



Technical test

Part 1: Programming

The goal of this test is to assess your ability to program a simple tool.

Data

3 binary images (containing only zeros and ones):

- `binary_image_1.png`
- `binary_image_2.png`
- `binary_image_3.png`

Expected work

We expect to have a function `find_max_rectangle` that would:

- take a binary image as input.
- give as output the biggest rectangle `[xmin, ymin, xmax, ymax]` containing only ones.

Note:

- For the first example `binary_image_1.png` your algorithm should return `[71, 120, 135, 170]`
- We should be able to evaluate your programming skills, so a ready-made function won't help you.
- You can use one of the following programming languages: python, MATLAB, C++.

Evaluation

The evaluation of your work will be based on the following questions:

- Is your code clear, well structured and commented?
- Does the `find_max_rectangle` function work?
- Is the running time of the `find_max_rectangle` function acceptable?

Part 2: Computer Vision. Classification and Detection of Tomatoes

The goal of this test is to assess your ability to process training and test data, train an algorithm, and use this algorithm to construct a classification tool. You will have to recognize and detect a given food item in a collection of pictures.

Data

Training:

- 552 train images, some of them containing tomatoes.
- Box annotation localizing the tomatoes in the training images: train_database.txt
- The boxes respect the template [xmin, ymin, width, height]
- A dictionary, which maps the food_ids to the name of the food item (there is also a background class) : id2name.txt

Test:

- 2190 test images, some of them containing tomatoes.
- Box annotation localizing the different food items in the images: test_database.txt
- The boxes respect the template [xmin, ymin, width, height]

Expected work

- Training of an algorithm that will be able to classify the 2190 test images between images that contain tomatoes and images that does not.
- A small report (max 2 pages) presenting:
 - o useful metrics that you consider relevant to assess your performance regarding your algorithm.
 - o how and why you chose to use this algorithm.
 - o your choice of parameters.
 - o a small analysis of your results.
 - o the more important thing is how you came to have your results not the results themselves.
- All the codes, data that would be needed to reproduce the presented results.

BONUS (Only if you have time)

A function `find_tomatoes(im_path)` that would at least:

- Tell whether there are tomatoes in the image.
- In the positive case, find a box that would localize the tomatoes in the image.
- Display the image with the boxes.

Note:

- You can use every available open source libraries, but you should be able to explain every algorithm that you use.
- You can even use additional data if you want to.
- You can use one of the following programming language: python, MATLAB, C++.

Evaluation

The evaluation of your work will be based on the following questions:

- Is the choice of your algorithm and its parameters relevant for this task?
- Is your justification of this choice relevant?
- Is your code clear, well structured and commented?
- Does your algorithms perform relatively well?
- Are the presented results reproducible? (We should be able to run your code on my computer and achieve the same results that you present in your report).
- Does the `find_tomatoes` function work?

Good Luck !