Computer Vision

Undergraduate Course

Chapter 3. Image Display (Practice)

Dongbo Min

Department of Computer Science and Engineering

Chungnam National University, Korea

Practice Lecture (1/2)

- Typing and understanding MATLAB codes in textbook
  - Reproducing Figure 3.2 and 3.3
- Implementing 'bit plane' using various images
  - Reconstructing results when using only the smaller number of bits ($L = 1 \sim 8$)
  - For example, when $L = 3$, use $c7$, $c6$, and $c5$ for reconstruction.
- Producing Figure 3.5~3.7 not using '`imresize()`', but using your own code.
  - `Function imresize_boxfilter(filename, 'scale factor in x', 'scale factor in y')`

Practice Lecture (2/2)

- Implementing uniform quantization
- Implementing dithering
  - Note that D and D_2 in p. 29 is for 2-gray level. For 4-gray level, D and D_2 should be **scaled** accordingly.
  - 2-gray level
    4-gray level

```
Function D_2gray_dither(filename)
Function D_4gray_dither(filename)
Function D2_2gray_dither(filename)
Function D2_4gray_dither(filename)
```

- Implementing Floyd & Steiberg algorithm
  1. Original code (top left → bottom right)
  2. Modified code (bottom right → top left)
  3. Do 1 and 2 produce the same results? If not, why?

Principles for homework submission

- **MATLAB homework**
  - Submit all source codes (m file) for each (sub-) problem
  - If the codes do NOT work, then there will be a penalty.
  - The report for MATLAB homework should include the intermediate process, reason, and final results.

- **Report homework**
  - The report should include the intermediate process, reason, and final results.
  - The report homework should be done **by hand, NOT using any computer software**.

Example of Source Code

- For each problem, the source code should consist of **two functions**, as below.
  - In the 'homwork_main.m', the results should **appear** or be **saved** as below.

homework_main.m

```
in1 = imread('cameraman.tif');

out1 = function_example(in1);

imshow(out1); % or use imwrite(out1, 'output.png');
```

function_example.m

```
% Please make sure that there is a return variable to save an output.
% In the example below, 'y' is the return variable.
function y = function_example( im )

% Implement your code here.

end
```

숙제 제출 원칙

- **매트랩 숙제**
  - 각 세부문제 별로 모든 소스 코드를 제출
  - 만약 코드가 작동하지 않을 경우, 감점
  - 매트랩 숙제에 대한 보고서는 중간 결과, 이유, 최종 결과 등을 모두 포함하여 자세히 서술할 것

- **문제풀이 숙제**
  - 보고서는 중간 결과, 이유, 최종 결과 등을 모두 포함하여 자세히 서술할 것
  - 문제풀이 숙제는 반드시 손으로 해서 낼 것 (컴퓨터 SW를 사용하지 말 것!)

Homework (1/2)

1. (MATLAB) For ‘newborn.tif’ and ‘cameraman.tif’, implement the dithering with D, when 8-gray level is used.
   - Note that D in p. 29 is for 2-gray level. For 8-gray level, D should be **scaled** accordingly.

   `Function D_8gray_dither(filename)`

2. (MATLAB) For ‘newborn.tif’ and ‘cameraman.tif’, implement error diffusion
   - 2.1 Implementing Javis algorithm
   - 2.2 Implementing Stucki algoroithm

Homework (2/2)

3. (MATLAB) **Exercise 6**: G is 256x256 grayscale image of value 50, 100, 150, or 200 only. Namely, G contains a **single intensity value**. For these 4 cases,
   1) Find the proper 2×2 dither matrix D for 2-gray level.
   2) Display the dithered results.

4. (Report) **Exercise 8**: Explain the necessary properties of 2×2 dither matrix D when 2-gray or 4-gray levels are used.