EE1F2 Multimedia Data

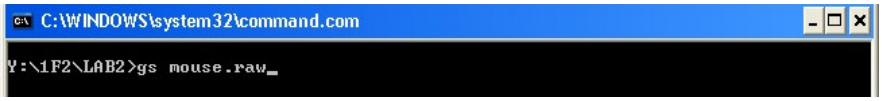
Laboratory Exercise 2: Image Compression Exercise

By Luis Hernandez and Dr. Sandra I. Woolley

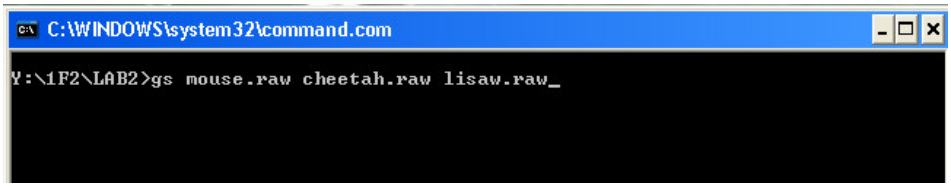
1. Using the compression Programs

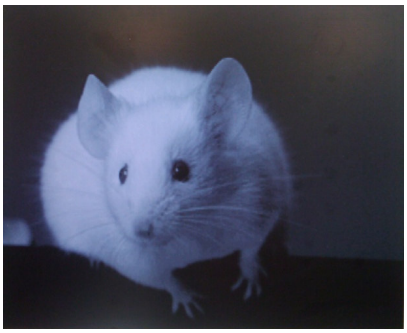
1.1 Creating the folder:

1.2 Testing the commands



1.3 Viewing multiple images





1.4 Comparing two images with gsdiff and getting the RMS error

```
C:\WINDOWS\system32\command.com
Y:\1F2\LAB2>gsdiff mouse.raw cheetah.raw
```

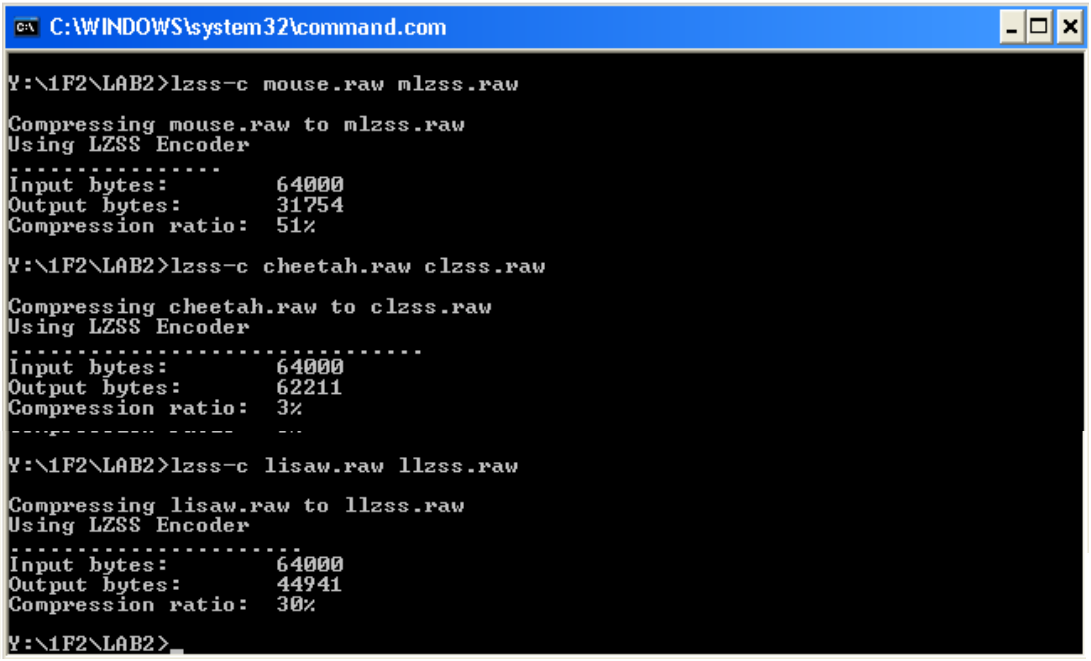
```
C:\WINDOWS\system32\command.com
RMS error between mouse.raw and cheetah.raw is 86.442908
Y:\1F2\LAB2>_
```

2. Lossless Compression

2.1 Compressing images using the Lossless-Huffman method

```
C:\WINDOWS\system32\command.com

Y:\1F2\LAB2>huff-c mouse.raw mhuffc.raw

Compressing mouse.raw to mhuffc.raw
Using static order 0 model with Huffman coding
....................
Input bytes:        64000
Output bytes:       45195
Compression ratio:  30%

Y:\1F2\LAB2>huff-c cheetah.raw chuffc.raw

Compressing cheetah.raw to chuffc.raw
Using static order 0 model with Huffman coding
............................
Input bytes:        64000
Output bytes:       56320
Compression ratio:  12%

Y:\1F2\LAB2>huff-c lisaw.raw lhuffc.raw

Compressing lisaw.raw to lhuffc.raw
Using static order 0 model with Huffman coding
........................
Input bytes:        64000
Output bytes:       53049
Compression ratio:  18%

Y:\1F2\LAB2>
```

2.2 Compressing images using the Lossless-LempelZiv'77 method



2.3 Calculating the Compression ratio and the bits per pixel.

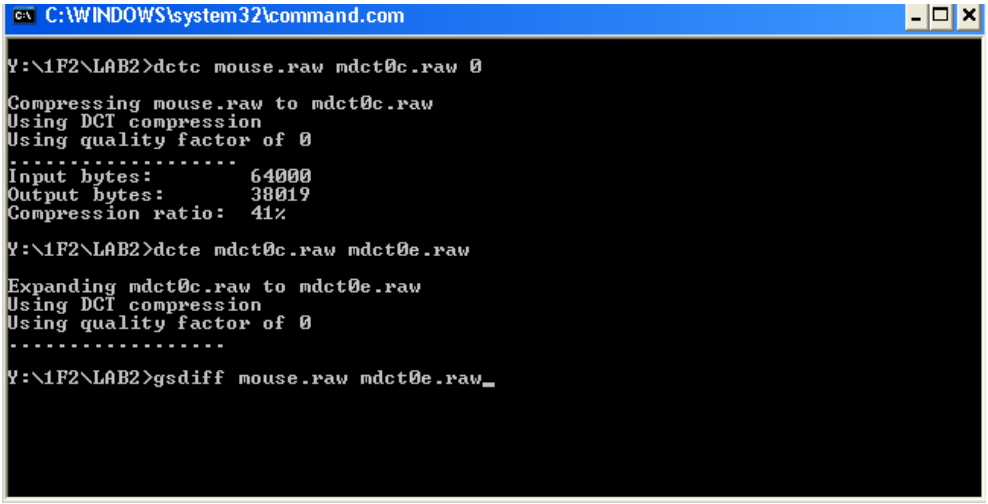
$$Compression\ Ratio = \frac{\text{old file size}}{\text{new file size}}$$

$$Bits\ per\ pixel\ (bpp) = \left(\frac{new\ file\ size}{\text{old file size}}\right) * \text{old bpp}$$

Test Image	Method	Input bytes	Output bytes	Compression Ratio	Bits per pixel(bpp)
Mouse	Huff	64000	45195	1.416	5.649
	lz	64000	31754	2.015	3.969
Cheetah	Huff	64000	56320	1.136	7.040
	lz	64000	62211	1.029	7.776
Lisaw	Huff	64000	53049	1.206	6.631
	lz	64000	44941	1.424	5.618

2. Lossy (DCT) Compression

2.1 Compressing mouse.raw image with different Q values



2.2 Images examples after compressing and decompressing with different Q values

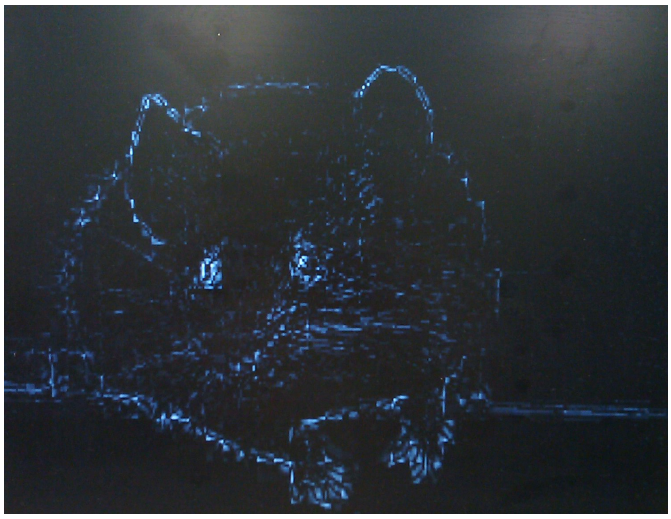
Q=0

a) gsdiff mouse.raw mdct0e (no difference at all)

b) mdct0e.raw

Q=5

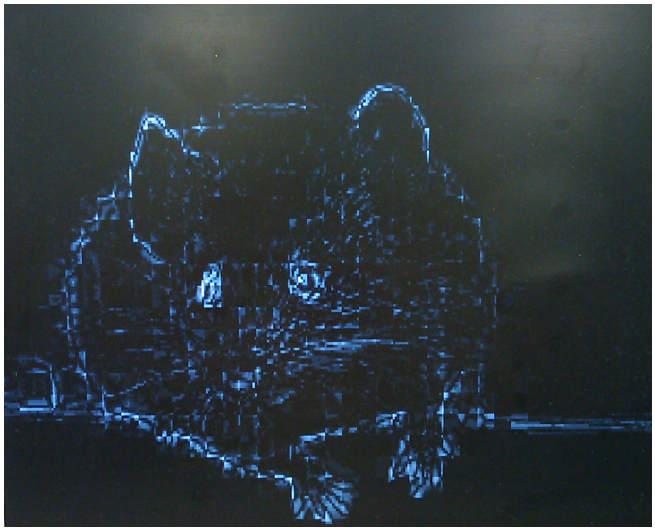
Q=15



a) Using gsdiff

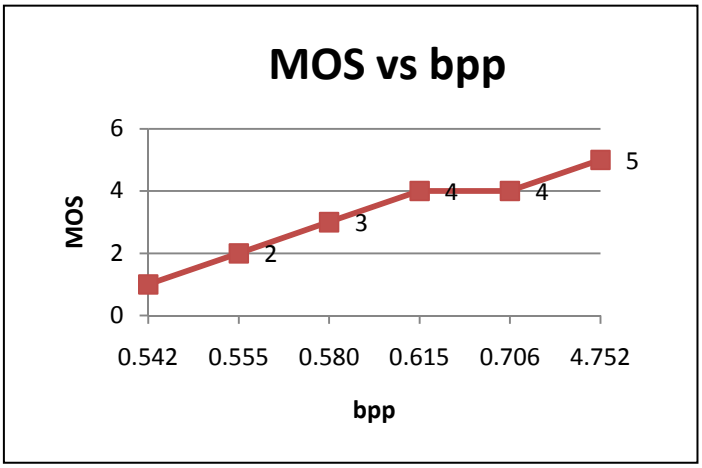
b) Image after decompressing (mdct15e.raw)

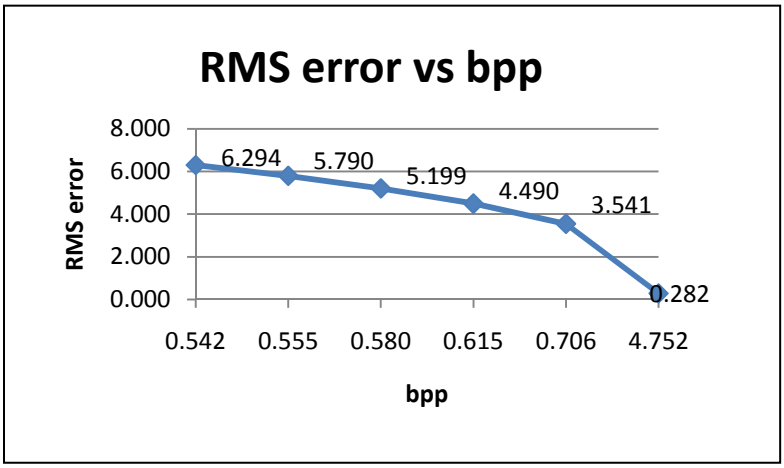
Q=25

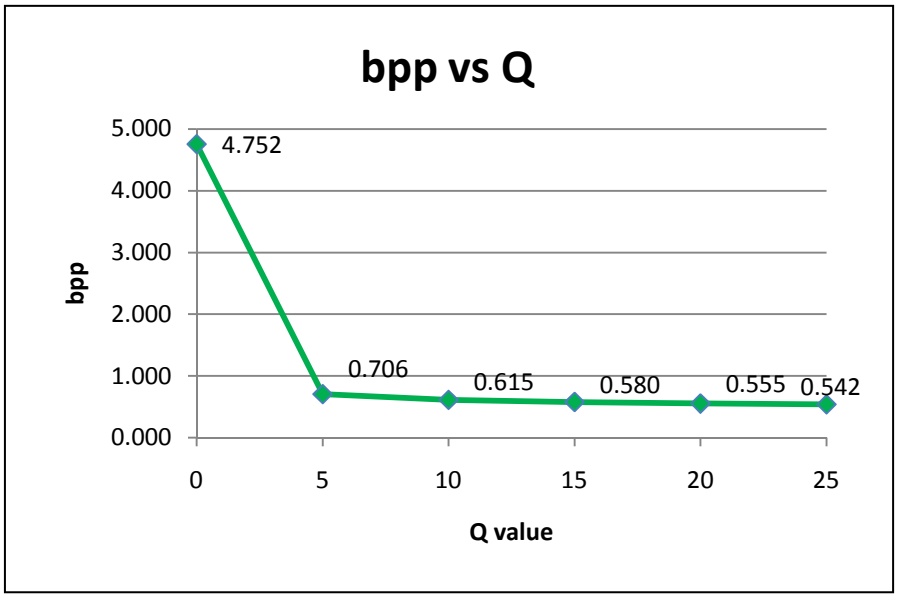


2.3 Results

Q value	File size	Compression ratio	bpp	MOS	RMS error
0	38019	1.683	4.752	5	0.281597
5	5651	11.325	0.706	4	3.541458
10	4917	13.016	0.615	3	4.489757
15	4640	13.793	0.580	3	5.199216
20	4442	14.408	0.555	2	5.790469
25	4337	14.757	0.542	1	6.293969

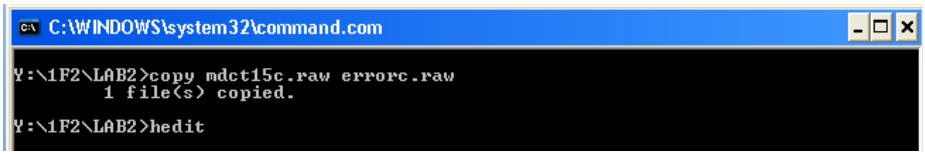




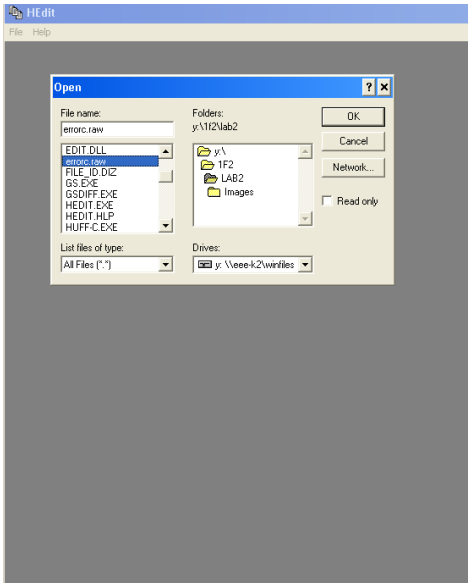


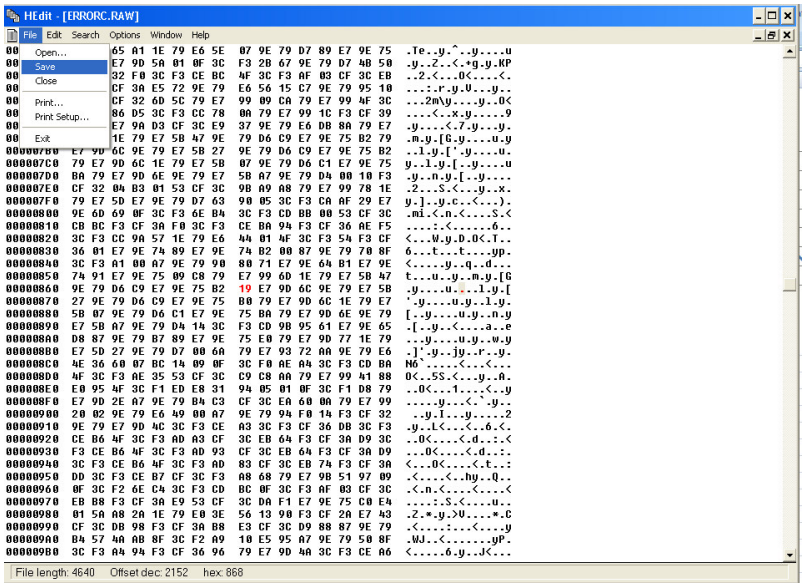
3. Investigating the Effects of Errors on Compressed Data

3.1 Making a compressed image copy



3.2 Editing the compressed image file (errorc.raw)





3.3 Decompressing the errorc.raw image and viewing the result (errore.raw)