Scilab Manual for Data Compression & Encryption by Prof S. Chaya Electronics Engineering Anjuman I Islam's Kalsekar Technical Campus[1]

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Huffman Encoding of a sequence

Scilab code Solution 1.1 Huffman encoding

```
1
2 //OS: Linux
3 //Tool Box-Huffman coding
4 //Scilab Version: Scilab 5.4.1
5 // Generate a Testmatrix
6 A=testmatrix('frk',10)+1;
7 A=A(:).';
8 [QT,QM]=huffcode(A);
9 disp('compressed Bit sequence:');
10 disp(QT);
11 disp('Code Table:');
12 disp(QM);
13 // End of Demo
```

Experiment: 2

Huffman Decoding of a compressed bit sequence.

Scilab code Solution 2.1 Huffman Decoding

```
1 //program to perform huffman decoding
2 //OS: Linux
3 //Tool Box-Huffman coding
4 //Scilab Version: Scilab 5.4.1
5 // Generate a Testmatrix
6 A=testmatrix('frk',10)+1;
7 A=A(:).';
8 [QT,QM]=huffcode(A);
9 disp('compressed Bit sequence:');
10 disp(QT);
11 disp('Code Table:');
12 disp(QM);
13 // Now, the reverse operation
14 B=huffdeco(QT,QM);
15 disp('Original:');
16 disp(A);
17 disp('Result after Uncompress:');
18 disp(B);
```

Experiment: 3

Implementation of RSA Algorthim

Scilab code Solution 3.1 RSA Algorthim

```
1 //OS: Windows 7
2 //Scilab Version: Scilab 5.4.1
3 clc;
4 clear all;
5 p=input("Enter the 1st prime no.");//Input: Taking
    the first prime no. for RSA
6 //Input ex. p=11
7 q=input("Enter the 2nd prime no.");//Input: Taking
    the second prime no. for RSA
8 //Input ex. q=5
9 n=p*q;
10 phi=(p-1)*(q-1);//Tuotient Function
11 printf("Enter the value of e >400");//Input: value
    of e (such that phi and the no. entered by you
    are relatively prime)
12 //Input ex. phi=7
13 e=input("");
```

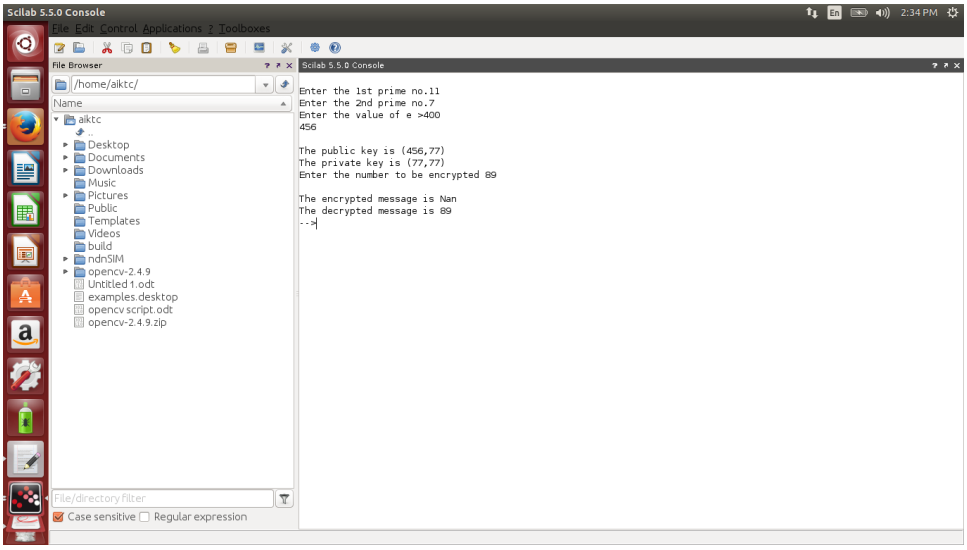

Figure 3.1: RSA Algorthim

```
for i = 1:n
    z=modulo((i*e),phi);
    if z == 1 then
break;
end
end
 printf("\nThe public key is (%.d",e);//Output: The
    public key is (e,n)
 //Output for ex. public key (7,55)
 printf(",%.d)",n);
  printf("\nThe private key is (%.d",i);//Output:
     The private key is (i,n)
  //Output ex. private key (23,55)
 printf(",%.d)",n);
 m=input("Enter the number to be encrypted ");//
    Input: Taking the message to be encrypted
 //Input ex. 5
a=m^e;
c=modulo(a,n);
printf("\nThe encrypted message is %.d ",c);//Output
```

```
    : Printing the encrypted message
31 //Output for ex. 25
32 b=c^i;
33 t=modulo(b,n);
34 printf("\nThe decrypted message is %.d ",m);//Output
    : Decrypted Message
35 //Output for ex. 5
```

Experiment: 4

Diffie Hellman Key Exchange Method

Scilab code Solution 4.1 Diffie Hellman Key Exchange

```
1  //OS: Windows 7
2  //Scilab Version: Scilab 5.4.1
3  clc;
4  clear all;
5  p=[13];//input("Enter the common prime number(p) ")
       ;//Input: taking common prime number as input
6  //Input ex. p=13
7  g=[6];//input("Enter the primitive root(g) (any no.)
       ");//Input: taking primitive root as input
8  //Input ex. g=6
9  a=[3];//input("Enter secret key of first user (any
       no.) ");//Input: Taking secret key for user 1
10 //Input ex. a=3
11 b=[10];//input("Enter secret key of second user (any
        no.) ");//Input: Taking secret key for user 2
12 //Input ex. b=10
13 A=modulo(g^a,p);//public key of user 1
14 B=modulo(g^b,p);//public key of user 2
15 common_key=modulo(A^b,p);//common key
```

```
16 printf("Common Key is %.d",common_key) ;//Output:
     Produced common key
17 //Output for ex. Common Key=12
```

Experiment: 5

Image Compression Using Block Truncation Coding

check Appendix AP 1 for dependency:

`lena.png`

Scilab code Solution 5.5 block truncation in image

```
1
2 //Caption: Program performs Block Truncation Coding(
    BTC) by choosing different
3 //block sizes of 8
4 //Software version
5 //OS Windows7
6 //Scilab5.4.1
7 //Image Processing Design Toolbox 8.3.1-1
8 //Scilab Image and Video Proccessing toolbox
    0.5.3.1-2
9
10 close;
11 clc;
```

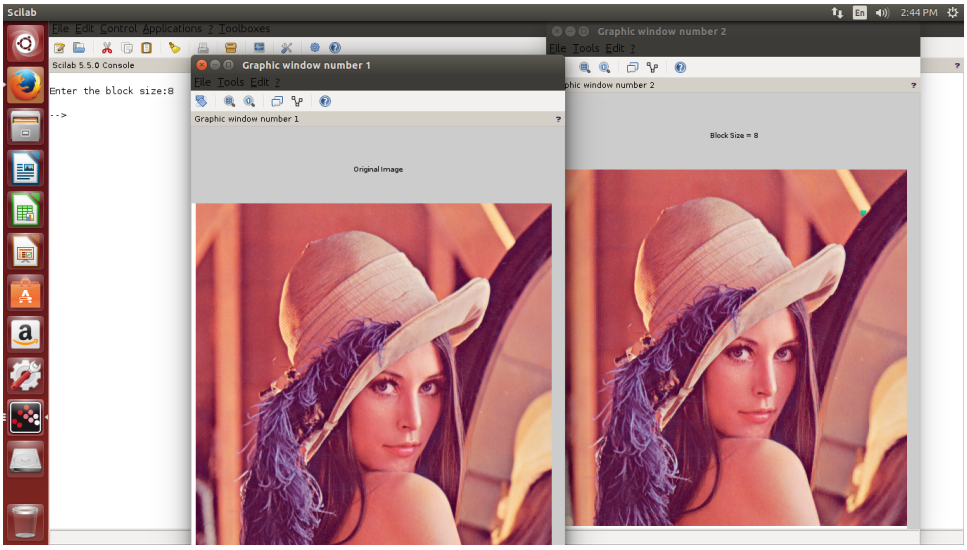

Figure 5.1: block truncation in image

```
12 x =imread('/home/aiktc/Desktop/lena.png');   //SIVP
     toolbox
13 //x=imresize(x,[256 256]);
14 x1=x;
15 x=double(x);
16 [m1 n1]=size(x);
17 blk=input('Enter the block size: ');//enter a block
     size of 8 only
18 for i = 1 : blk : m1
19 for j = 1 : blk : n1
20          y = x(i:i+(blk-1),j:j+(blk-1)) ;
21          m = mean(mean(y));
22          sig=std2(y);
23          b = y > m ; //the binary block
24          K = sum(sum(b));
25                 if (K ~= blk^2 ) & ( K ~= 0)
26                  ml = m-sig*sqrt(K/((blk^2)-K));
27                  mu = m+sig*sqrt(((blk^2)-K)/K);
28                  x(i:i+(blk-1), j:j+(blk-1)) = b*mu
                       +(1- b)*ml;
```

```
29          end
30  end
31  end
32  //imshow(uint8(x))
33  //title('Reconstructed Image')
34  x = uint8(x);
35  figure(1)
36  imshow(x1)
37  title('Original Image');    //IPD toolbox
38  figure(2)
39  imshow(x);    //IPD toolbox
40  title('Block Size = 8')
```

Appendix

LENA IMAGE