Computer Science 3053

Human-Computer Interaction

Assignment 5

Using JavaFX, develop a desktop application that demonstrates and empirically determines the parameters of Fitts's Law. For example, your application should present the user with two *targets* to click, alternating between one and the other. To demonstrate Fitts's Law your program must be able to calculate the distance between the user's mouse cursor starting point and position when the mouse button is clicked, as well as the time between those two events. Your program must lso be able to determine if the user clicked the *target* object (a success) or any other location (a failure). "Target" objects may be simple shapes such as rectangles or circles, or may be more complex (note that for Fitts's Law you'll need to determine the "apparent width" of the *target*).

Your application must:

1. Allow the user to click *targets* 10 times. Additional credit will be granted if this *target* click count is "configurable" by the user.

2. For each click track the time to click, success of clicking the appropriate *target*, distance to the *target*, and "apparent width" of the *target*. Additional credit will be granted if the *targets* are animated to move during the testing. Animation is relatively easy with JavaFX using the `Timeline` class.

3. At the conclusion of the test, the UI should present the user with test results that list both the percentage of "successful" *target* clicks and the appropriate Fitts's Law equation empirically determined from the collection of "successful" *target* clicks. Additional credit will be granted if the test data is visualized in some kind of scatter plot or other creative form.

0.1 Fitts's Law

Recall that Fitts's Law describes the time taken to click a *target* (called movement time, MT) as a linear relationship to the the "index of difficulty" (ID) which is the logarithm of the ratio of distance to the *target* (D) to "apparent width" of the *target* (W), plus 1.

$$ID = log(\frac{D}{W} + 1)$$

$$MT = a + b * ID$$

Empirical computation of a and b may be done using simple linear regression from a set of data points collected for MT, D, and W since MT is a linear function of ID (which itself is calculated from D and W).

Many online examples and instructions for computing an a and b using linear regression are available, if you are unfamiliar with linear regression and how to make use of it as a technique.

0.2 Due Date

You must complete the assignment by Thursday, March 24 at 11:59 PM and submit the source code (*.java file, not compiled class files, nor a JAR or ZIP) on D2L in the appropriate DropBox.

Some extra credit can be granted for creative extensions to the basic requirements listed above.