2018 Fall Advance Digital Image Processing Homework #2-2

EE 245765
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Problem 2 Zooming and Shrinking (C/C++)

a. Zooming the image with ratio 2:1 raw-column replication. Compare the output with lena512.raw. (Figure, 10%; Discussion, 5%)

Ans

In Figure 1, it is very clear to describe how row-col-replication works to achieve rooming image. Scale step, we multiply row index an column index with scale factor (2 in this case). Row and column replication are simply duplicate the row i and column j to row $i+1$ and column $j+1$.

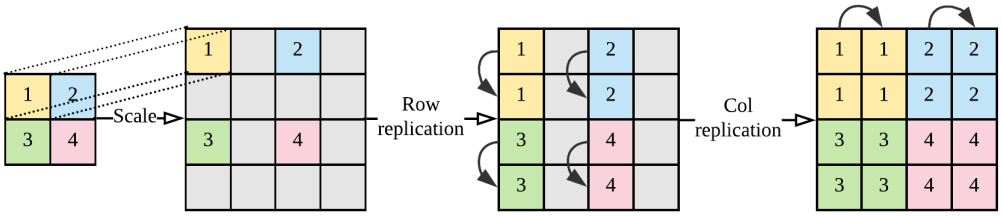

Figure 1: Concept of row-col replication.

Figure 2 shows the original Lena 512 image(result_img/lena_512.png) and the result(result_img/2-a zooming lena row-col replication.png) of row-col replication from Lena 256 image. Then you can see there is check broad effect on row-col replication result.

(a) Lena 512 original.

(b) Row-col replication from Lena 256.

Figure 2: Lena 512 and Lena 256 Row-col replication.

I calculated MSE and PSNR between Lena 512 and col-row replication. The running result as Figure 3. The data is loss a lot here. The typical PSNR value for video compression are between 30 to 50 dB.

```
> ./hw2_2_rooming_shrinking
Hw2.2.a
MSE: 24.3996, PSNR: -13.8738 db
```

Figure 3: MSE and PSNR result.

b. Shrinking the image with ratio 1:2 raw-column deletion. Check your result with or without blurring (using Xnview) your input image before shrinking. (Figure, 10%; Discussion, 5%)

Ans

c. Zooming the image with ratio 2.3 using both nearest-neighboring and bilinear interpolation. Discuss the difference in the output images. (Figure, 10%; Discussion, 5%)

Ans

Problem 3 Isopreference test (C/C++)

Experiment the isopreference test on lena_256.raw and baboon_256.raw images with your programs developed in Problems 1 & 2. Do your experiments and observations match the textbook description? Discuss it. (Discussion, 20%)

Ans

References

[1] Wikipedia. *Mean squared error*[online].
Available from World Wide Web: (https://en.wikipedia.org/wiki/Mean_squared_error).

[2] Wikipedia. *Peak signal-to-noise ratio*[online].
Available from World Wide Web:
(https://en.wikipedia.org/wiki/Peak_signal-to-noise_ratio).