

# **Algorithms Assignment 2**

## **Huffman Compression and Decompression**

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Compression rate = ( Original file size / Compressed file size ) in bytes

For Lecture6.pdf file that was the output

CA Command Prompt

Microsoft Windows [Version 10.0.19042.1415]

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C:\Users\omara>java -jar C:\Users\omara\Desktop\huffman\_18011111.jar c D:\Study\lecture6.pdf 1

Compression ratio :1.050600623352854

Time in nano second: 874760700 /Seconds:0/ Minutes: 0

C:\Users\omara>java -jar C:\Users\omara\Desktop\huffman\_18011111.jar d D:\Study\18011111.1.lecture6.pdf.hc

Time in nano second: 125471600 /Seconds:0/ Minutes: 0

C:\Users\omara>java -jar C:\Users\omara\Desktop\huffman\_18011111.jar c D:\Study\lecture6.pdf 2

Compression ratio :0.8063539590526186

Time in nano second: 382573700 /Seconds:0/ Minutes: 0

C:\Users\omara>java -jar C:\Users\omara\Desktop\huffman\_18011111.jar d D:\Study\18011111.2.lecture6.pdf.hc

Time in nano second: 150474200 /Seconds:0/ Minutes: 0

C:\Users\omara>java -jar C:\Users\omara\Desktop\huffman\_18011111.jar c D:\Study\lecture6.pdf 3

Compression ratio :0.5331912384720706

Time in nano second: 406366300 /Seconds:0/ Minutes: 0

C:\Users\omara>java -jar C:\Users\omara\Desktop\huffman\_18011111.jar d D:\Study\18011111.3.lecture6.pdf.hc

Time in nano second: 170901400 /Seconds:0/ Minutes: 0

C:\Users\omara>java -jar C:\Users\omara\Desktop\huffman\_18011111.jar c D:\Study\lecture6.pdf 4

Compression ratio :0.6234698564475191

Time in nano second: 337796500 /Seconds:0/ Minutes: 0

C:\Users\omara>java -jar C:\Users\omara\Desktop\huffman\_18011111.jar d D:\Study\18011111.4.lecture6.pdf.hc

Time in nano second: 145521600 /Seconds:0/ Minutes: 0

C:\Users\omara>java -jar C:\Users\omara\Desktop\huffman\_18011111.jar c D:\Study\lecture6.pdf 5

Compression ratio :0.6959854582100686

Time in nano second: 333809600 /Seconds:0/ Minutes: 0

C:\Users\omara>java -jar C:\Users\omara\Desktop\huffman\_18011111.jar d D:\Study\18011111.5.lecture6.pdf.hc

Time in nano second: 138452100 /Seconds:0/ Minutes: 0

C:\Users\omara>

Table with the values below:

N	Compression rate
1	1.05
2	0.80
3	0.53
4	0.62
5	0.69

## For gbbct10.seq file:

```
CA Command Prompt
Microsoft Windows [Version 10.0.19042.1415]
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C:\Users\omara>java -jar C:\Users\omara\Desktop\huffman_18011111.jar c D:\Study\gbbct10.seq 1
Compression ratio :1.9737454987079857
Time in nano second: 51823652000 /Seconds:51/ Minutes: 0

C:\Users\omara>java -jar C:\Users\omara\Desktop\huffman_18011111.jar d D:\Study\18011111.1.gbbct10.seq.hc
Time in nano second: 30616436500 /Seconds:30/ Minutes: 0

C:\Users\omara>java -jar C:\Users\omara\Desktop\huffman_18011111.jar c D:\Study\gbbct10.seq 2
Compression ratio :2.3821124128529862
Time in nano second: 59643612000 /Seconds:59/ Minutes: 0

C:\Users\omara>java -jar C:\Users\omara\Desktop\huffman_18011111.jar d D:\Study\18011111.2.gbbct10.seq.hc
Time in nano second: 24688877100 /Seconds:24/ Minutes: 0

C:\Users\omara>java -jar C:\Users\omara\Desktop\huffman_18011111.jar c D:\Study\gbbct10.seq 3
Compression ratio :2.6601613083752156
Time in nano second: 55403040700 /Seconds:55/ Minutes: 0

C:\Users\omara>java -jar C:\Users\omara\Desktop\huffman_18011111.jar d D:\Study\18011111.3.gbbct10.seq.hc
Time in nano second: 23395604000 /Seconds:23/ Minutes: 0

C:\Users\omara>java -jar C:\Users\omara\Desktop\huffman_18011111.jar c D:\Study\gbbct10.seq 4
Compression ratio :2.832737785640432
Time in nano second: 60188137500 /Seconds:60/ Minutes: 1

C:\Users\omara>java -jar C:\Users\omara\Desktop\huffman_18011111.jar d D:\Study\18011111.4.gbbct10.seq.hc
Time in nano second: 23572569100 /Seconds:23/ Minutes: 0

C:\Users\omara>java -jar C:\Users\omara\Desktop\huffman_18011111.jar c D:\Study\gbbct10.seq 5
Compression ratio :2.6923731966145144
Time in nano second: 69862905200 /Seconds:69/ Minutes: 1

C:\Users\omara>java -jar C:\Users\omara\Desktop\huffman_18011111.jar d D:\Study\18011111.5.gbbct10.seq.hc
Time in nano second: 28868844900 /Seconds:28/ Minutes: 0

C:\Users\omara>
```

Table with the values below:

<b>N</b>	<b>Compression Rate</b>
<b>1</b>	<b>1.97</b>
<b>2</b>	<b>2.38</b>
<b>3</b>	<b>2.66</b>
<b>4</b>	<b>2.83</b>
<b>5</b>	<b>2.69</b>

**Note that :**

**Compression rate = ( Original file size / Compressed File size )  
in bytes**

## Comparing with 7-zip:

### Lecture6.pdf file

Using 7-zip the rate was ( 1.34 ), while using my program was ( 1.05 ) at  $n = 1$  , but when  $n$  increase the rate decreases and the compressed file becomes larger than the original one, so this file doesn't has many frequent  $n$  grouped characters.

### gbbct10.seq file:

using 7-zip the rate was ( 4.16 ), while using my program was ( 1.97 ) at  $n = 1$ , and by increasing  $n$  the ratio increase so we got a compressed file which smaller than original one twice as shown in the above table, so this file has many frequent  $n$  grouped characters.