CS 112 Project Assignment: Visual Password

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Overview

In this project you will use Python to implement a visual password system. In the industry today there is ongoing research about better password mechanisms. Currently, using text-based passwords is seen by many as very hard to remember, easy to lose or break, and generally not the best approach. Some researchers are looking at various visual password systems. You will be implementing one of these, specifically one you can find on the web at:

http://digg.com/programming/Cool_Visual_Passwords

The password system you will implement allows users to register by typing in their username and then clicking on 5 locations in the image. These locations are now their "password".

They can then login by typing in their username again and clicking in 10 locations, 5 of which must be within 15 pixels of the 5 password locations. The reason to have 10 clicks is in case someone is watching you click, they do not know which are "real" password locations and which are fake. The clicks can be in any sequence, they do NOT need to be in the same sequence as the original setting.

For this assignment you will be using some basic graphical user interface concepts from the Tkinter library in Python.

Assignment

For CS112 you will need to implement the following parts:

Window Creation

- The window should look like the image below. I have outlined 6 frames that each hold widgets. (Note: in the final solution you do not "see" the frames… I have just outlined them so you can see them.)
- The buttons and labels should be aligned as I've shown

- I used the pack() geometry manager, but you can use the pack or grid layout. (Pack is easier to use, grid gives you more flexibility.)

http://cs.gmu.edu/~dfleck/classes/cs112/spring08/projects/visualpassword/frames.png

Looking at the picture:

- Main frame has two frames in it vertically (big green frame and pink frame
- Pink frame has two horizontal frame in it (gray and yellow)
- Yellow has two vertical frames in it (light-blue and dark purple)

Login flow:

1. User clicks on the login button
2. Click counter resets
3. User is asked to click on the picture 10 times
4. After the 10th click the system checks the username entered, finds the clicks for that user in the passwords.txt and compares that to the current list of 10 clicks the user just made

5. If they have hit upon all of the clicks in passwords.txt, a message should tell the user the login was successful. (At this point we are not logging into any system really, but in the future we could use this code for many other applications (maybe project 3?)
6. If they did not login successfully a message should appear telling them that

Register flow:

1. The user enters their desired username in the text box
2. The user clicks "register"
3. The user clicks on the picture 5 times
4. The user's name and clicks are stored in the passwords.txt file

Format of the passwords.txt file:

The passwords.txt file must be formatted with each line like:
name~x1,y1~x2,y2~x3,y3~x4,y4~x5,y5~

A sample file is:
carl~191,64~134,116~110,152~61,78~102,61~
dan~31,39~64,72~102,64~168,45~214,28~
bob~176,148~176,160~179,179~179,194~179,212~
dan3~120,478~233,476~332,484~247,581~308,563~
harold~179,206~178,399~436,399~495,398~496,203~

Where the x1 and y1 are coordinates of the mouse clicks.

Errors you need to account for:

- If the username is not present when you need it to be, you must give an error to the user

Some helpful code/information is on the lecture slides and you can also see many Tkinter sites on the web:

http://www.pythonware.com/library/tkinter/introduction/index.htm
http://wiki.python.org/moin/TkInter
http://docs.python.org/lib/module-Tkinter.html

Challenges:

- You need to implement the distance formula to decide if you are within 15 pixels of a click:
  - distance = $\sqrt{(x1-x2)^2+(y1-y2)^2}$

- You will need to read and parse the passwords.txt file

- You will need to decide if you have a solution or not

- How I did it (you can follow whatever working algorithm you want though)
    - Maintain a mode global variable to know if you are collecting clicks for a login or register
    - After you get to the required number of clicks for your mode, do the test
        - This means you will have a global variable storing the current list of clicks
        - You will also have a global variable for the username field so you can get the text out of that field at any time
        - There may be other things that are globally used throughout the program

grail.gif is available at:

http://cs.gmu.edu/~dfleck/classes/cs112/spring08/projects/visualpassword/grail.gif

Requirements:

- You must use functions (trust me, you'll want to anyway!)
    - Create a function to make the window, then in that function call another function to create each widget (picture, button, label, etc…). One of them will create a group of widgets to get the label next to the text box.
- You may use global variables to maintain state for some things. You'll almost definitely **need** to for this project until we learn more about Objects!
- You must save passwords into passwords.txt in the format specified above
- You must read passwords from passwords.txt
- You must use grail.gif (this is the file we'll use to test)
- You must have the File->Exit and Help->About menus.
    - File->Exit should call the destroy() method of the root window
    - Help->About should display an info message with the following text:
- You must make sure your application has the same visual layout that mine does (buttons/text in roughly the same place)

```
This is a Python Visual Password
program for CS 112 created by YOUR NAME HERE

        To use it, first you must register as a user.
        Registration:
                type in your username
                click inside the picture 5 times
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                these 5 click locations are now
                       your password

        Login:
                type in your username
                click inside the picture 10 times,
                       ensuring at least 5 of them
                       hit your password click
                       locations
                       (or get close)
                the system will then let you know if
                       you have successfully logged in
```

Bonus Points

If you want to get a 10% bonus on this assignment (which is equivalent to a lab grade) you can add in the following requirements:

- Have the picture be changeable for each user, so that a user ID is associated with a set of clicks and a specific GIF image
    - When a user clicks the login button the specified image should be displayed
    - When the user registers there should be a way for them to also specify the GIF image to use

My Code

To make your life easier and help you understand what to do, I'll even provide my solution… just download my compiled Python code, and the image needed. Run the code and see what you get!

http://cs.gmu.edu/~dfleck/classes/cs112/spring08/projects/visualpassword/visualPasswordO.pyc
http://cs.gmu.edu/~dfleck/classes/cs112/spring08/projects/visualpassword/grail.gif

(You could spend your time trying to get my source from the compiled code.. but I think you'll be wasting your time… ☺)

Starting Hints

If you are not sure how to start, build the program up from these steps. You should do each step in order and test each step before moving on!

1. Create a window and display it
2. Add a button to the window
3. Add an event handler to the button so when you push it, a print command runs that says "button pushed"

4. Add a second button to the window
5. Add a second event handler that says “button 2 pushed” when you push it
6. Pack the buttons on the left side to get them side-by-side
7. Put the buttons in a Frame (no visual difference on the screen for this)
8. Add a text entry box to the screen
9. When button 1 is pushed, change the print to say “the text in the box is “ … (the text in the entry box). Hint: To do this the entry box probably needs to be a global variable!
10. Add a label on the screen that says “Username”
11. Put the label and the text entry box in their own frame
12. Pack the label and username into the frame side-by-side
13. Keep building up your application from here… look at the notes, slides for the class to see more examples of how to do things or read the online resources.
    a. Add the File Menu
    b. Add the Help Menu
    c. Add a new frame with the picture in it
    d. Bind mouse clicks to the picture
    e. Add in a StringVar label to display status text (global variable again will be needed)

What to turn in:

1. Source code
2. Answers to the following questions:
    1. What did you like/dislike about this project?
    2. What was the most difficult part of this project?
    3. How many hours of work did you do on this project?
    4. Did you work with anyone else on the high level issues?
       If so, who? (This is okay and will help you learn a lot)