

# TNM087 – Image Processing and Analysis

## Lab 1 –Intensity Transformations

### Task 3 - Intensity-level slicing in RGB+IR imaging

Intensity-level slicing is a type of intensity transformation, which can be used to highlight a specific range of intensity values in an image. In this task you will implement a form of intensity slicing by combining two different images: an RGB color image and the corresponding infra-red (IR) image. IR-images captures electromagnetic radiation in the infra-red band (i.e. longer wavelengths compared to the visible spectrum) and can be used for thermal imaging, capturing the difference in temperature. By combining the IR image with a conventional color image, you will select a specific range of intensity levels in the IR images (corresponding to a temperature range), and mask out the corresponding areas in the RGB-image.

#### Task:

Implement intensity-level slicing for an RGB-image, with the intensity range defined in an IR-image. The range of intensity values will be selected interactively from the IR-image. Modify the provided m-file: 'LevelSlicing.m'

```
function [RGB_Range, IR_Select] = LevelSlicing ( RGB_Image, IR_Image,  
LevelRange)
```

**RGB\_Image:** Is the input RGB color image, which can be of type `uint8` or `double`.

**IR\_Image:** Is the input IR image, which can be of type `uint8`, `uint16` or `double`.

**LevelRange:** Is a parameter that defines the range of intensity levels to select in the IR image, defined in % of total intensity range. (For example: if you select a pixel with the intensity 0.7 in the IR image, and `LevelRange` is set to 10%: the intensity range 0.65-0.75 should be selected).

**RGB\_Range:** Is the output RGB image of type `double`, displaying the selected intensity range.

**IR\_Select:** Is the output RGB image of type `double`, displaying the position of the selected pixel in the IR-image.

Use the images 'RGBflower' and the corresponding IR-Image 'IRflower'. Note that the IR-image is a 16-bit image in the data format `uint16`, i.e. in the range [0, 65535].

1. Select a pixel from the IR-image having the intensity value (temperature) of interest. The function `ginput` is used to display the image and interactively select the reference pixel.
2. Compute the intensity-level range in the IR-image, using the value for the selected pixel and the parameter `LevelRange`.
3. Create a mask (a binary image) including only the specific intensity range in the IR image, and
4. Use the mask to mask out the areas in the RGB-image that lies within the specifies IR-range. Note that the resulting RGB-image should not be binary, but contain full color information within the selected intensity-level range.
5. Display the IR-image with the position of the selected pixel marked in red. You may use a cross or a small square to mark the pixel. A single red pixel will be difficult to see in the image, so make sure to use at least 5x5 pixels if you use a square.