DIP Hackaton 2021-2022 Instructions for participants

PLEASE READ THESE INSTRUCTION CAREFULLY!!

Task Description

1. The challenge includes segmentation of day-to-day objects from 6 different natural images.
2. For each object you will get training images. The objects are numbered from 1 to 6.
3. HOWEVER: your score will be determined by the performance of your algorithms **on different images** (of the same objects) that you do not have access to, i.e. "test images" taken by the course staff. Therefore - your algorithms must be as general as possible. Try to exploit invariant features of the objects.

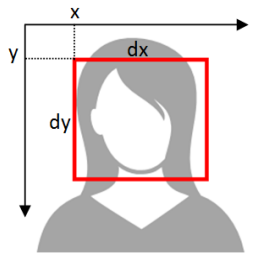
General Instructions

1. Code is in **MATLAB only!**
2. The code will be evaluated using **MATLAB 2019b**. Make sure that your code is compatible.
3. Each group is allowed to work with one laptop per student. You can divide the work among the team members as you see fit, but teamwork will be highly appreciated.
4. Note that segmentation of different objects is of varying difficulty. You have limited time to complete the task, so choose wisely which images you want to tackle first.
5. The score of each team will be presented in the main room, while each team will be in its own breakout room.
6. You are required to connect to BGU-VPN in order to participate.

Submission Instructions

1. All relevant files should be uploaded to your team's ftp folder:
    a. Connect using **ftp** to ip: 132.72.48.22. Your credentials are the same as in the 'Pre-Hackathon Exercise'.
    b. Place all code files in the "Code" sub-folder.
    c. Place one image for each object in the "Input" sub-folder. The images must be named "I$.jpg" where "$" represents the object number (e.g. the image of the 3rd object will be named "I3.jpg").
    d. Do not place any files in the "Output" sub-folder.
2. You need to submit **a separate MATLAB function for each object**. (NOT SCRIPT)
3. The name of each function must be "seg$.m" where "$" represents the object number (e.g. the function for segmenting the 3rd object will be named "seg3.m").
4. Each team may submit seg$.m files to one or more objects at once. You may update these files at any time as many times as you want.

5. You may upload auxiliary functions that support your seg$.m files to the “Code” sub-folder.
6. **The input for each function:** is a single RGB image of size MXNX3. You may **not** assume that the image is in “double” format and/or normalized to [0,1] values!
7. **The output for each function:** must be of the format **[BB, mask]**, where:
    a. BB is a **1X4 vector representing the bounding box** of segmented object. The format of the vector must be [x, y, dx, dy] of **type uint16**. See Example:



Example of bounding box format.

    b. mask is a **MXN logical matrix representing the mask of the segmented object** (i.e object pixels are ‘1’, background pixels are ‘0’). Make sure your mask is of type ‘**logical’** (and not int, double, etc.).

8. Once a file is submitted it will be automatically evaluated and the team members will receive a confirmation email with their latest results. You will also see the results of your method in the “Output” folder as computed on your submitted training example. You are encouraged to check these results and make sure that they are as expected.
9. In case of errors in your code, you will get the detailed error message in the email. You may fix the errors and re-submit the function.
10. **DO NOT DO THE FOLLOWING:**
    a. **DO NOT** open any **figures** or use any function that open figures.
    b. **DO NOT** close any **figures** of use any function that closes figures.
    c. **DO NOT** use **“clear all”** anywhere in your code or in any function used by your code.
    d. **DO NOT** use **“clc”** anywhere in your code or in any function used by your code.
    e. **DO NOT** save anything to disk anywhere in your code or in any function used by your code.
    f. **Failing to comply with these instructions will disqualify you from the Hackathon**

Evaluation Process

1. Your submission will be judged on their performance on the test images.
2. Each function you submit will be given two scores with respect to the ground truth:
    a. Jaccard distance for the bounding box accuracy: $J = \frac{|A \cap B|}{|A \cup B|}$ where A is the submitted bounding box and B is the ground truth.
    b. Dice score for the segmentation mask accuracy: $D = \frac{2|G \cap F|}{|G| + |F|}$ where G is the submitted mask and F is the ground truth.
    c. Your final score for that image will be $S_i = 0.7J + 0.3D$, or zero in case you did not submit a segmentation code.

3. The aggregate score for the entire challenge will be computed as a mean of the individual image scores, i.e. $\underline{S} = \frac{1}{6}\sum_{i=1}^{6} S_i$
4. The winning team will be the one with the highest aggregate score at the end of the event.

Images

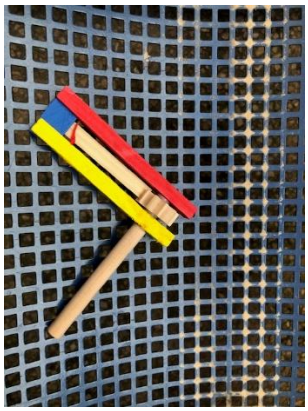
Examples of the images with their number and **rough** scale. Note that the scale, angle, lighting, etc. may be different and so the methods should be as general as possible. These are **not** the test images!

I1:

I2:

I3:

I4:



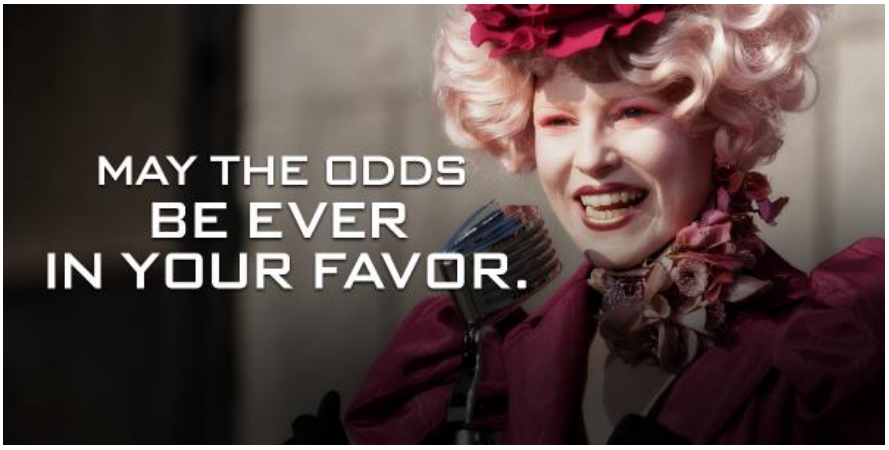
I5:

I6:

Prize

1. In addition to never-ending fame and glory, the winning team members will be awarded with a very cool prize!

...GOOD LUCK, and


MAY THE ODDS
BE EVER
IN YOUR FAVOR.