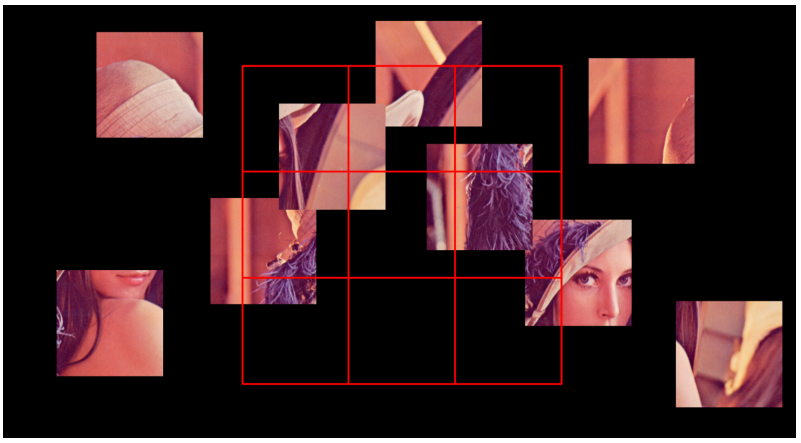
DRAG AND DROP PUZZLE

INTRODUCTION

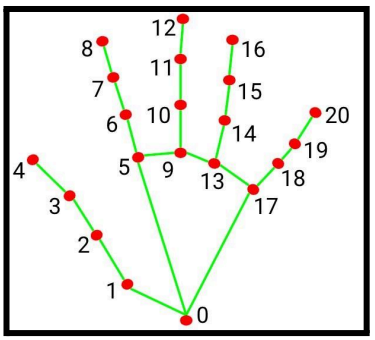
Our project is a simple game that focuses on hand gesture recognition.The player is given pieces of a puzzle and a grid,they have to pick up the pieces and drag them in the right spots of the grid to recompose the picture.When the puzzle is solved the original image and the time needed to solve it are shown.The player can also choose various degrees of difficulty and change other settings through a menu.
We used the cvzone library to recognize and track the movements of the player's hand,while we used numpy and many image processing functions we learned during the course to create the puzzle from a given picture,draw the grid,draw the buttons of the menu and so on.

PUZZLING THE IMAGE

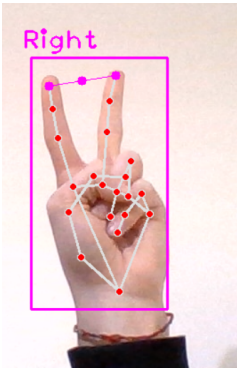


The first step was puzzling the image and drawing the grid. We wrote an algorithm that could split the image into pieces of the same size and then scatter them across the screen randomly. To be able to implement different degrees of difficulty,the number of pieces in which the picture is divided can be chosen. Although in the beginning the pieces of the puzzle were just simple images,to be able to drag them around the screen we had to know their position on the screen at any time. This led us to use an object oriented approach,so all the pieces of the image became instances of a class that provides all the needed methods to drag them.This approach also made possible to implement other features like fixing a piece in place when it is in the right position.

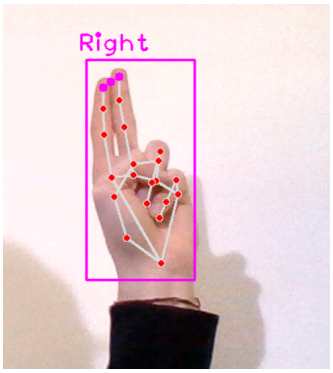
HAND TRACKING AND GESTURE RECOGNITION



We used the cvzone library which uses MediaPipes and Opencv libraries to detect the hand's landmarks in an image, in this case the webcam video stream, and render visual effects on them.
We focused on two key points of interest, the index and middle fingers of the hand (index 8 and 12) which,if joined shortly, produce a click on the video stream.
Finger clicking is useful for navigating the menu or it can activate the action of picking up a piece of the puzzle.
The movement of these two points is also analyzed to be able to move the images in the game window.



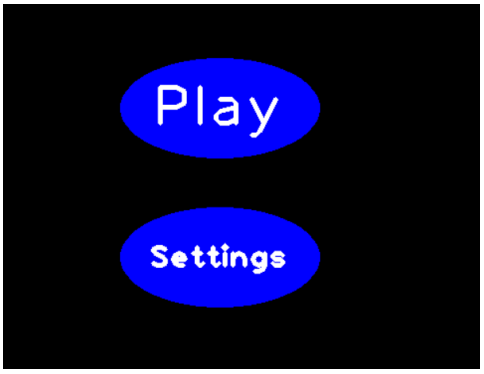
Hand at rest,nothing happens

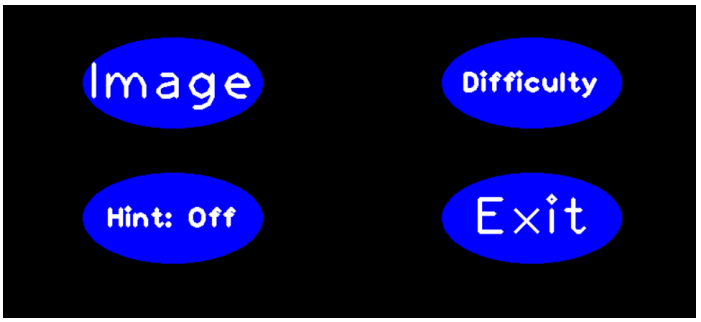


A click is detected or something is being dragged

THE MENU

The menu is composed of different buttons,some of them(like the button ”Settings”) when clicked change the buttons that are shown on screen.
By interacting with the menu the player can change some settings like difficulty or the picture to use for the puzzle.





THE PROJECT ZIP FILE

The project zip file contains:”main.py” file,”imgSplit.py” file and a “img” folder.The main.py file is the file to run to start the game and contains the code that manages the menu while imgSplit.py contains the game itself.The img folder contains the pictures that are used for the puzzle.