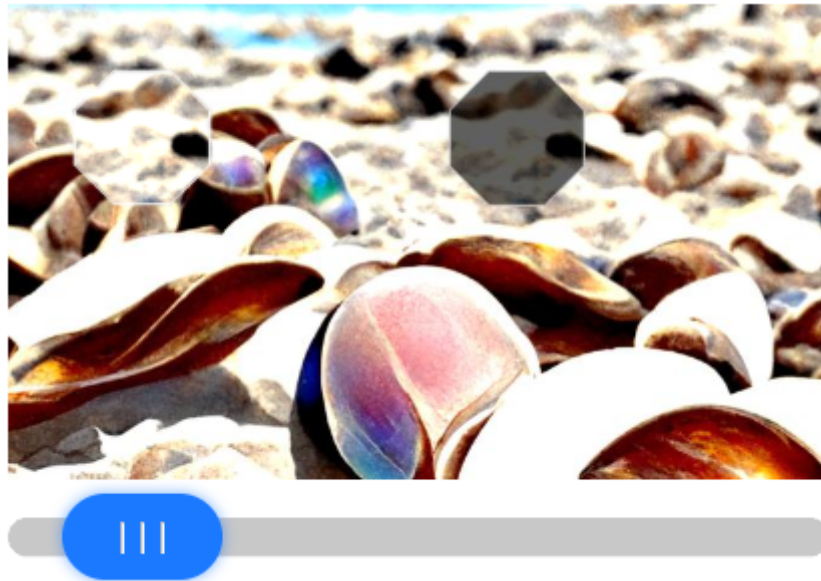# Lab Assignment 3 CS301 2023FALL

Jason's website has 100,000 users, but recently he has noticed that there are always some attacks from Internet, so he plans to apply a real person verification system when users log in to the website. Please help Jason implement this verification system.

Part 1: Drag the slider to complete the puzzle (50%)

Cover a certain area of the whole picture, and drag the gap picture/slider to make the picture complete.

Notes: We will use `original picture` to indicate the whole picture, and `gap picture` to indicate the covered section.

The specific requirements are as follows:

1.1 Picture display (10%)

1.1.1 Display the original picture on LCD screen. (5%)
Notes: The picture can be stored in SD card or not, and the utility of SD card will not acquire additional points. The picture can be displayed in one color or in different color, and 16-bit true color displaying will not acquire additional points.

1.1.2 In the original picture, the gap section that need to be supplemented should be depicted clearly. Meanwhile, the gap picture should be displayed in some areas outside the original picture. (5%)

1.2 Show the moving process of gap picture (25%)

1.2.1 When the gap picture is moving, the original picture behind it needs to be displayed correctly, and the occlusion relationship between the two needs to be handled correctly. (10%)
1.2.2 When the gap picture is moving, it can be redrawn correctly with clear boundaries. (10%)
1.2.3 After completion, the boundary at the gap picture disappears and the complete picture is displayed. (3%)

1.2.4 Once the verification of part 1 is completed, there should be a prompt to enter the second stage of verification. (2%)

Explanation 1: Sliding bar shown in the example image is not the only illegal style to show the moving process, and other design methods that can clearly and reasonably represent its movement process can be used.

Explanation 2: Octagon shown in the example image is not the only illegal shape of the gap picture, other shapes can also be used, such as a rectangle, triangle, etc.

1.3 Error requirements (15%)

1.3.1 When splicing original picture with gap picture, the left and right boundary error range is set to [1%, 10%]. If it is too precise or too out of bounds, the verification cannot be completed. We should quit the verification phase directly and proceed to the initial interface. (5%)
1.3.2 The time range is set between [0.1s, 5s]. If the movement is too fast or too slow, the verification cannot be completed. We should quit the verification phase directly and proceed to the initial interface. (10%)

Part 2: Click on letters/numbers in order (50%)

Click on the letters/numbers in the picture in a specific order to complete the verification. The specific requirements are as follows:

2.1 Verification picture display (15%)

2.1.1 Display the picture with verification information on LCD screen, and the verification should contain capital letters, small letters, and numbers. (10%)
2.1.2 Letters and numbers are randomly generated. (3%)
2.1.3 When user can't figure out the letters clearly, they can click the picture or a button to refresh the picture. (2%)

2.2 Verification function (10%)

To complete the verification, users should click on the letters or numbers in the picture in a specific order according to the requirements in the prompt, and a message indicating successful should arise if the user pass the verification. (10%)
说明： Time range control similar to section 1.3.2 can be added or not, and designs with time range control will not receive additional points.

2.3 Interference terms (15%)

2.3.1 Letters and numbers appear in a variant form that can not be recognized by AI. (5%)
2.3.2 Interference content such as dots, dashes, and wavy lines appear in the background. (5%)
2.3.3 Letters and numbers doesn't appear horizontally, but by rotating a certain angle similar to the example image. (5%)

2.4 custom function(10%)

You can design a new function to enhance the verification function in Part 1 or Part 2.