Reversible Data Hiding
無失真資訊隱藏

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來源

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- 來源：IEEE Transaction on Circuits and Systems for Video Technology,
- Accepted for future publication
- 發表日期：23/2/2006

大綱

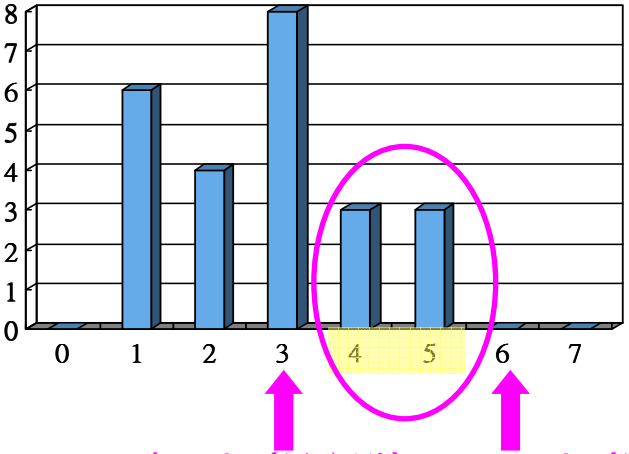
- 方法
- 實驗結果
- 結論

方法　1/3

原始圖像

2	5	3	1	1
4	2	5	1	1
2	3	4	4	1
3	3	1	2	5
3	3	3	3	2

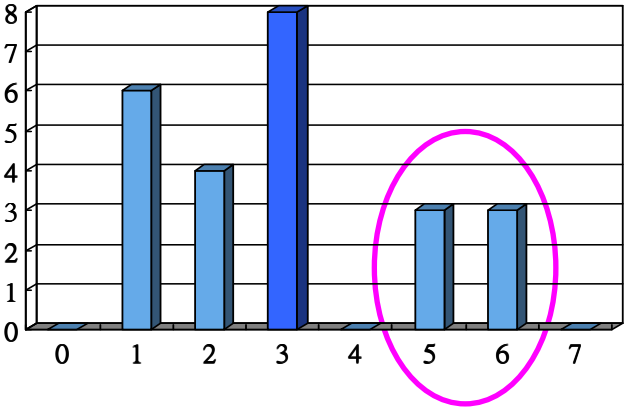
2	6	3	1	1
5	2	6	1	1
2	3	5	5	1
3	3	1	2	6
3	3	3	3	2



a=3

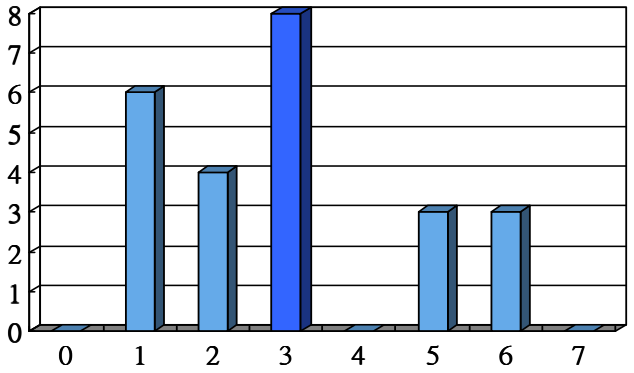
b=6

peak point(最高點)　zero point(最低點)



方法　2/3

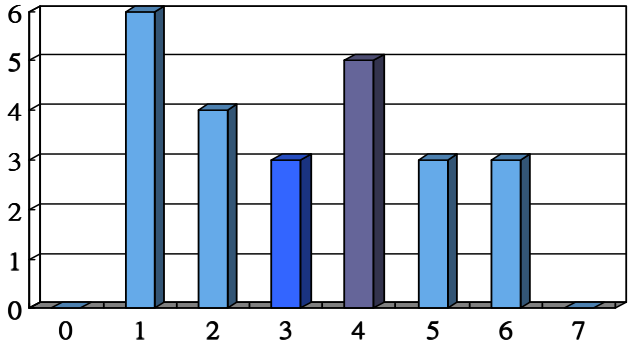
2	6	3	1	1
5	2	6	1	1
2	3	5	5	1
3	3	1	2	6
3	3	3	3	2



藏入值：11001101

資訊藏入後圖

2	6	4	1	1
5	2	6	1	1
2	4	5	5	1
3	3	1	2	6
4	4	3	4	2



方法　3/3

資訊藏入後圖

2	6	4	1	1
5	2	6	1	1
2	4	5	5	1
3	3	1	2	6
4	4	3	4	2

a=3

b=6

取出

2	6	4	1	1
5	2	6	1	1
2	4	5	5	1
3	3	1	2	6
4	4	3	4	2

取出藏入值
11001101

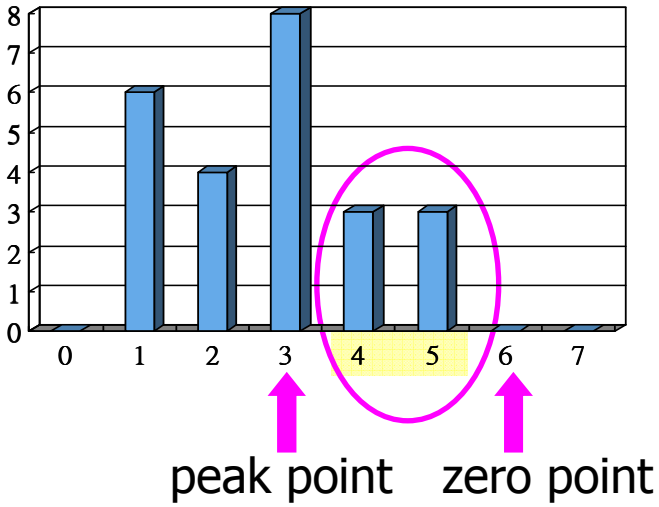
2	6	4	1	1
5	2	6	1	1
2	4	5	5	1
3	3	1	2	6
4	4	3	4	2

恢復

2	5	3	1	1
4	2	5	1	1
2	3	4	4	1
3	3	1	2	5
3	3	3	4	2

原始圖像

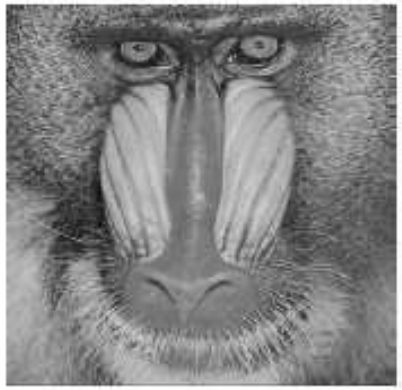
公式

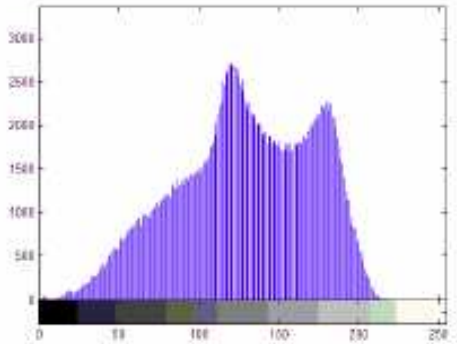


$$MSE = (\frac{1}{M \times N}) \sum_{i=1}^{M} \sum_{j=1}^{N} (x_{ij} - \hat{x}_{ij})^2 = 1$$

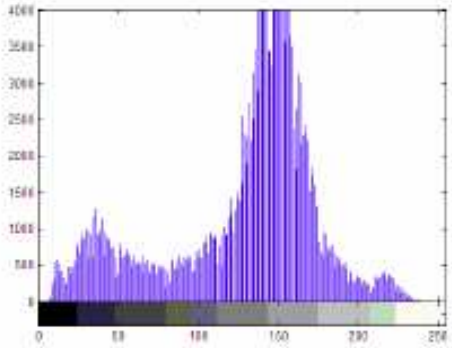
$$PSNR = 10 \times \log_{10} \frac{255^2}{MSE} = 48.13$$

實驗結果　1/3



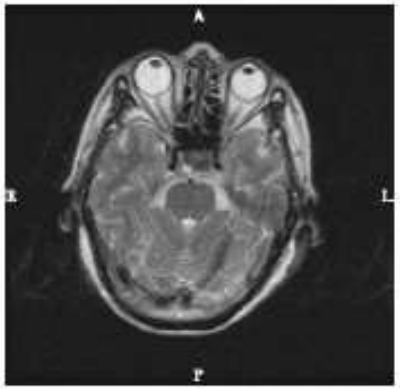


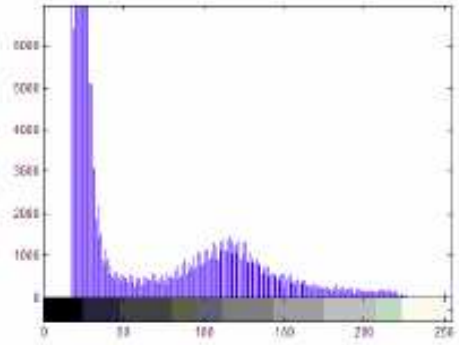
(a) Baboon



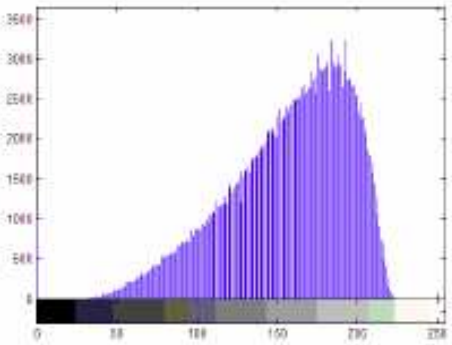
(b) Boat

實驗結果　2/3



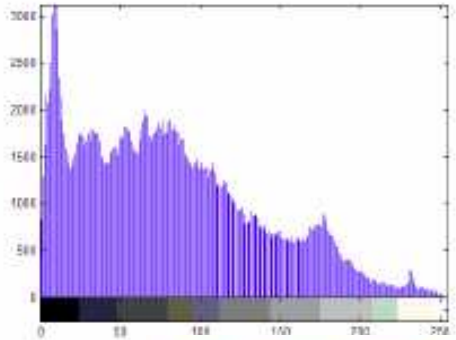


(c) Medical image

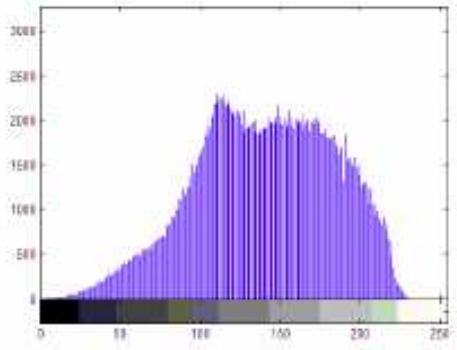


(d) Texture image

實驗結果　3/3



(e) CorelDraw image I



(g) Aerial image

實驗結果表格 1/3

Table 1. Experimental results for some commonly used image.

Images (512x512)	PSNR of marked image (dB)	Pure payload (bits)
Lena	48.2	5,460
Airplane	48.3	16,171
Tiffany	48.2	8,782
Jet	48.7	59,979
Baboon	48.2	5,421
Boat	48.2	7,301
House	48.3	14,310
Bacteria	48.2	13,579
Blood	48.2	79,460

實驗結果表格 2/3

Table 2. Test results for eight medical images.

Images (512×512)	PSNR of marked image (dB)	Pure payload (bits)
Mpic1	48.2	72554
Mpic2	48.3	184,442
Mpic3	48.2	48,356
Mpic4	48.2	37,692
Mpic5	48.3	88,224
Mpic6	48.2	151,225
Mpic7	48.2	83,505
Mpic8	48.2	139,626

實驗結果表格 3/3

Table 3. Test results for six texture images.

Images (512×512)	PSNR of marked image (dB)	Pure payload (bits)
Texture1	48.2	4,017
Texture2	48.3	6,487
Texture3	48.2	6,349
Texture4	48.2	11,131
Texture5	48.3	7,923
Texture6	48.2	10,246

實驗結果表格　3/3

Table 4. Test results for six aerial images.

Images (1024×1024)	PSNR of marked image (dB)	Pure payload (bits)
Aerial 1	48.2	54,265
Aerial 2	48.2	41,457
Aerial 3	48.2	46,978
Aerial 4	48.2	38,734
Aerial 5	48.3	56,853
Aerial 6	48.2	35,287

Table 5. Test results for all of the 1096 images in CorelDraw database.

Images (512×768)	PSNR of marked image (dB)	Pure payload (bits)		
		Max	Min	Avg.
	48.2	59,262	6,115	18,263

比較

Table 6. Overall comparison between other reversible marking methods [10,11,13,14,16,17] and our proposed method. Note that the pure payload and the PSNR of Goljan's method are estimated averaged values when the embedding amplitude is four.

Methods	Pure payload in a $512 \times 512 \times 8$ image (bits)	PSNR of marked image (dB)
Honsinger et al.'s [10]	<1024	Not mentioned
Macq and Deweyand [11]	<2,046	Not mentioned
Fridrich et al.'s's [13]	1024	Not mentioned
Goljan et al.'s [16]	3k-41k	39
Vleeschouwer et al.'s [14]	<4096	< 35
Xuan et al.'s [17]	15k-94k	24-36
Celik et al.'s [20]	15-143k	38
Proposed	5k-80k	>48

結論

- 藏入和取出要按照順序
- 這個實驗後的 PSNR 是 48db
- 以大小為 512*512*8 grayscale image
- 藏量是5k-80k

謝謝收聽!

或許你或妳也聽嘸吧! (謎之聲:亂報一通麻>_<)