

Computer Vision

Undergraduate Course

Chapter 6. Geometric Transform (Practice)

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Practice Lecture (1/2)

- 1D신호를 이용하여 1D 보간을 수행하시오.

```
function test_1Dinterpolation()  
x=1:12;  
y=[30 10 20 40 25 10 30 60 30 20 10 30];  
xn = 1:0.1:12;  
yn0 = interp1(x,y,xn, 'nearest');  
yn1 = interp1(x,y,xn, 'linear');  
yn2 = interp1(x,y,xn, 'cubic');  
yn3 = interp1(x,y,xn, 'spline');  
  
plot(xn, yn0,'*', xn, yn1, 'r', xn, yn2, 'b', xn, yn3, 'k', x, y, 'o');  
set(gcf, 'Position', get(0,'Screensize'));  
  
end
```

- Test function `imresize(A, k, 'method')`
 - A: Input image
 - k: scaling factor
 - method: 이미지 보간 방법



Practice Lecture (2/2)

- Test a down-sampling of an image in MATLAB
 - Without and with low-pass filtering

```
>> t=zeros(1024,1024);  
>> for i=1:1024  
    for j=1:1024  
        t(i,j)=((255.5)^2<(i-512).^2+(j-512).^2)&((i-512)...  
            ^2+(j-512).^2<(256.5)^2);  
    end  
end  
>> t=~t;
```

```
>> tr=imresize(t,0.25);
```

```
>> trc=imresize(t,0.25,'bicubic');
```

$t(i,j)=((255.5)^2 < (i-512).^2 + (j-512).^2) \& ((i-512).^2 + (j-512).^2 < (256.5)^2);$



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 'homework_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 세부분제 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!)



Practice Homework (1/2)

1. (MATLAB) 2D 이미지에 대해 **up-sampling** nearest neighbor 보간, bilinear 보간, bicubic 보간을 **직접** 구현하시오. 그리고 MATLAB function `imresize()`와 비교하시오.
 - 결과는 동일 해야된다.
 - 소수점인 scaling factor 인 경우에도 수행되어야 한다.
 - Test your codes with 'cameraman.tif' with the scaling factor = 2.7



Practice Homework (2/2)

2. (MATLAB) 이미지 회전 함수를 nearest neighbor보간, bilinear 보간, bicubic 보간을 사용하여 직접 구현하고, MATLAB function `imrotate()` 과 비교하십시오.
 - 결과는 동일 해야된다.
 - 회전 각도가 소수점인 경우에도 수행되어야 한다.
 - Test your codes with 'cameraman.tif' with the rotation angle = 30° .
3. (MATLAB) Test exercises 5 and 6 using the codes that you implement in the homework 1. Then, answer the questions together with very detailed reasons.
 - 이미지 down-sampling를 수행할 때, MATLAB function `imresize()` 을 사용 가능.
 - 이미지 up-sampling일 땐, 직접 구현한 함수를 사용.
 - For exercises 5 and 6, please refer to the next page.



- Exercise 5. Suppose an image is enlarged by some amount k , and the result is decreased by the same amount. Should this result be exactly the same as the original? If not, why?
- Exercise 6. What happens if the image is decreased first and the result enlarged?

