The original size of the bmp file was 2,497 kb, and the original size of the txt file was 89kb.

📄 office_hours.bmp	11/3/2022 8:22 PM	BMP File	2,497 KB

📄 sample_document.txt	11/3/2022 2:12 PM	Text Document	89 KB

After running our compression algorithm on both files, we get a noticeable difference in size from the original and different ratios of compression depending on whether or not we enable the -b flag.

Office_hours.bmp Compress/Decompress (-b flag enabled)

📄 office_hours.huf	11/6/2022 7:34 PM	HUF File	393 KB

```
PS C:\Users\james\OneDrive - University of Connecticut\Documents\Fall 2022 Semester\CSE 3500> Measure-Command {python bwt_huffman.py -c -b -i office_hours.bmp -o off
Seconds           : 1
Milliseconds      : 84
Ticks             : 10844564
TotalDays         : 1.25515787037037E-05
TotalHours        : 0.000301237888888889
TotalMinutes      : 0.0180742733333333
TotalSeconds      : 1.0844564
TotalMilliseconds : 1084.4564
```

```
PS C:\Users\james\OneDrive - University of Connecticut\Documents\Fall 2022 Semester\CSE 3500> Measure-Command {python bwt_huffman.py -d -b -i office_hours.huf -o off
ice_hours_decompressed.bmp}

Days              : 0
Hours             : 0
Minutes           : 0
Seconds           : 1
Milliseconds      : 695
Ticks             : 16950291
TotalDays         : 1.96183923611111E-05
TotalHours        : 0.000470841416666667
TotalMinutes      : 0.028250485
TotalSeconds      : 1.6950291
TotalMilliseconds : 1695.0291
```

Image Compression Ratio: 393 / 2497 = **84%**

Image Compression Time: **1084 ms**

Text Document Decompression Time: **1695 ms**

Office_hours.bmp Compression (-b flag disabled)

office_hours.huf	11/7/2022 12:32 PM	HUF File	340 KB

```
PS C:\Users\james\OneDrive - University of Connecticut\Documents\Fall 2022 Semester\CSE 3500> Measure-Command {python bwt_huffman.py -c -i office_hours.bmp -o office
TotalDays         : 0.00589407771527778
TotalHours        : 0.14145865166667
TotalMinutes      : 8.48747191
TotalSeconds      : 509.2483146
TotalMilliseconds : 509248.3146
```

Image Compression Ratio: 340 / 2497 = **86%**

Image Compression Time: **509,248 ms**

Image Decompression Time: **Took too long**

Sample_document.txt Compress/Decompress (-b flag enabled)

sample_document.huf	11/7/2022 12:51 PM	HUF File	53 KB

```
PS C:\Users\james\OneDrive - University of Connecticut\Documents\Fall 2022 Semester\CSE 3500> Measure-Command{python bwt_huffman.py -c -i sample_document.txt -o samp
le_document.huf}


Days              : 0
Hours             : 0
Minutes           : 0
Seconds           : 0
TotalMilliseconds : 445.1311
```

```
PS C:\Users\james\OneDrive - University of Connecticut\Documents\Fall 2022 Semester\CSE 3500> Measure-Command {python bwt_huffman.py -d -b -i sample_document.huf -o
sample_document_decompressed.txt}


Days              : 0
Hours             : 0
Minutes           : 0
Seconds           : 0
Milliseconds      : 192
Ticks             : 1928711
TotalDays         : 2.23230439814815E-06
TotalHours        : 5.35753055555556E-05
TotalMinutes      : 0.00321451833333333
TotalSeconds      : 0.1928711
TotalMilliseconds : 192.8711
```

Text Document Compression Ratio: 53 / 89 = **40%**

Text Document Compression Time: **212 ms**

Text Document Decompression Time: **192 ms**

Sample_document.txt Compression (-b flag disabled)

| sample_document.huf | 11/6/2022 7:34 PM | HUF File | 37 KB |

```
PS C:\Users\james\OneDrive - University of Connecticut\Documents\Fall 2022 Semester\CSE 3500> Measure-Command {python bwt_huffman.py -c -i sample_document.huf -o sam
ple_document_decompressed.txt}


Days             : 0
Hours            : 0
Minutes          : 0
Seconds          : 0
Milliseconds     : 271
Ticks            : 2717852
TotalDays        : 3.14566203703704E-06
TotalHours       : 7.54958888888889E-05
TotalMinutes     : 0.00452975333333333
TotalSeconds     : 0.2717852
TotalMilliseconds : 271.7852
```

```
PS C:\Users\james\OneDrive - University of Connecticut\Documents\Fall 2022 Semester\CSE 3500> Measure-Command {python bwt_huffman.py -d -i sample_document.huf -o sam
ple_document_decompressed.txt}


Days             : 0
Hours            : 0
Minutes          : 1
Seconds          : 10
Milliseconds     : 658
Ticks            : 706588589
TotalDays        : 0.000817810866898148
TotalHours       : 0.0196274608055556
TotalMinutes     : 1.17764764833333
TotalSeconds     : 70.6588589
TotalMilliseconds : 70658.8589
```

Text Document Compression Ratio: 37 / 89 = **58%**

Text Document Compression Time: **271 ms**

Text Document Decompression Time: **70,658 ms**

When comparing our compression algorithm with others such as ZIP, RAR, BZIP2, GZIP, we see that while our compression ratio is quite big, it is not nearly as good as theirs. But that can be due to the fact that our implementation was not perfect, the ones described before are quite industry standards, so they have to be up to par, the best of all of them being BZIP2.

ZIP

| office_hours.zip | 11/6/2022 7:29 PM | Compressed (zipp... | 55 KB |

| sample_document.zip | 11/6/2022 7:30 PM | Compressed (zipp... | 35 KB |

Image Compression Ratio: 55 / 2497 = **97%**

Text Document Compression Ratio: 35 / 89 = **60%**

RAR

office_hours.rar	11/6/2022 7:16 PM	WinRAR archive	43 KB
sample_document.rar	11/6/2022 7:16 PM	WinRAR archive	35 KB

Image Compression Ratio: 43 / 2497 = **98%**

Text Document Compression Ratio: 35 / 89 = **60%**

BZIP2

office_hours.bmp.bz2	11/6/2022 5:32 PM	WinRAR archive	26 KB
sample_document.txt.bz2	11/6/2022 7:38 PM	WinRAR archive	29 KB

Image Compression Ratio: 26 / 2497 = **99%**

Text Document Compression Ratio: 29 / 89 = **67%**

GZIP

office_hours.bmp.gz	11/6/2022 7:40 PM	WinRAR archive	59 KB
sample_document.txt.gz	11/6/2022 7:40 PM	WinRAR archive	35 KB

Image Compression Ratio: 59 / 2497 = **98%**

Text Document Compression Ratio: 35 / 89 = **60%**