Assignment #1
Due on Friday, October 20, 2023 by 23h59.

Send code and reports to shaifali.parashar@gmail.com

A. Template Matching

In this problem, we will look at how to find a template pattern in a cluttered scene. In order to make it more fun we will use `Where is Waldo?' You are given a scene of an amusement park (where_is_waldo.jpg) and you must find Waldo (template1.png). Given a reference image (scene of an amusement park) and a template image (face of Waldo), iterate over all pixel locations of reference image and compare the local patch with template image using sum of square distance (SSD) metric. Display SSD for whole image. Find the location ((x; y) coordinate) where the SSD is minimum and see if you can find Waldo there! Repeat above process with the noisy template (template2.png). Do you find the same location? If not, what metric (refer to class lectures) should be beneficial for you?

Note: Do not use an existing fuction to evaluate SSD and search for the location.

B. Image Transformations

In this problem, we will look at how to use homographic transformations to manipulate images. You are given an image of a bus (bus.jpeg) with an advertisement of sprite on it. Your goal is to replace this advertisement with simpsons poster (simpsons.jpeg).

1. In order to write a homographic transformation, you will need 4 point correspondences between the two images. You can manually match the four corners of the Simpsons image to the sprite advertisement on the bus.
2. As taught in class, estimate a homographic transformation between the Simpsons image to the sprite advertisement on the bus. Apply this transformation to every pixel on the Simpsons image and show the results.

   Note: Do not use an existing function to estimate transformation or homography.

3. Repeat the step 2 by finding a transformation between bus and Simpsons image. Show your results. Are the two results identical? Are the two processes same in terms of computation? Explain, with reasoning, which of these transformations are more appropriate.

C. Panaromic Image Stitching

In this problem, we will look at how to use homographic transformations to create panaromas. You are given 3 images of Keble College, Oxford. Your goal is to combine them.

1. Manually match images to estimate transformations using 4 points. Stitch the images together to create Panaroma.

2. Use any feature matching technique of your choice to estimate transformations. You can use built-in functions to find these matches. Do you have more than 4 points? If yes, then would you rather use all available points to estimate transformations or

randomly pick 4 and apply RANSAC. You can use a built-in implementation of the RANSAC function.

Bonus: Use cylindrical projection system to get better panaroma.