Project 1 CPSC 335

Tommy Huynh:

Tommyh@csu.fullerton.edu

Juheng Mo:

Henrymo@csu.fullerton.edu

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README.md — ~/Projects/project-1-alternating-disks-juhengmo — Atom

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disks.hpp   README.md

```
1  # Project-1
2  Alternating disks: light-dark
3
4  Group members:
5
6  tommy huynh tommyh@csu.fullerton.edu
7
8  juheng mo henrymo@csu.fullerton.edu
9
```
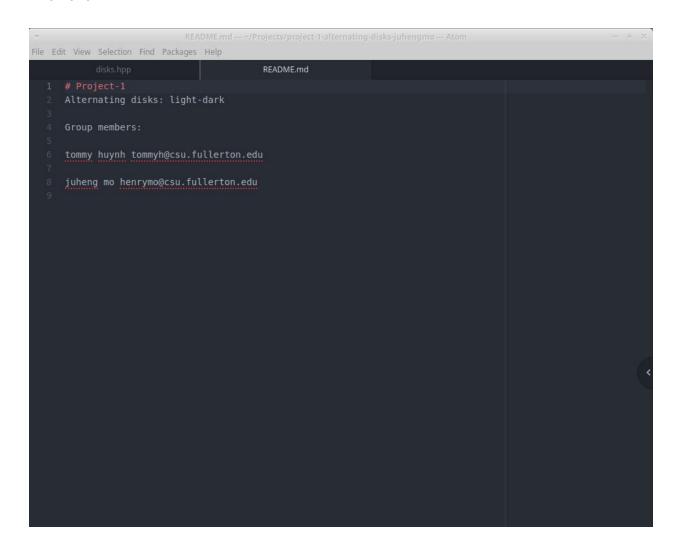
Pseudocode:

Left to right:
```
Counter = 0
For (loop to iterate through the first half of the vector;i++){
        For (loop to iterate through the vector of colored circles; j++){
                If (the left disk == dark && the right disk == light){
                        Swap(the left disk index)
                        Counter ++
                }
        }
}
```
Lawnmower:
```
Counter = 0;
for(loop iterate through the first half of the vector; i+2){
        // left to right
        for(loop iterate from the first element to the n-1th element; j++){
                if(the left disk = dark && the right disk = light){
                        swap(the left disk index);
                        Counter++;
                }
        }
        // right to left
        for(from last element to the second element; k--){
                if(the right disk = light && the left disk = dark){
                        swap(the left disk index);
                        counter++;
                }
        }
}
```

Time Complexity:

Left-to-Right:
S.c. = 1 + ((n/2)+1)(n)(6+max(3,0))
     = 1 + ((n^2/2)+n)(6+3)
     = 1 + ((n^2/2)+n)(9)
     = 1 + (9n^2/2+9n)
     = O(n^2)

Lawnmower:
S.c. = 1 + (n+1)((n)(6+max(3,0)) + (n)(6+max(4,0))
     = 1 + (n+1)((n)(9) + (n)(10))
     = 1 + (n+1)(9n+10n)
     = 1 + (n+1)(19n)
     = 1 + (19n^2 + 19n)
     = O(n^2)

Description:

Left-to-Right:
     The first for loop iterates from 0 to n/2 because the dark disk moves to the left by one element every iteration, the first for loop stops when no dark disk is found in the first half of the vector, so at stops at n/2. The second for loop in the first for loop goes from 0 to n-1 because we are checking if the left disk is a dark disk and if the right disk is a light disk. When we get to n-1, the if statement checks the last element in the vector, and if the for loop goes to n, j+1 at n is out of bounds. Then we swap if we found a dark disk on the left side and a light disk on the right side.

Lawnmower:
     The first for loop iterates from 0 to n/2 because the dark disk moves to the left by one element every iteration, the first for loop stops when no dark disk is found in the first half of the vector, so at stops at n/2, and we are incrementing by 2 because we go through 2 for loops inside the first for loop. Inside the first for loop, we have a for loop that goes from left to right. After the left to right for loop, we have another for loop that goes to right to left. Similar to the left-to-right algorithm, if the left disk is a dark disk and if the right disk is a light disk, then we do a swap.