

Scilab Manual for
Data Compression & Encryption
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Experiment: 1

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 Algorithm

Scilab code Solution 3.1 RSA Algorithm

```
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("");
```

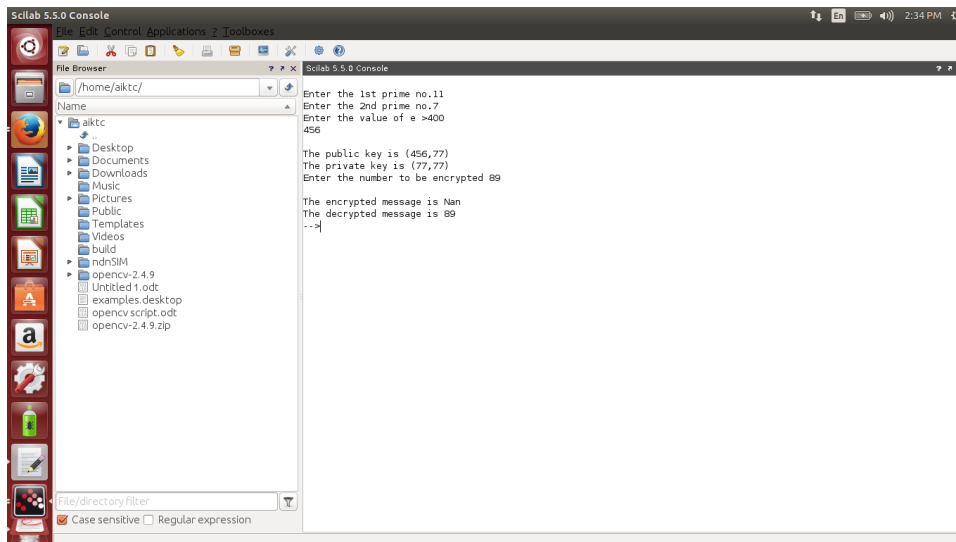


Figure 3.1: RSA Algorithm

```

14 for i = 1:n
15     z=modulo((i*e),phi);
16     if z == 1 then
17 break;
18 end
19 end
20 printf("\n\nThe public key is (%.d",e);//Output: The
    public key is (e,n)
21 //Output for ex. public key (7,55)
22 printf(",%.d",n);
23 printf("\n\nThe private key is (%.d",i);//Output:
    The private key is (i,n)
24 //Output ex. private key (23,55)
25 printf(",%.d",n);
26 m=input("Enter the number to be encrypted ");//
    Input: Taking the message to be encrypted
27 //Input ex. 5
28 a=m^e;
29 c=modulo(a,n);
30 printf("\n\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 Processing toolbox
   0.5.3.1-2
9
10 close;
11 clc;
```

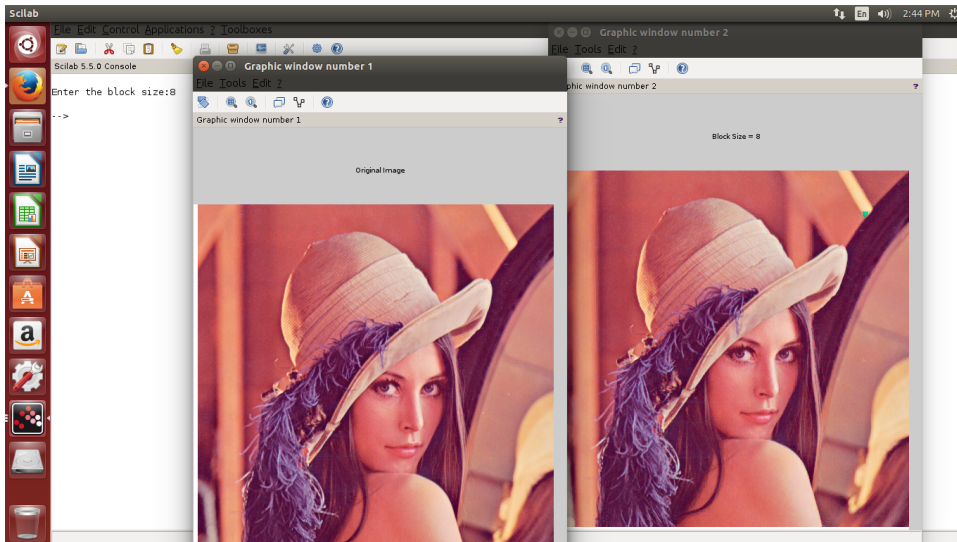


Figure 5.1: block truncation in image

```

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             m1 = 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)*m1;

```

```
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