

Team Megabyte

Project 3

CPSC 335-02

### **Complexity Order of Balloon Juice Algorithm**

The algorithm that we created is meant to be a combo algorithm and visualization task, meaning that we are meant to display the amount of steps our bot takes, as it takes them to find a path from the starting point to the end point. We are using the breath-first search algorithm in order to look for what is called the “Mystic Balloon”.

#### **Big-O Running Time of the Program**

The running time for our Balloon Juice algorithm is  $O(V+E)$  since we are using BFS. The “V” in this case, stands for the vertices and the “E” stands for edges. At its worst case, the run time of the function will be the number of vertices in the plot added with the number of edges.

#### **Main Operations**

The main operations are what allow the function to move from vertex to vertex when searching for the balloon. Using BFS, it will visit all adjacent vertices first and move on the next set of adjacent vertices until it finds the balloon.

linkBalloon(a,b,c,src) has a running time of  $O(1)$  since all it's doing is checking if it is a balloon or not

linkAllBalloonsFrom(src) has a running time of  $O(E)$  since it's connecting all the balloons to each other using the edges from which it started from

searchBalloon(a,b,c) has a running time of  $O(V)$  since it goes to check every vertex at least once