Minor Assignment 5

ENGINEER 1D04
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McMaster University, Fall 2013

Revised: February 18, 2014

Please use AutoMarker (`automarker.mcmaster.ca`) and Avenue to acquire, test, package and submit your assignment. The procedure for submitting assignments is summarized on Avenue, with additional details provided by AutoMarker. **Please frequently back up your work by creating a submission package in AutoMarker**. This will provide a chance to recover your work in the event of an equipment failure.

Background

The purpose of this assignment is to create a simple interactive graphical user interface (GUI). Design, implement, and test a program that satisfies the requirements below.

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IMPORTANT!!!: This assignment will be run through an automated testing program to be graded. Function syntax in your program must be **exactly** as specified, including spelling, capitalization, and the order of function parameters. **DO NOT** include a `main` function. Failure to precisely follow the requirements below will result in a **significant loss of marks**.

Requirements

1. The program creates an interactive GUI using the services provided by Zelle's `graphics` module.

2. Implement a function `distanceBetweenPoints(p1, p2)` that takes two `Point` objects as input and returns the distance between the `Point` objects as output.

3. Implement a function `drawCircle(w, c ,r, s)` that:

   a. takes an object w of type `GraphWin`, a Point object c, a number r, and a string s as input,

   b. creates an object C of type `Circle` whose center is c and radius is r,

   c. fills in the interior of C with the color represented by s,

   d. draws the circle C on the window w,

     e. and returns C as output.

4. Implement a function `circleGame()` that does the following when it is executed:

     a. It creates a pixel window with a convenient coordinate system.

     b. It draws a red-filled circle in the center of the window.

     c. When the user clicks on the window with the mouse, three possible things happen according to where the mouse click was located:

        i. If the mouse click was located inside the circle but less than one quarter of the radius from the center of the circle, the window is closed and the program terminates.

        ii. If the mouse click was located inside the circle but greater than one quarter of the radius of the circle from the center of the circle, the circle's radius is reduced by 20%.

        iii. If the mouse click was located outside the circle, the circle's radius is increased by 10%.

     d. The center and color of the circle does not change.

     e. Uses the functions `distanceBetweenPoints` and `drawCircle`

5. The program requires very little besides the function definitions. There is no `main()`.

6. The program does not read anything from standard input or write anything to standard output. That is, the program does not interact with the user who invokes it.

7. The program is written in Python in a module, NOT in the Python Shell. To create a new module in IDLE, go to File → New Window. You must save this file with a .py extension. For more information on submitting your program, click the "AutoMarker Instructions" button above.

8. Your name, MacID, student number, and the date are given in comments at the top of your Python (.py) file before your program.

9. Your answers to the design questions and the test plan (see below) are given in comments at the bottom of your Python (.py) file after your program.

10. Your program MUST have valid Python syntax and it must run without errors. Ensure that your program runs properly by running it before you submit.

11. You must sign out with a TA or IAI after you have submitted your lab at the submission station. Failure to do so could result in a zero.

Design and Implementation Instructions

1. Use the methods provided by Zelle's `graphics` module to create your interactive GUI.

2. **Use a while loop in your program.**

Design Question

1. Would it be possible to write a program without an indefinite loop that satisfies the requirements above?

2. If you call the function distanceBetweenPoints(p1,p2) with the parameters: p1 = (0,0), p2 = (4,0), does the function still output the expected value?

3. If drawCircle does not return a value, does the program still work as expected?

Test Plan

What would be a good set of test cases for your program?

Further Practice

Extend your program so that the darkness of the red color of the circle is modified each time the user clicks the window according to the location of the mouse click.