Report:

The solution consists of two main parts:

1. Locating circles in the image.

2. Identify which of the circles is the special ball.

The first part uses HoughTransform for circuits, when a process of trial and error is made until the various parameters used as parameters for this function are determined.

The second part uses an SVC type machine learning model which was learned on the 15 images we received in the task plus various augmentations, using this model we can classify each circle in the image and give it a score if it is the circle that surrounds the circle. We will choose the circles that have a significant chance of being the balls from the rest of the balls.

For each circle that is finally selected, its distance from the camera eye is calculated, when the radius of the sphere in reality is 10 and the focal length is 800.

After that, we will draw on the image all the circles we identified as balls and write the image to disk so that its name also contains the distances of each ball in the image from the camera eye.

The total time it took to detect the ball and calculate the distance for all 15 images is: 18.6 seconds for 10 tests.

It is important to note that the measurement was performed for the central function: mark\_balls().

The depth estimation for each image:

MVC-001F.JPG: 127

MVC-002FJPG: 296

MVC-003F.JPG: 211

MVC-004F.JPG: 250

MVC-005F.JPG: 167

MVC-006F.JPG: 195

MVC-007F.JPG: 258, 250

MVC-008F.JPG: 143

MVC-009F.JPG: 160

MVC-010F.JPG: 129

MVC-011F.JPG: 216

MVC-012FJPG: not found

MVC-013F.JPG: 190

MVC-014F.JPG: 250

MVC-015F.JPG: 200, 205