Journal Report 6
10/7/19-10/11/19
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## Daily Log

Detail for each day about what you researched, coded, debug, designed, created, etc. Informal style is OK.

### Monday October 7

Rewrote packing method so instead of a dictionary containing images mapped to array representations of them, images are mapped to lists of array representations which represent their representations along a circle. This allows rotations to be accessed extremely easily, and should speed up the algorithm, as before I was regenerating rotations of images in steps of my algorithm, which costs a lot of computation time.

### Tuesday October 8

Reprogrammed packing method so that at a given position, an object in 0 degree, 120 degree, and 240 degree rotations were tried out, and then a temporary random variable was set to the optimal rotations, and rotations of this variable and this variable plus or minus 60 degrees was found and the variable was set to the optimal of these three, and then this variable plus or minus $30$ degrees was found, ect. At a given position, this allowed for the optimal rotation of an object to be selectively determined, where if you check $3^n$ rotations across the circle, determining the optimal rotations takes $O(3n)$ instead of $O(3^n)$ time, and is much less computationally expensive

### Thursday October 10

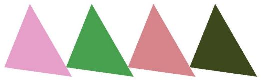
At the beginning of class, I had orchestra practice, so I got less accomplished
After fixing some errors, I found that the algorithm was actually able to pack several objects in a few minutes. However, the rotations of objects it gave ended up being weird (i. E.- did not lay down objects completely flat or close to flat, specifying different widths didn't seem to do much), so there is likely an error in the way I programmed the packing method. I will modify it next week.

## Timeline

| Date | Goal | Met |
|---|---|---|
| September 27th | I hope to figure out a method that efficiently finds the optimal rotation of an object by initially testing out several rotations of each object and then progressively gets closer to the optimal rotation through these tests, and begin work on it | I figured out that the best method for doing this is just by finding the optimal rotation for each object as you pack it, and any specific optimization algorithms would take too long |
| October 3rd | I hope to program the method found in the previous week | I did not program any method, but came up with several that would pack objects quickly and would be plausible |
| October 10th | I hope to program ”faster” algorithm approaches I have come up with, and test which one is the fastest | I was unable to do this, but did start on one approach that seems to be packing objects at a relatively fast speed |
| October 17th | I hope I can fix errors from last week so that the algorithm gives a packing that is clearly close to optimal | |
| October 24th | I hope to be able to speed up my algorithm to the point that I can pack a triple digit number of objects in a class period | |

## Reflection

This week I noticed several major mistakes in my packing with rotation method that I fixed for greatly improved run time, such as modifying the dictionary and changing the selective packing method. I could run my program in full, which gave the following packing:



This clearly means that there is an error in the way I pack objects. I will investigate what specifically this might be in the code - one thing that I realize I need to fix is that the scale of the width of an image changes when you rotate it, so I will need to modify my scaling method to adjust for this. However, I am certain that at this point at least my code can pack objects in a relatively quick amount of time (the original image file had a different rotations that the orientation of the triangles in the image, so my code definitely checked through rotations - it was just unable to pinpoint which was the best), which I had struggled with for the past two weeks. I hope to be able to fix the errors with this packing method next week, and begin work on ways to speed it up.

At some point, I also need to change my rotation method so that increasingly smaller rotations are narrowed down upon for each object. This allows objects to be laid down flat on a surface, as they are clearly not right now. I might make this change by changing arrays that are mapped two in the dictionary I modified on Tuesday to dictionaries, which map rotations to arrays representing objects in that orientation.

Additionally, I will probably modify the current method I'm working on so that it is similar to method I wrote down last week. Right now, I am just looking for a program that can pack objects, and hope to focus on improving it later.