

LAB: Color Image Segmentation

Detect Face Temperature from IR(Infra-Red) images

I. Introduction

In this lab, you are required to create a simple program that detects the temperature of a person wearing a mask. You will be given a video of IR images of several people measuring their face temperature. Measure the maximum and average temperature of the face (excluding the mask) and show a warning sign if the average temperature is above 38.0 C.

We will not use any deep learning or any other complex algorithms. Just use simple image processing methods such as :

- InRange, Morphology, Filtering, findContour
- Refer to [Tutorial: Color Image Segmentation] for programming tips

Download the source Video file: [Click here](#)



II. Procedure

Part 1. Face Segmentation excluding mask

Segmentation using InRange()

- Recommended to use the program code given in [Tutorial:color segemtation]
- Analyze the color space of the raw image. You can use either RGB or HSV space
- Apply necessary pre-processing, such as filtering.

Image Processing with Deep Learning

- By using `InRange()`, segment the area of ROI: exposed skin (face and neck) that are not covered by cloth and mask. You must use `inRange` of all 3-channels of the color image.
- Apply post-processing such as morphology to enhance the object segmentation.
- Use `findContours()` to detect all the connected objects
- Select only the proper contour around the face. (Hint: can use the contour area)
- Then, draw the final contour and a box using `drawContours()`, `boundingRect()`, `rectangle()`
- Need to show example results of each process.

Part 2. Temperature Measurement

Temperature from Intensity data

The intensity value of the image is the temperature data scaled within the pre-defined temperature range. Use the intensity value to estimate the temperature.

- Analyze the intensity values(grayscale, 0-255) of the given image.
- The actual temperature for this lab is ranged from 25($I=0$) to 40 C ($I=255$).



- Estimate the (1) maximum temperature and (2) average temperature within ONLY the segmented area (Contour Area)

Image Processing with Deep Learning

- For average temperature, use the data within the **Top 5%** of the temperature in Descending order.
 - ✓ Hint: `cv::sort()` in `SORT_DESCENDING`
- Show the result as TEXT on the final output image.
 - ✓ Hint: `cv::putText()`
- Your final output should be similar to result of the the Demo_Video.

III. Report and Demo Video

You are required to write a concise lab report and submit the program files and the demo video.

Lab Report:

- Show what you have done with concise explanations and example results of each necessary process
- In the appendix, show your source code.
- Submit in both PDF and original file (*.docx etc)
- No need to print out. Only the On-Line submission.

Demo Video:

- Create a demo video
- Submit in Hisnet

Source Code:

- Zip all the necessary source files.
- Only the source code files. Do not submit image files, project files etc.