Machine Vision

Homework#1
Deadline: 2024/03/20 23:59:59
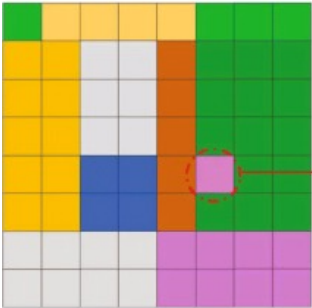
Robot Vision Lab (Room 1421)
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HW#1

1. Image Quantization(binary, gray, index-color)

    1-1. Convert the color image to the grayscale image

    - Formula: $(0.3{\times}R) + (0.59{\times}G) + (0.11{\times}B)$.

    1-2. Convert the grayscale image to the binary image

    - Choose a appropriate threshold by yourself.

    1-3. Convert the color image to the index-color image

    - Define your own colormap of 16 type colors.
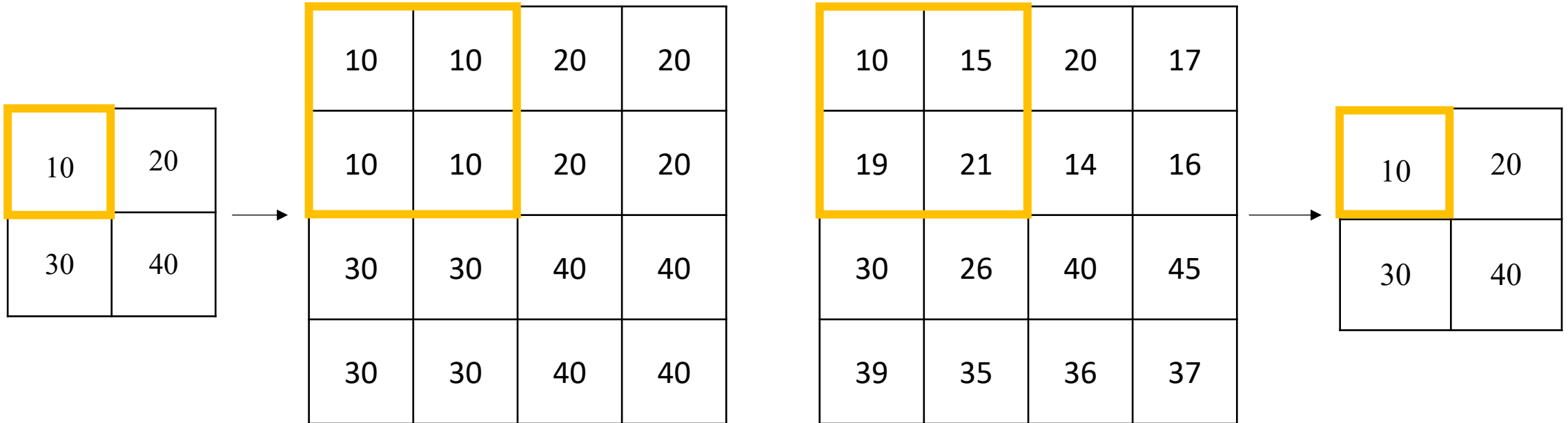
HW#1

(a) Indexed image   (b) Data matrix   (c) Palette matrix

HW#1

2. Resizing Image

2-1. Resizing image to $\frac{1}{2}$ and 2 times without interpolation

10	10	20	20
10	10	20	20
30	30	40	40
30	30	40	40

10	20
30	40

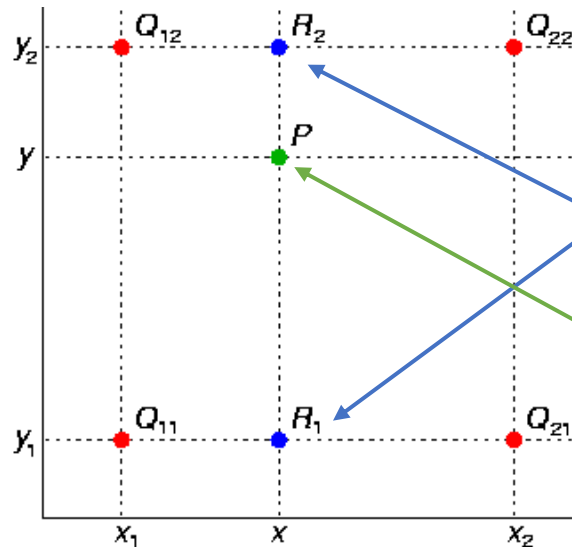| 10	15	20	17
19	21	14	16
30	26	40	45
39	35	36	37

10	20
30	40

HW#1

2. Resizing Image

2-2. Resizing image to $\frac{1}{2}$ and 2 times with interpolation

- You can use bilinear or bicubic interpolation.

$$f(x, y_1) \approx \frac{x_2 - x}{x_2 - x_1} f(Q_{11}) + \frac{x - x_1}{x_2 - x_1} f(Q_{21}),$$

$$f(x, y_2) \approx \frac{x_2 - x}{x_2 - x_1} f(Q_{12}) + \frac{x - x_1}{x_2 - x_1} f(Q_{22}).$$

$$f(x, y) \approx \frac{y_2 - y}{y_2 - y_1} f(x, y_1) + \frac{y - y_1}{y_2 - y_1} f(x, y_2)$$

HW#1

- Report
  - Student ID
  - Name
  - Describe the main part of your method
  - Result images and colormaps
  - Explain the results you get

HW#1

- Rules in using C/C++ OpenCV Lib

  ➢ Use [OpenCV-2.x](#) version

  ➢ Allow use:

    1. Read, save, show image (cvLoadImage, cvShowImage, …)

    2. Define image (Mat)

    3. Get image size (cvSize, cvGetSize)

  ➢ Not Allow use:

    1. Cannot use the function of Lib to do the main part of homework.

       Example: cvtColor(image, gray, CV_RGB2GRAY);   // convert RGB to Gray

HW#1

- Rules in using Python OpenCV Lib

  ➢Allow use:

  1.   Read, save, show image (cv2.imread, cv2.imshow, …)

  2.   Define image

  3.   Get image size

  ➢Not Allow use:

  1.   Cannot use the function of Lib to do the main part of homework.

       Example: cv2.cvtColor(image, cv2.COLOR_BGR2GRAY) // convert RGB to Gray

HW#1

- Grade
  - Program(80%)
    - Q1-1(10%)
    - Q1-2(10%)
    - Q1-3(20%)
    - Q2-1(15%)
    - Q2-2(25%)
  - Report(20%)

HW#1

• Folder Structure

➢ There are 21 images in the results folder.

➢ Write all questions in one program

Python

```
112598058_hw1/
├── images/
│   ├── img1.jpg
│   ├── img2.jpg
│   └── img3.jpg
├── results/
│   ├── img1_q1-1.jpg
│   ├── img1_q1-2.jpg
│   ├── img1_q1-3.jpg
│   ├── img1_q2-1-half.jpg
│   ├── img1_q2-1-double.jpg
│   ├── img1_q2-2-half.jpg
│   ├── img1_q2-2-double.jpg
│   │         …
│   └── img3_q2-2-double.jpg
├── 112598058_hw1.py
├── 112598058_hw1.pdf
└── Readme.txt (Optional)
```

C/C++

```
112598058_hw1/
├── project_hw1/
│   ├── images/
│   │   ├── img1.jpg
│   │   ├── img2.jpg
│   │   └── img3.jpg
│   ├── results/
│   │   ├── img1_q1-1.jpg
│   │   ├── img1_q1-2.jpg
│   │   ├── img1_q1-3.jpg
│   │   ├── img1_q2-1-half.jpg
│   │   ├── img1_q2-1-double.jpg
│   │   ├── img1_q2-2-half.jpg
│   │   ├── img1_q2-2-double.jpg
│   │   │         …
│   │   └── img3_q2-2-double.jpg
│   ├── include/
│   │   └── func.h
│   ├── func.cpp
│   └── main.cpp
├── 112598058_hw1.pdf
└── Readme.txt (Optional)
```

HW#1

- Please compress your files.

  ➢ Example: 112598058_hw1.zip

- Deadline: 2024/3/20 23:59:59

  ➢ For each hour late, 10% of the total score will be deducted.

- Don't share your code and your report with other students.

  Do it by yourself.