Sensory Robotics - depth camera

Image segmentation with depth image

Goals:

With the help of Intel RealSense d435i camera system: segmentation of RGB images on the basis of their appropriate depth image-pairs.

Short description of the exercise:

Software environment: Python
Tools to use during this lab:

- Intel RealSense d435i camera system.

There are multiple ways how depth cameras can work (even in the laboratory we have more types of them). For a good comprehension of the types, please read the following post carefully:
https://www.intelrealsense.com/beginners-guide-to-depth/

The system is capable of registering/creating an RGB and a depth image, see Fig. 1.

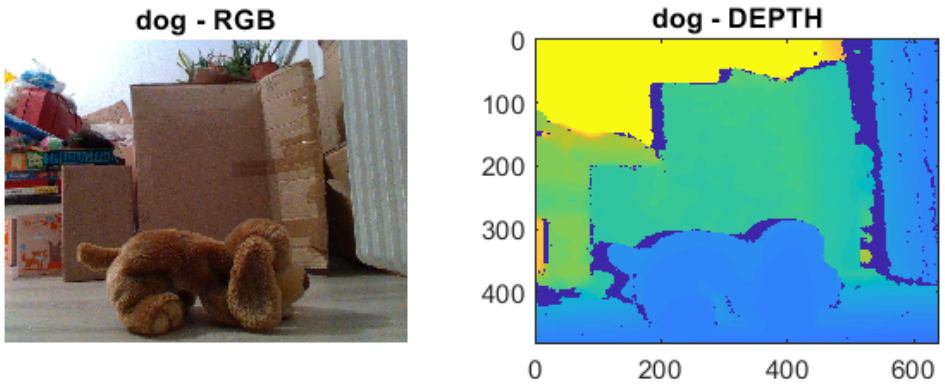

Figure 1: visualized sample images, captured simultaneously.

Description of the measurement:

During the measurement, you have to produce two pairs of images:

- in one RGB+depth pair: it should capture an empty scene, in the further away third: one of you should stand,
- in the other RGB+depth pair: the same empty scene, but with a chair in the center/closer region of the image.

The task: combine the two RGB images on the basis of their corresponding depth images, in the way that the chair should hide a part of the standing person.

Examplary image-pairs can be seen in Fig. 2 (with two different chairs).

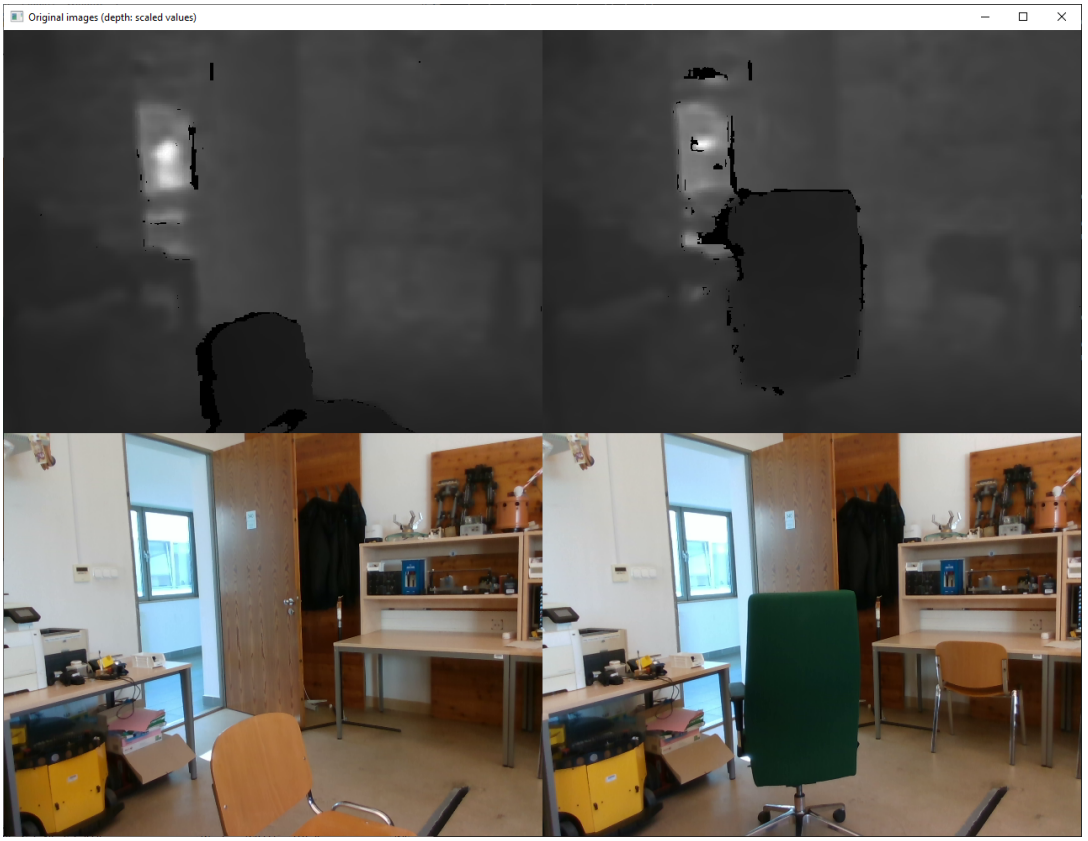

Figure 2: examplary image-pairs.

The result of the simplest image fusing can be seen in Fig. 3 – *plese do a more elaborated solution*!

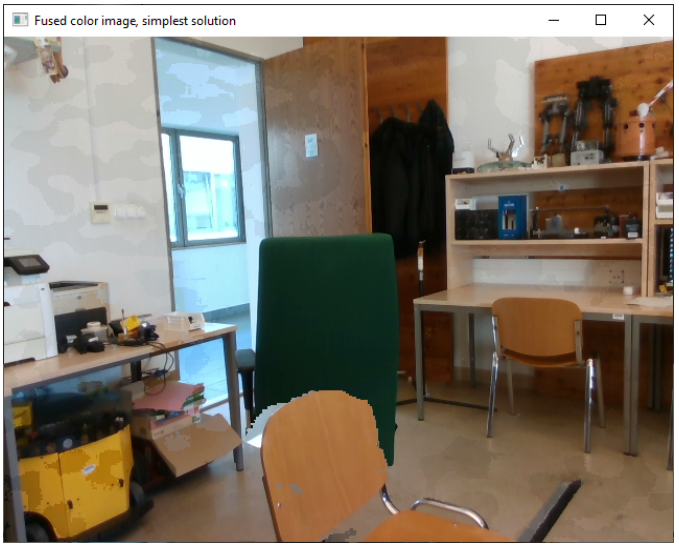

Figure 3: the result of the simplest image fusing – you can observe multiple errors in the resulted image.

Available source-codes:

Already given:

- **`modified_align_depth2color.py:`** a script initializing the camera, and showing the RGB and depth streams continuously. Please carefully read and understand what is inside this code. Feel free to ask any question. Pressing key '**`c`**' you can record the current RGB+depth pair of images as **`.npy`** arrays.

Please prepare:

- a script: this loads your saved **`.npy`** archives, shows the raw images, then fuses them, finally showing also the fused result.

What and when to upload:

What:

- all of your modified/new source codes,
- all of your **`.npy`** files,
- your report.

Please include in the report your opinion about the measurement errors seen in the image, please try to make a more 'noise-less' combination (with standard image processing routines).

Deadline: indicated in moodle.

Thank you.
Miklós