

Digital Image Processing-Assignment 01

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I. 問題一

程式碼:

```
1 % load color image and display it
2 I = imread('lenna-rgb.tif');
3 figure,
4 subplot(3,2,1), imshow(I), title('
    Original image');
5 % convert it to grayscale if needed
6 grayI = rgb2gray(I);
7 subplot(3,2,2), imshow(grayI), title('
    Grayscale image')
8 % divide the image into 4 parts with the
   same size
9 [row,col] = size(grayI);
10 I1 = grayI(1:round(row/2), 1:round(col/2)
   );
11 I2 = grayI(1:round(row/2), round(col/2)
   +1:end);
12 I3 = grayI(round(row/2)+1:end, 1:round(
   col/2));
13 I4 = grayI(round(row/2)+1:end, round(col
   /2)+1:end);
14 subplot(3,2,3), imshow(I1), title('
    UpperLeft')
15 subplot(3,2,4), imshow(I2), title('
    UpperRight')
16 subplot(3,2,5), imshow(I3), title('
    LowerLeft')
17 subplot(3,2,6), imshow(I4), title('
    LowerRight')
```

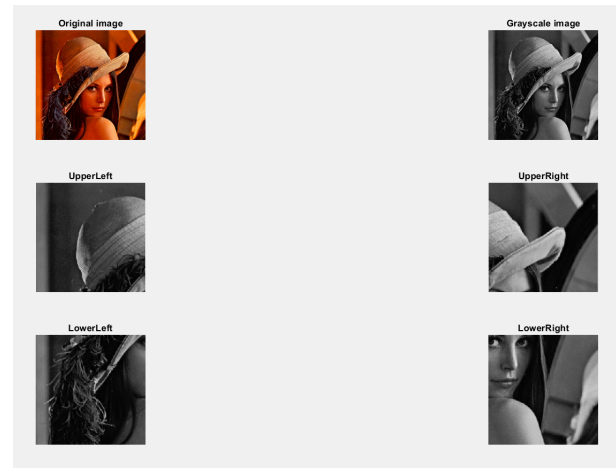


Fig. 1. The result of problem1

II. 問題二

A. 選定辦法

- Nearest-neighbor interpolation
- Bilinear interpolation
- Bicubic interpolation

B. 圖片



Fig. 2. Cat



Fig. 3. Cat after converting to grayscale

C. 程式碼

```

1 I = imread('cat.jpg'); %% read picute
2 grayI = rgb2gray(I); %% to grayscale
3 imwrite(grayI,'grayCat.jpg');
4
5 grayI = imread('grayCat.jpg');
6
7 S = ["nearest","bilinear","bicubic"]; %
  test method
8
9 for i = 1:3
10     plotno = i;
11     grayI2 = grayI;
12     for j = 1:10
13         for N = 1:j %% shrink the size of
14             the image by two 6 times (
15                 recognize limit)
16                 grayI2 = imresize(grayI2,0.5,
17                     S(i));
18             end
19
20             for N = 1:j %% shrinking
21                 imagesback to its originalsize
22                 grayI2 = imresize(grayI2,2);
23             end
24
25             % figure, imshow(grayI2)
26             subplot(10, 3, plotno), imshow(
27                 grayI2), title(S(i) + j);
28             plotno = plotno + 3;
29             imwrite(grayI2,"grayCat"+ i + "_"
30                 + j + ".jpg");
31         end
32     end
33 end

```

D. 比較

三種辦法都在縮小 7 次在復原後無法辨識為一隻貓，Nearest-neighbor interpolation 的顏色和原圖較相近。

隨著縮小次數增加，Nearest-neighbor interpolation 會變成一格格大黑/白點。Bilinear interpolation 則像是起霧一般，變成一小點黑白點。Bicubic interpolation 則是皆於兩者之間。



Fig. 4. Using Nearest-neighbor interpolation shrink the size of the image by two 7 times and undo.

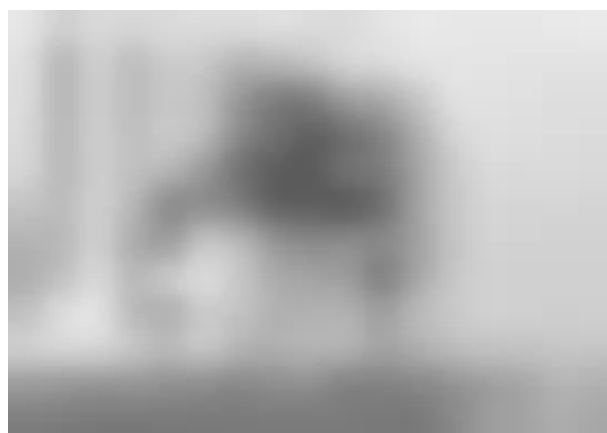


Fig. 5. Using Bilinear interpolation shrink the size of the image by two 7 times and undo.

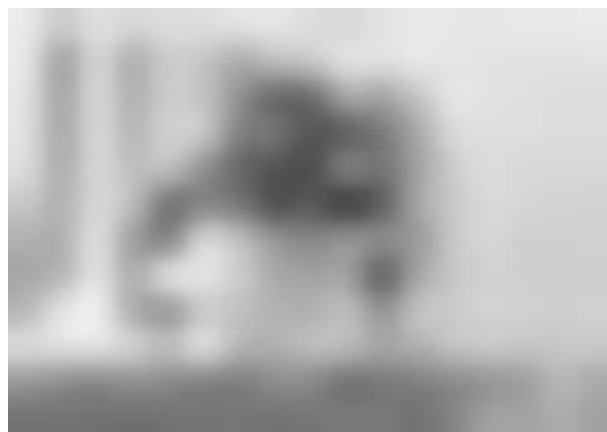


Fig. 6. Using Bicubic interpolation shrink the size of the image by two 7 times and undo.