Comp1130 Programming As Problem Solving(Advanced)

Assignment 1 Technical Report

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Tutorial group:Tuesday 2-4pm

Tutor:Debashish Chakraborty

University ID:u6683369

ANU College of Engineering & Computer Science

Introduction

In this assignment, I write code for how to type in the type that the graph should have to draw shapes and how to draw shapes by the interaction of mouse and key. In this assignment, I would like to get my extension marks from extension A3 and B2. And here are some guides for you to test my code.

User guide for my extension questions

Pool A

A1: 1. Draw something
2. Key press “S” to change your tool to SelectTool
3. Click on the shape that you would like to redraw
4. Draw the shape again

A2: 1. Draw a polygon
2. Key press “S” to change your tool to SelectTool
3. Click on the polygon that you would like to add vertex with
4. Click a point to add a vertex

A3: 1. Draw something
2. Key Press “S” to change your tool to SelectTool
3. Click on the shape that you would like to change its layer with
4. Using “P” to make your shape “up” and “L” to make your shape “Down”

Tips for SelectTool:”After you select a shape if you want to select a shape again, you need to KeyPress “A” to clear its memory, so that you can select another shape.

Pool B

B1: 1. Just draw all shapes

B2: 1. Key Press “W” to change your tool to CircleTool
2. Click 3 points
3. Circle will be drawn

Part A:Type To Draw

The objective of functions that are in Part A are simply just pattern matching against your function type and do some calculations so that reasonable shapes can show up in the canvas. The only thing that I find it’s quite difficult in this Part is the how to draw a Ellipse without having a predefined function of it. First I think that I can somehow change the solidCircle to solidEllipse. And then where I go wrong is that I think I can maybe using getWidthAndHeightshift to change it, when I first started this assignment, actually I didn’t have any idea about it except for the simple patternmatchings. After I finished all functions except for change circle to ellipse, and saw the type for the getWidthAndHeightshift function, I suddenly got the idea. This function is used for Rectangle and Ellipse to specify its sides and translation. So after that I went back to the CodeWorld and saw that there’s actually a builtin tool called “scaled”, after having some try on how it works, I can finally write the function for solidEllipse, and I never thought it’s going to be that easy. I test my program by using doctest, the results will be shown in terminal.

Part B:Click To Draw

The objective of the functions work together in Part B are to patternmatch against everything(shape,colour,points,tool…) and call drawNewGraphic, getNewGraphic to show your graphs. The difficulties in this part is that when first time I am trying to test it, it can only draw one single shape on the canvas, so I have looked carefully and think of a way that I can store the all the graphics that I have drawn. After I saw the graphic is a list, I knew how to do with it, make gs the list of the graphics that I have drawn, and everytime when I draw something, add the new graphic to the list of all old graphics(which is gs). And in this way, the program is able to show all the graphics that I have drawn. Also in this part I use doctest to debug my program, and before the last time that I submitted, it works perfectly(no warnings and bugs).

Extension Pool A

Because I have done all extensions in Pool A and they contradicts in some ways, my code looks weird by fixing all the problems that could occur. I write two extra tools for pool A which are SelectTool, RedrawTool. To determine if a point is on a shape, I write some codes in Graphic.hs, I use a value of 1e-6 to determine if a point is on a line or on a point, if point's distance to a point or a line is less than 1e-6, I say that it's on this point or line and output it as True. The only problem that I find is difficult is that it's hard to determine whether a point is in Polygon or not, so I have to search up for all resources on internet. For polygon there are 3 conditions to determine whether a point is on polygon which I write it in last few lines of Graphic.hs: is this point on the vertex of Polygon? Is this point on the sides of Polygon? And if the intersects are odd or not.(And there's a function to determine whether the intersects are odd or not.) And because that A1 and A2 are using the same tools, so after I select some shape, I need to determine whether it is Polygon or not, so I write a function called isPolygonTool and output as Bool type. And from line 277-294 in Events.hs, I list two case, if the shape is Polygon, then add a vertex. If otherwise, then redraw the shape.

Moreover, for me to implement layers, I construct a order system by using index numbers. I add a index number to every shape that I have drawn, and if you can see the 184 line of my View.hs, you are able to see that I sort it from smallest index number to the largest. After that step, I met with a issue, when I am doing A3, the Key "P" and "L" are already used by PolygonTool and LineTool, and it contradicts with A3's requirement as I supposed to use "P" and "L" to implement layers. Then I thought if I can restrict "P" and "L" to be only worked as implement layers' tool when the tool is SelectTool then it's fine. However it turns out to be not working, after testing few times by putting these lines(now in Events.hs line 206-225) to different positions of Events.hs, I eventually get that how haskell works is that it runs from top to the bottom. So If I put those things at the front, it has higher precedence than those bottom lines and it will run first. Therefore if I Press "L", the index of the graphic that I have selected by using SelectTool and MousePress will be its original value minus one, so its layer will go down every time I press "L". Also similar step for "P". What I have found really cool in this task is that during the process that I am trying to solve the problems, I learnt zip, filter, map, let..in, if..else which we haven't learn in the class. By using these functions, itcsit anu saved many lines for me.

After I done those things and fixed everything, when I tried to run the doctest for Events.hs, it won't work because I have changed the type of the State from 3 arguments to 4 arguments. Although the shape is still correct and tutors said that it's fine, I wrote my own doctest that it can works on my code. What I can improve is that I can make some new functions to fix my doctest, but by doing that, it makes the code rather complicated and lack of readability.

Extension Pool B

For extension B1, actually there's a easiest way of doing that, you can add a point to every shape that you have drawn, and write Mousemovement function to patternmatch every shape with it. However similar to the issue in Pool A, it won't pass the doctest. So I construct a system to make it pass doctest. (Line 188-201 from Events.hs, also add a tool called WithpointTool to store a point as you draw) This system is simply get a point when you draw and clear the point after you finished so that you can pass the doctest. And because for Polygon it has a list of points so I can't really use WithpointTool as it takes a point, therefore I write one more line(Now at line 271 from Events.hs) to update the state as it draws.

For extension B2, you have to know how to calculate the radius and the central point of circle by having 3 points. So I just write another getcirclegraphic and write tool, shape, key… for circle. After add everything and patternmatch everything then I finished.(Probably the easiest extension)

Conclusion

The assignment really helps me a lot by letting me solve problems, during the process of solving problems, I learnt many new things(new expressions, new function…) which I think really going to help with my coding career.

Reference

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