The Bayer filtered image: Only one of the three channels contains values in each pixel.

Interpolate the missing pixel values by its nearest neighbors.

Compute the average of the missing point’s nearest neighbors of that channel.
HW1 – 1 PSNR

PSNR

\[
MSE = \frac{1}{mn} \sum_{i=0}^{m-1} \sum_{j=0}^{n-1} [I(i,j) - K(i,j)]^2
\]

\[
PSNR = 10 \cdot \log_{10} \left( \frac{MAX_I^2}{MSE} \right)
= 20 \cdot \log_{10} \left( \frac{MAX_I}{\sqrt{MSE}} \right)
\]

I: interpolated image
K: ground truth
MAX_I: 255
HW1–1 Result

PSNR = 28.3482  31.9865  27.8325

PSNR = 27.0158  33.9831  28.6289
HW1–1 Common Problems

- Boundary pixels
- PSNR
  - Round your result to integers first and then convert to double
  - Compute PSNR for each channel
  - Which images to use?

Your result  g.t.  filtered.
For a 200x300x3 image
  ◦ \([\text{r c h}] = \text{size(img)} \Rightarrow [200 \ 300 \ 3]\)
  ◦ \([\text{r c}] = \text{size(img)} \Rightarrow [200 \ 900]\)

We have two images!

Put results in report

Discussion(5%)
HW1–2 Results

2x2  
PSNR: 22.3 dB

4x4  
PSNR: 26.7 dB

8x8  
PSNR: Inf dB
HW1–2 Error – DCT, IDCT

- 2D DCT $\rightarrow$ six for loops
- Twice 1D DCT $\rightarrow$ two for loops

$$F(u) = \sum_{r=0}^{M-1} \frac{2C(u)}{\sqrt{M}} f(r) \cos\left(\frac{(2r + 1)u\pi}{2M}\right)$$

- 1D DCT : $A*f$
- 2D DCT : $A*f*A'$

- Index, image size, retain, time
利用IDCT還原的影像，型態為double，需轉換為uint8再計算PSNR

- PSNR: 22dB, 27dB, 307dB

計算PSNR時，I(i,j), K(i,j)型態須為double，否則相減不會有負數

\[ \text{MAX}_I = 255 \]
Report 50%

- Method (15%)
  - Summarize algorithms and formulas clearly step by step
  - Only formulas
- Results (20%)
- Discusses (10%)
  - Answer questions in homework assignment
  - Write down what you observe
- How to execute? (5%)
Program -> 0
If you have any problem -> 綜二館714

HW2 – function

- function GammaTransform(filename, gamma)
- function interpolation(filename, ratio)

Office hours
- 4/19(二) 7:30~9:30 PM
- 4/20(三) 7:30~9:30 PM