PURPOSE OF THE PROGRAM

The assignment aims at creating a file named as HuffmanCodebook, storing the Huffman tree. The program utilizes the File system API and various data structures.

Three major functions performed in this program are :

1. Building HuffManCodebook
2. Compression of Files
3. Decompression of Files

The Code Structure follows the instructions by making Heap and Binary Tree. Files are named as CustomHeap and BinaryTree.

Helper Files are also present in the code structure such as Dictionary files and Augmented Tree.

Helper Files:

1. Augmented Tree keeps the record of recent and most frequent character.
2. Dictionary keeps the record of all the character array and is used for the conversion of Huffman tree to character array.

Header files are also present with the main code (c) Files.

Main File - FileCompression is named on the project name and is used to use all the functions to perform required operations.

This file contains the code for executing the program and performing the important operations.

Time Complexity:

1) Building Minimum Heap for n nodes -> O(n)
2) Complexity for tokenizing -> O(n)
3) Building HuffmanCodeBook -> O(n*log(m)); Because if there are m nodes, it will take O(log m) time for the tree of size n to traverse every tree which gives us -> n * log m -> O(n*log(m))
4) Decompression -> O(n^2); because if n numbers of codes, then will traverse n times

TEST PLAN DOCUMENT

1- Building codebook
Command - ./fileCompressor -b test.txt
Output -
Program Started :
Processing: test.txt
Processed 1 files.
Saved Codebook HuffmanCodebook successfully

2- Compressing File
Command - ./fileCompressor -R -c test.txt HuffmanCodeBook
Output -
Program Started :
Compressing: test.txt
Compressed 1 files successfully using HuffmanCodeBook codebook.

3- Decompressing File
Command - ./fileCompressor -R -d test.txt.hcz HuffmanCodeBook
Output -
Program Started :
Decompressing: test.txt.hcz
Decompressed 1 files successfully using HuffmanCodeBook codebook.

4- Invalid Cases

a) Command - ./fileCompressor -R -d test.txt HuffmanCodeBook
   Reason - The file is not .hcz file i.e. compressed file.
   Output -
   Program Started :
   Decompressed 0 files successfully using HuffmanCodeBook codebook.

b) Command - ./fileCompressor -R -c testfolder
   Reason – You need the HuffmanCodeBook
   Codebook is required while padding flags c or d.
   ./fileCompressor [-R] <flag> <path or file> |codebook|
   Valid Flags are : b, c, d
   -R: recursive
   Codebook is required if flag is c or d

c) Command - ./fileCompressor -R -c -d test.txt HuffmanCodeBook
Reason - Only one flag can be used at a time
Output -
Please Choose one flag from b, c, d.
./fileCompressor [-R] <flag> <path or file> |codebook|
Valid Flags are : b, c, d
-R: recursive
Codebook is required if flag is c or d