Bishop's University

CS563-463 Winter 2023

Computer Vision-Image processing

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ASSIGNMENT

Assignment management

Number: 3

Name: K-Means clustering

Posting date: 2023-03-28

Delivery date: 2023-04-11, midnight

Name the file as: Assignment_$Number_$TeamName

Production: A soft document (pdf) for the report. A program for the implementation

Team members

Last name	First name	ID	Email

Part 1

You need to implement a segmentation program based on K-means. The program assigns to each pixel in the image a unique label corresponding to its class. The figure below shows a sample color image that your program takes as input.
The requirements below intend to specify what is to be done, but not how it should be done. The student should consider various design decisions for constructing the segmentation program.

Figure 1: Color image

1. The program should give a brief greeting and announce its purpose
2. The program should prompt the user for its input. The inputs are as follows.
    a. The name of the .pgm or .ppm file that contains the image to process
    b. The image type: grayscale or color
    c. The number of clusters in the image
    d. Selection of which feature to use for clustering.
        i. Color only
        ii. Colors with pixel location coordinates
        iii. Grayscale
        iv. Grayscale with pixel location coordinates
3. The program generates as output a color image where each color corresponds to a different cluster label.
4. Important program steps must be clearly described. Program code or tools used, developed by others, should be documented. The core of the segmentation part (i.e. K-means) must be your own code.
5. A document/ report must be submitted that shows the use of the program, the results, and some discussion of the results.

Resources

Example test data files are provided.

Submission: report + program

You will submit 2 files:

File1: The Software program

It contains the source code of your programming work. If many files, provide a zipped content with a How to use file that includes the team information, name of the team and students identification.

File2: Reports on methods and results

A report of maximum 3 pages that explains your work.
For the electronic report of your results, you may use Word, PowerPoint, or other document processor to prepare the report. This report must have the following sections: 1) identification of person and assignment, 2) brief problem definition, 3) summary of choices made for the solution, 4) Segmentation results of 2 color and 2 gray scale images, 5) brief discussion of results. As a guideline, a well done report need only be 2 typed pages in addition to the pages showing the example results.

Moodle

A link will be open on Moodle for Submission
Group work is accepted. Maximum number of students in a team is three.
Only one student of the group will do the submission.

Notes

Partial credit will be given for partial completion of the tasks. Thus, it is wise to always have a version of the program that correctly computes some of the required outputs.

It is unwise to work with large input images until the program steps are working correctly. It is too difficult to determine problems with large images.

Good luck and remember that any part of this assignment can be discussed with the instructor for more clarifications and hints.