input1.jpg**

**a(1.5 points).** Extract each star in the input image automatically by using color filtering in HSV color space, remove noise if exist, and save each output image into a file.

Input: input1.jpg

Output: Six output image files

Here is a sample output for the yellow star:



**b(1.5 points).** Repaint each star in the input image to Green color automatically, remove noise if exist, and save each output image into a file.

Input: input1.jpg

Output: Six output image files

Here is a sample output for the yellow star:



**c(0.5 points).** Repaint all stars in the input image to Green color automatically, remove noise if exist, and save the output image into a file.

Input: input1.jpg

Output: An output image file with all stars in Green color.

**d(1.0 points).** Convert the input image into Grayscale color space, and repaint White borders of all stars to Black color by using thresholding techniques, remove noise if exist, and save the output image into a file.

Input: input1.jpg

Output: An output image file with the borders of all stars in Black color.

Here is a sample output:

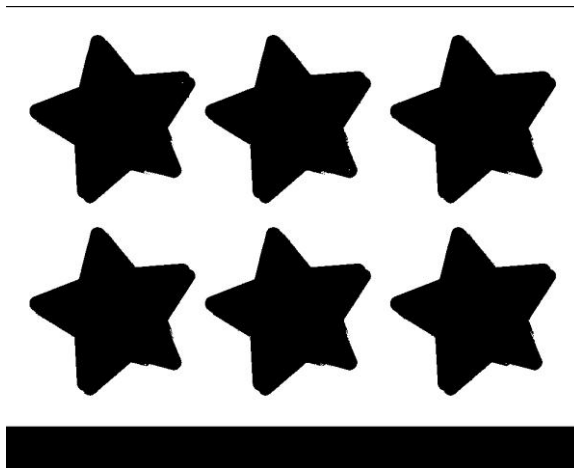


**e(0.5 points).** Convert the input image into Grayscale color space, repaint the background to White color, and repaint all stars to Black color by using thresholding techniques, remove noise if exist, and save the output image into a file.

Input: input1.jpg

Output: An output image file with all stars in Black color.

Here is a sample output:



**f(1.0 points).** Draw contours of all objects in the input image (contours in Red color), remove noise if exist, and save the output image into a file.

Input: input1.jpg

Output: An output image file with red contours of all objects

Here is a sample output:

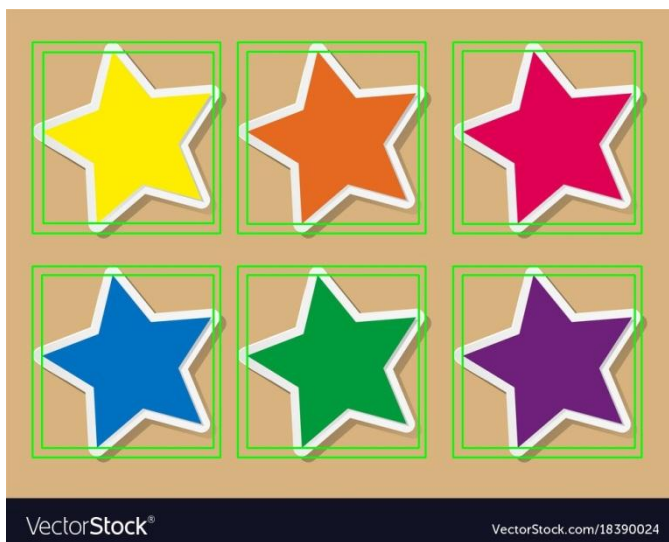


**g(1.0 points).** Draw rectangles surrounding each contour of all stars in the input image (rectangles in Green color), remove redundant rectangles, remove noise if exist, and save the output image into a file.

Input: input1.jpg

Output: An output image file with rectangles surrounding each contour of all stars

Here is a sample output:



**h(1.0 points).** Sharpen the input image, add the text of your Student IDs to the output image and save the output image into a file.

Input: input1.jpg

Output: An output image file with sharpened edges and student IDs

### III. Report part

1. The report must be submitted in **PDF format**, and the content must be written based on the report/essay format of the Faculty of Information Technology. **In case students do not follow the Faculty's format, they will receive 0 points for the Report part.**
2. Filename of the report must be the Student ID, for ex., a student with student ID 521H1495 will submit the report file named **521H1495.pdf**
3. The report must include the following contents:

- a. Chapter 1: Methodology of Solving Tasks (**1 point**)

Write a short description of the solving methods in the “Programming part”. For ex.:

- Load the image in grayscale color scheme
- Gaussian Blur
- Canny
- ....

- b. Chapter 2: Task results (**1 point**)

Insert all output images of the tasks in the “Programming part” into this section. The images must be clear, and properly laid out. The images captions and descriptions are also required.

### IV. Submission guideline

- Students submit **Python source files and a report file** to the "**MidTerm\_Essay**" assignment on Google Classroom of the practical class.
- Students must ensure that the Python source files are not corrupted during execution. The source code with errors will not be scored.
- Python source files must be saved in the correct format (**file extension is .py**). The source files in the wrong format will not be scored.

### V. Submission deadline

- Deadline for submitting essay is **11:00PM 29/11/2022**.
- Students who submit later than the above deadline will receive 0 score.

## VI. Regulations

- The result of this essay will be the Midterm score.
- **Student who copy their friends's essay will be scored 0.**
- **If a student's work shows signs of copying each other, the student will attend an interview with the lecturer.**

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