ĐẠI HỌC TÔN ĐỨC THẮNG TON DUC THANG UNIVERSITY	KHOA CÔNG NGHỆ THÔNG TIN KỲ THI GIỮA KỲ HỌC KỲ 1 NĂM HỌC: 2023 – 2024

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 two programing tasks:

- 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 1 (5.0 points): Given an input image as follows:

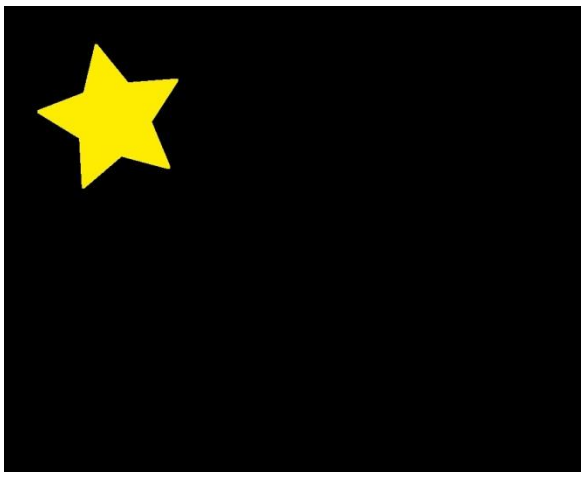
Filename: **input1.jpg**

1a(3.0 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:



1b(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:

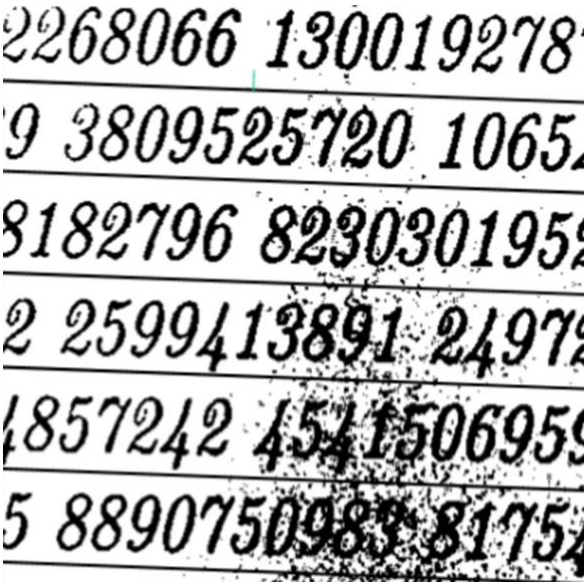
1c(1.0 points). Convert the input image into Grayscale color space, repaint the background to White color, and repaint all stars to Black color by using thresholding techniques, remove noise if exist, and save the output image into a file.

Input: input1.jpg

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

Here is a sample output:

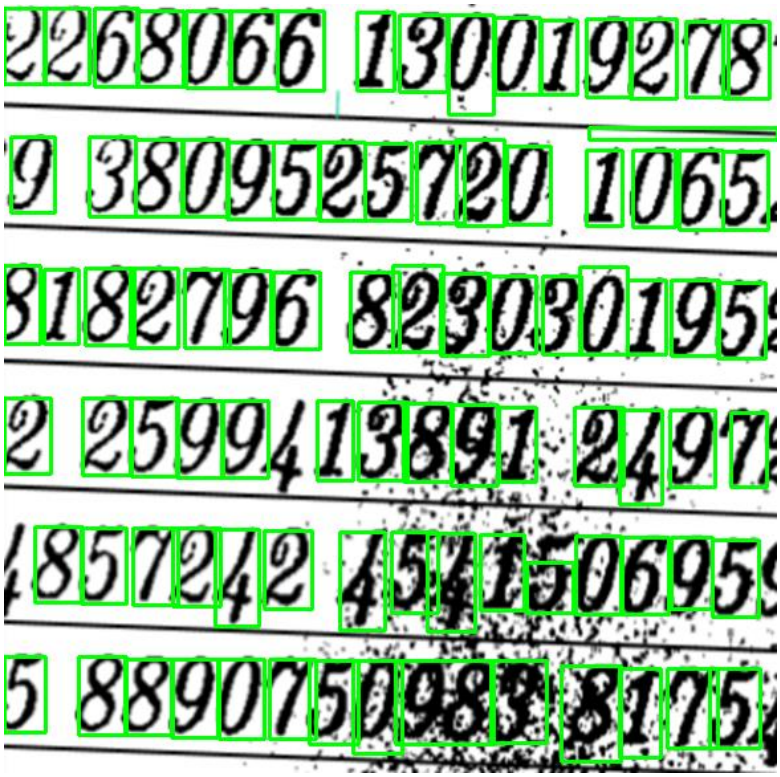
Programing Task 2 (3.0 points): Given an input image as follows:



Filename: **input2.png**

Draw rectangles surrounding each digit in the input image automatically, and save the output image into a file.

Here is a sample output:



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
    - Thresholding
    - Find contours
    - ….

    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 **a Python source file and a report file** to the "**MidTerm_Essay**" assignment on Elearning website 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. 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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