A-1 Implementation of the CGP Algorithm

Choose “PyCharm” from Programs. The first interface that appears looks like Figure (A-1).

1. Opening PyCharm 2022.2.2.
2. Click open the Application for **Registration Process**.

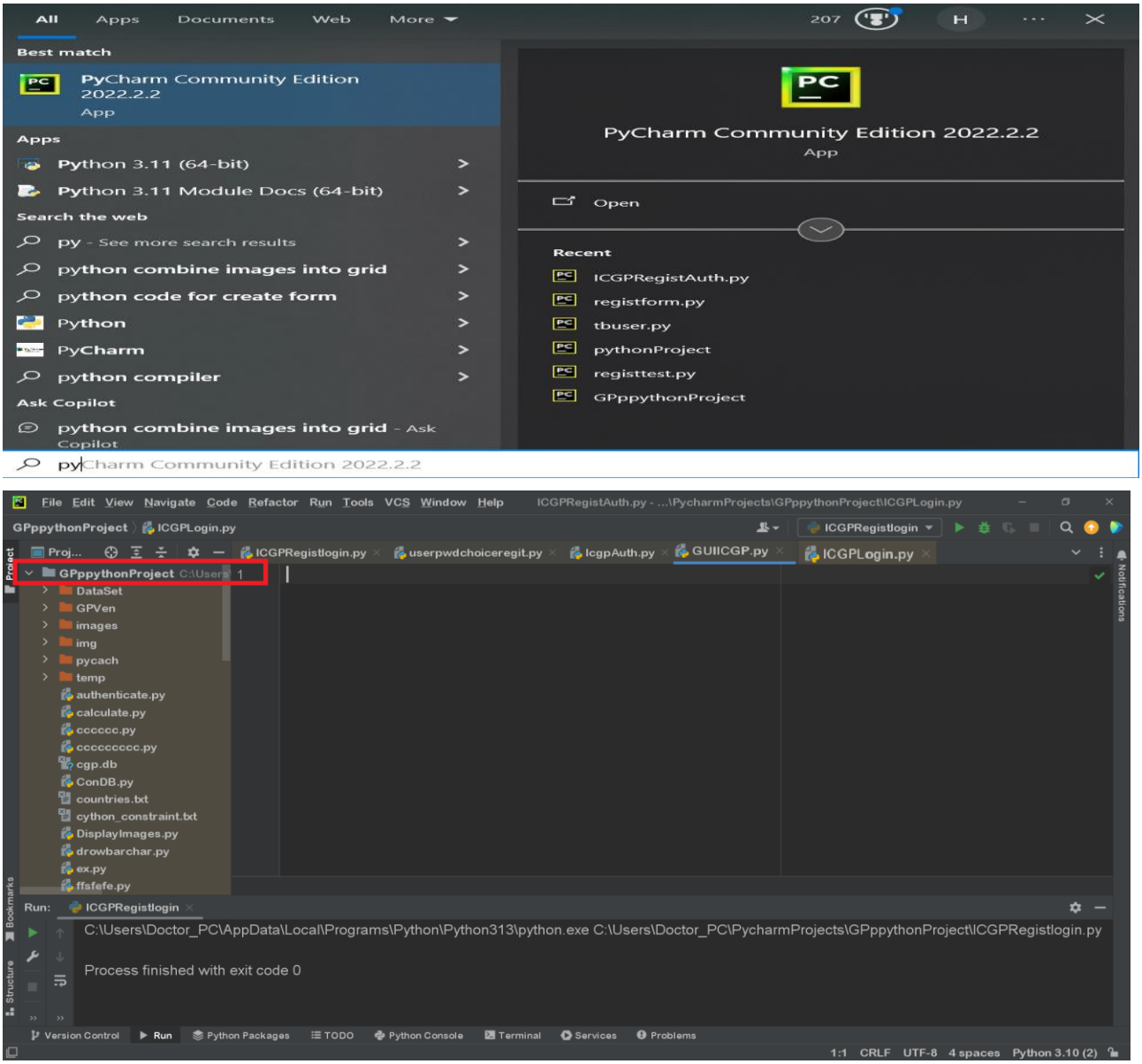

Figure A-1 The First Interface of PyCharm

The second step Presenting data: The user's data file needs to be loaded first as represented in Figure (A-2).

3. Enter his/her username.
4. Choose the upload button to load an image from the CGP dataset or choose any personal image he/she prefers from his/her device.

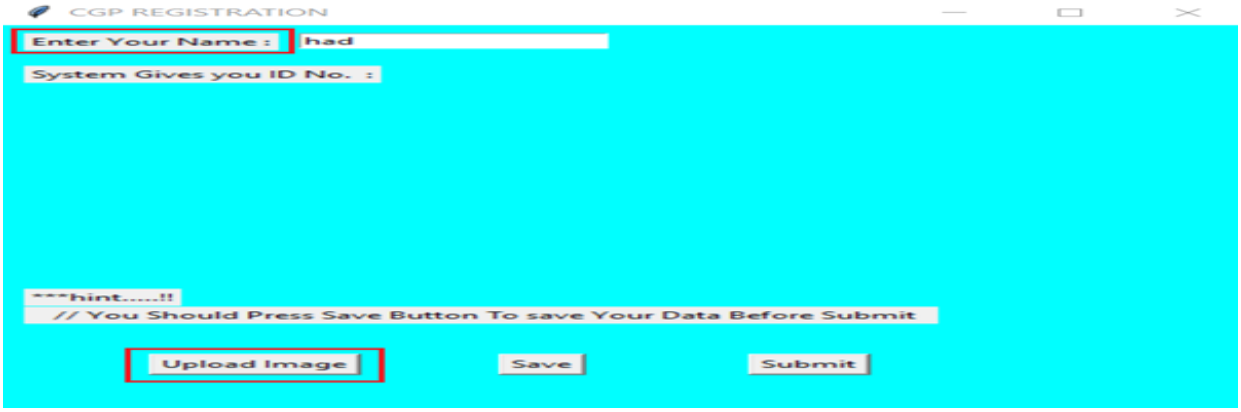

Figure A-2 The First Interface of PyCharm

The third step: The user chooses a personal image from his/her device or from a CGP dataset file as represented in Figure (A-3).

5. Choose the CGP image carefully based on the category he/she preferred.
   5.1 Each category holds inside its group of images.
6. When choosing a determined category, system shows category-related images; and then clicks open.

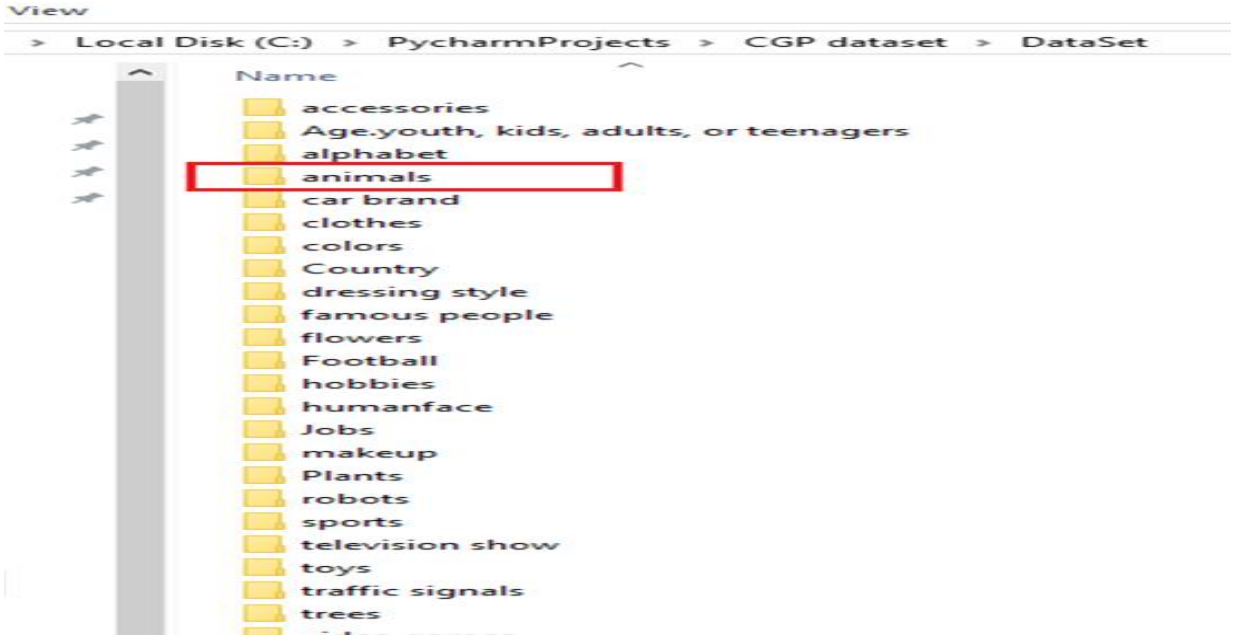

Figure A-3 The First Interface of PyCharm

The fourth step will be showing select category images as represented in Figure (A-5).

7. Click category.
8. Click Open.
9. Choose an image, that called “UI”.
10. Click Ok.

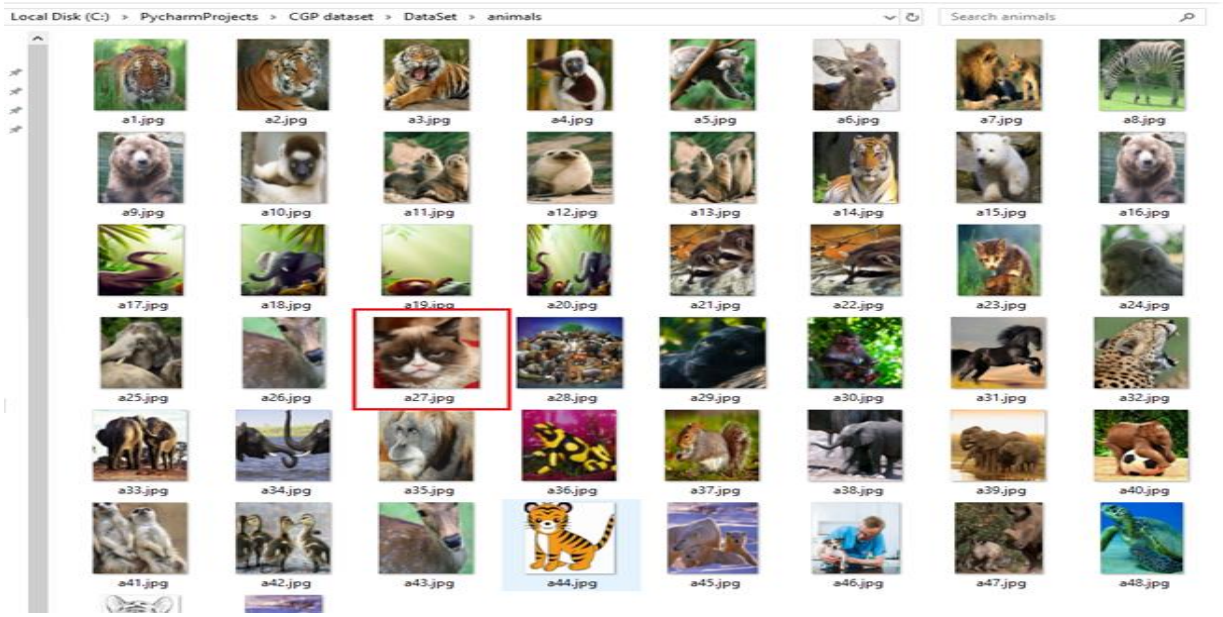

Figure A-4 The First Interface of PyCharm

The fifth step will be saving the user’s data as represented in Figure (A-6).

11. Click save button.
12. Click Submit Button.

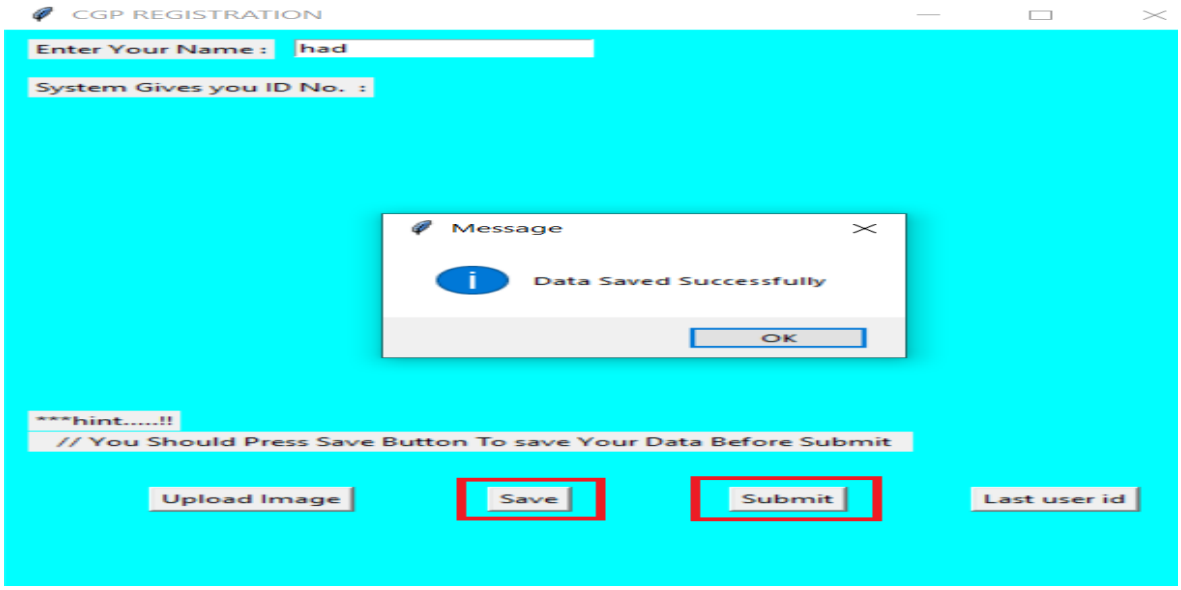

Figure A-5 The First Interface of PyCharm

The sixth step: the CGP system will save the user's data in database and generate a unique number for the user as represented in Figure (A-7).

13. Save user's data in the SQLite database.
14. Generate a Unique Random Number for the registered user called "Uno".

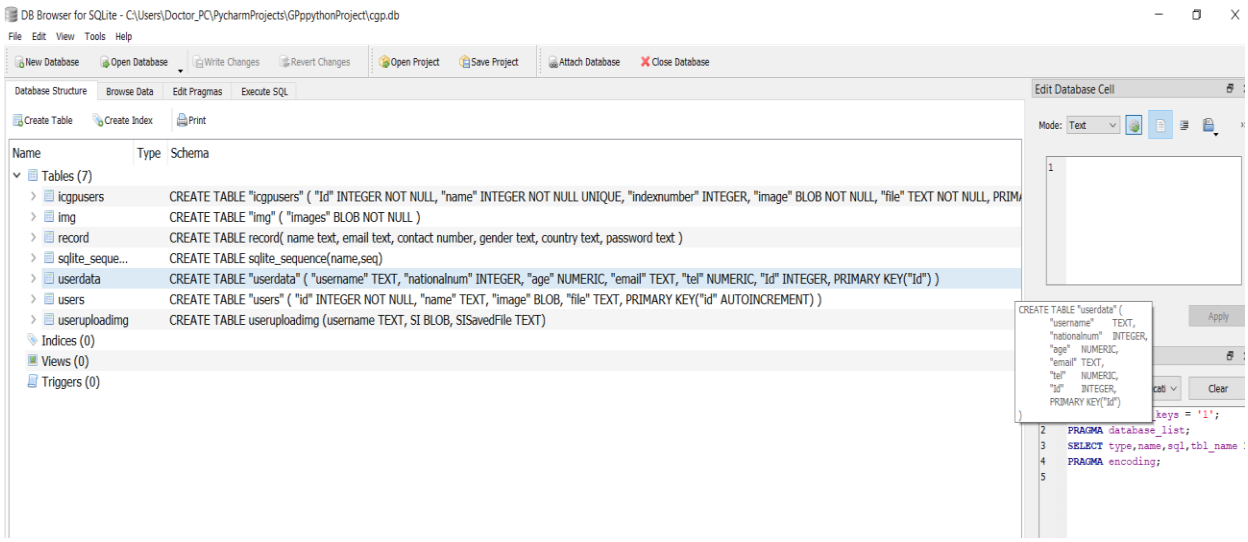

Figure A-6 The First Interface of PyCharm

The seventh step will show the CGP password, the username, user number and user image on the screen as represented in Figure (A-7).

15. CGP password Output

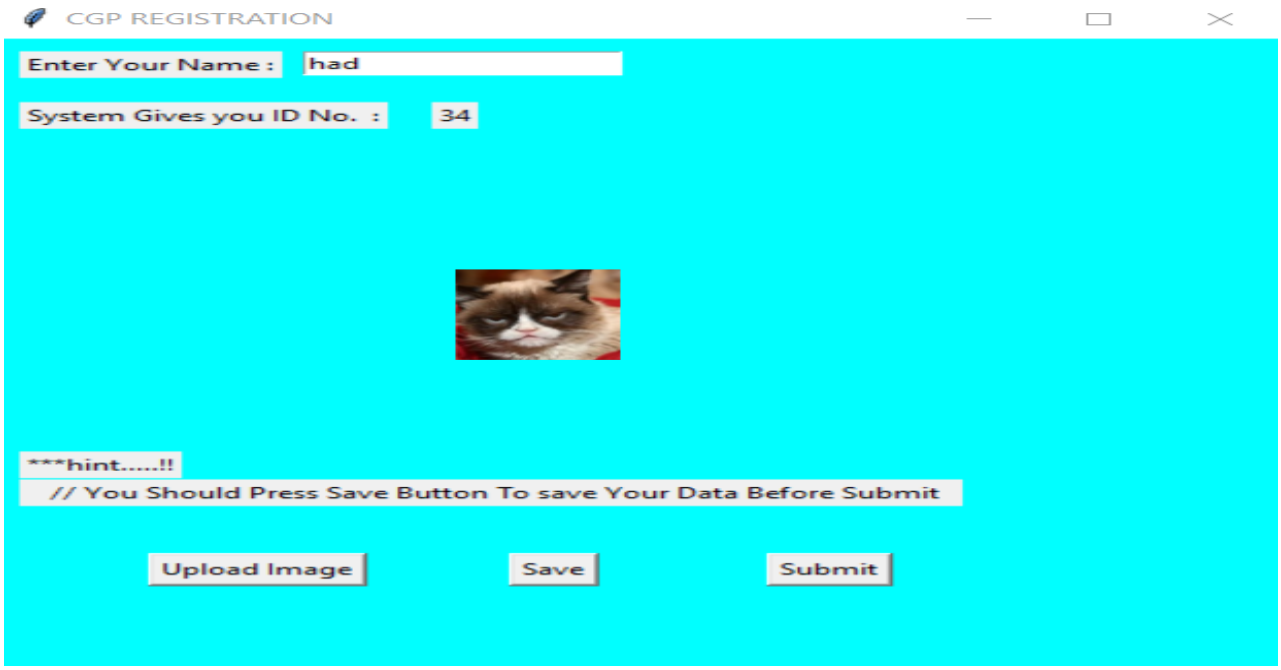

Figure A-7 The First Interface of PyCharm

The CGP user password record will be the username, random user number, and the registered image after resizing and blurring, as represented in Figure (A-8).

The final format of the password wouldn't be one element, but it was a combination of five factors (user name, user number, and his/her registered image with the same name, size, and resolution), making it difficult to guess and resistant to several attacks.

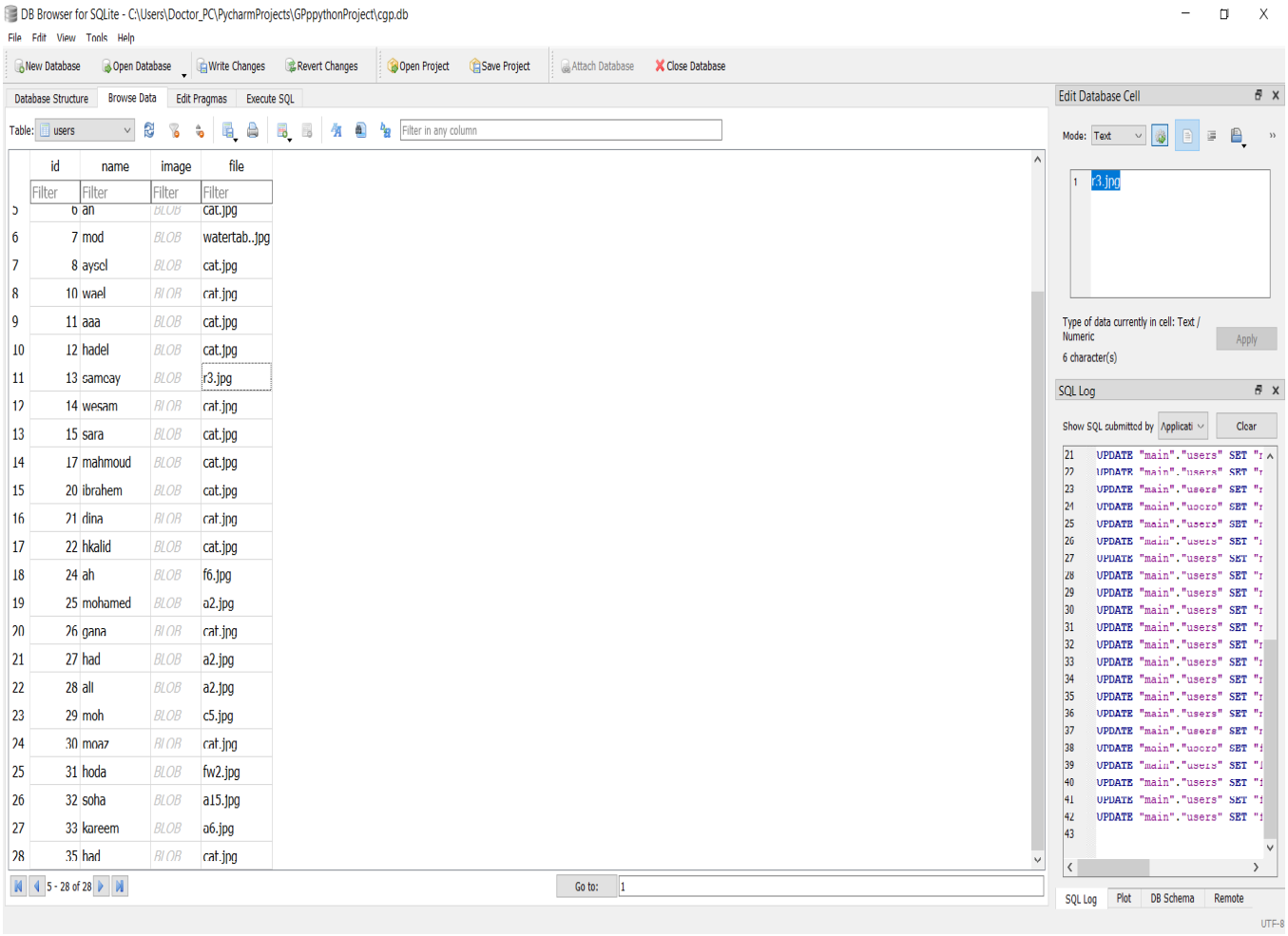

Figure A-8 The First Interface of PyCharm

- **In the CGP Authentication step**, users need to be authenticated to log into the system. First open the login form as represented in Figure (A-10), user must fill in all fields.

1. Click open the CGP Application for **Authentication Process**.

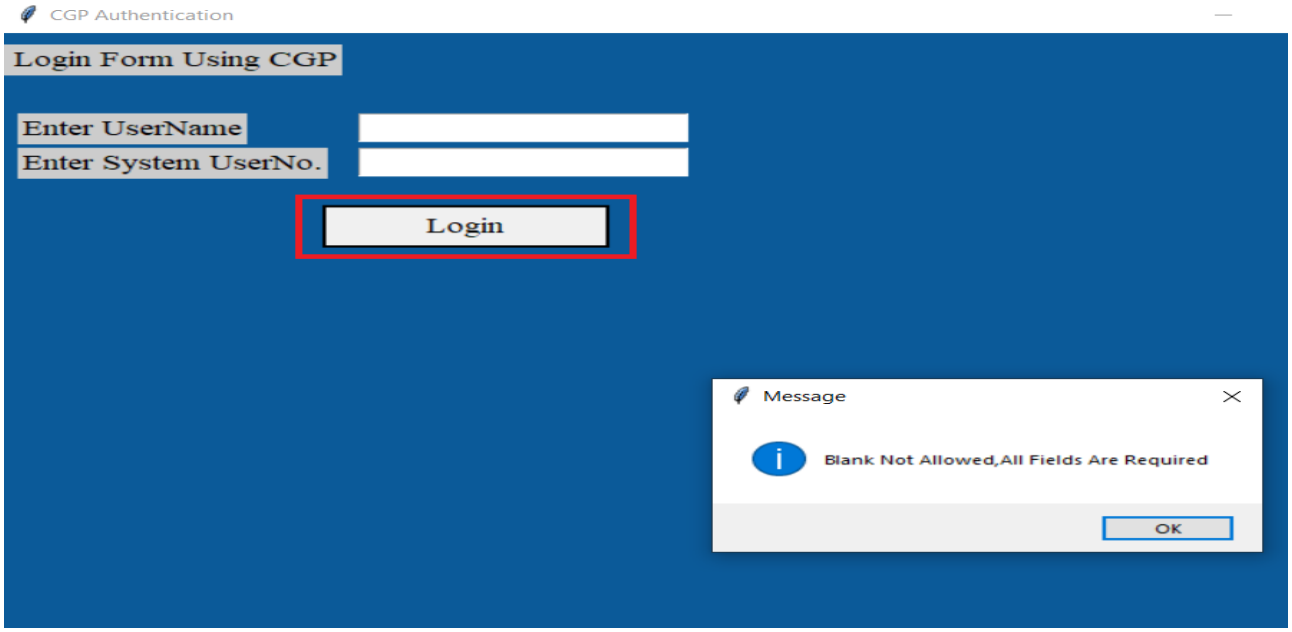

Figure A-10 The Data File Needs to be loaded

The second step: receiving data; The user's data file needs to be uploaded, user will enter his/her user name, user number and upload the image he previously choiced at the registration step with the same name and size as represented in Figure (A-11).

2. Enter the user name "UI".
3. Enter the user system number "Uno".
4. Click login.

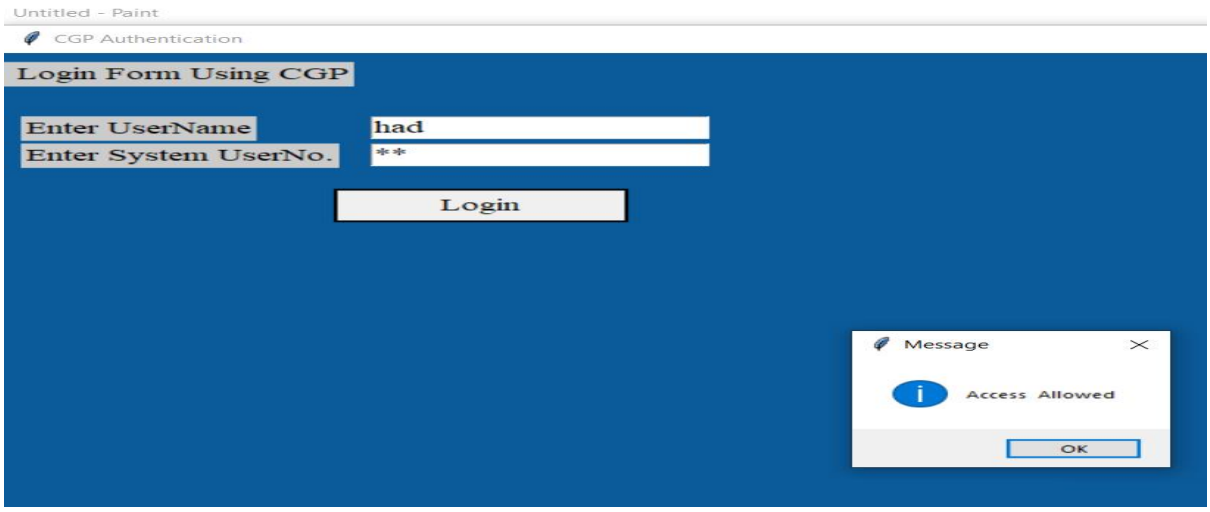

Figure A-11 The Data File Needs to be loaded

The Third step: the user uploads his/her CGP graphical password for accessing the system, as represented in Figure (A-12).

5. Upload the user image.
6. Choose the image he/she previously registered.
7. If the user chooses his/her image with the same name, size, and resolution, he/she will login successfully.

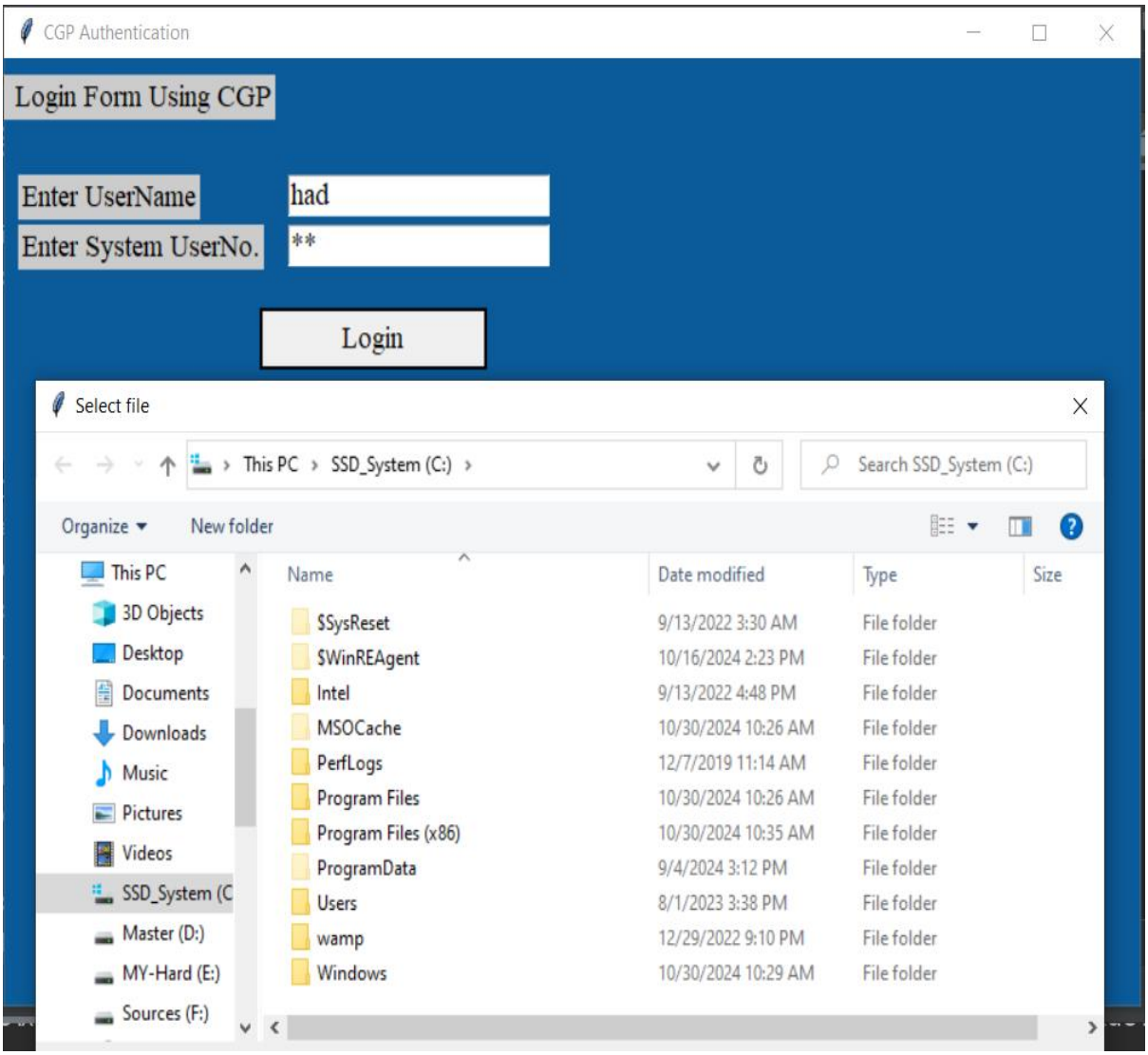

Figure A-12 The Data File Needs to be loaded

- Finally, if the user inputs all of the registration data correctly, he or she can access the system or web application that used the CGP graphical password to verify that he or she was the authorized user.