Boggle

# To run

Just make sure that sowpods.txt is in the bin directory and open a command line there. Type “Java boggle” to run.

# Task 1

The following lines from BoggleBoard.java will generate a 5x5 boggle board.

BoggleBoard.makeDice();

BoggleBoard.makeBoard();

And then to display the board.

BoggleBoard.printBoard();

# Task 2

For word in dictionary

For character in word

If first character in word

For row X on board

For column Y on board

If board(x,y) equals character

Initialise path(x,y)

Queue path in pathlist

Endif

Endfor

endfor

else

for every path in pathlist dequeue

for every neighbour of last coord of path

if neighbour not in path

if neighbour equals character

initialise path p as new path(path)+neighbour

enqueue p

endif

endif

endfor

endfor

endif

endfor

if pathlist is not empty

add word to foundwords

endif

endfor

for word in foundwords

print word

endfor

Worst case is every word is on the boggle board so every neighbour of every character of every word is searched. However each word is still only processed once making it O(n) where n is the number of words.

# Task 3a

A much better way to run boggle would be to look at every possible path on the boggle board and trim a trie data structure. Worst possible case is there is a 25 letter word for every path, making complexity of the datastructure ( m\*T(m)\*C), where n is the number of dice and where T(m) is the mth triangular number and C is the size of each node in the trie. This would be O(m^2) space taken.

The time to initialise would be O(n) where n is the number of words as for each word, you depth first traverse the trie until you are at the correct letter and add a marker, or adding leaves for new characters and a marker.

# Task 4: Running Time

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | words | words | words | words | words | words |
|  | 10 | 100 | 1000 | 10000 | 100000 | 267751 |
| run1 | 28 | 32 | 59 | 256 | 562 | 899 |
| run2 | 29 | 32 | 60 | 257 | 484 | 811 |
| run3 | 28 | 32 | 66 | 187 | 413 | 726 |
| run4 | 28 | 33 | 61 | 246 | 465 | 841 |
| run5 | 28 | 33 | 63 | 265 | 508 | 806 |
| run6 | 28 | 40 | 61 | 193 | 523 | 851 |
| run7 | 27 | 33 | 61 | 185 | 495 | 747 |
| run8 | 27 | 34 | 64 | 201 | 471 | 717 |
| run9 | 27 | 34 | 71 | 158 | 504 | 851 |
| run10 | 28 | 32 | 61 | 213 | 490 | 816 |
| average | 27.8 | 33.5 | 62.7 | 216.1 | 491.5 | 806.5 |

Logarithmic scale

Non-logarithmic scale