

COMP3317 Computer Vision

Department of Computer Science

Assignment 2: *Feature Detection*

Deadline: 23:59, Mar 10, 2021.

Task

In this assignment, you are going to implement the functions for performing (1) color-to-grayscale image conversion and (2) corner detection. To guide your coding, a partially completed Python program is provided to you, which provides implementations for parsing the program arguments, loading an input image, plotting the corner detection result, and loading/saving the detected corners from/to a file. In completing this assignment, you only need to modify the following functions: `rgb2gray()`, `smooth1D()`, `smooth2D()` and `harris()`. Please refer to the tutorial notes as well as the comments in the source code for details of these functions.

Requirements

Your implementation should:

- ☐ Use the formula for the Y-channel of the YIQ model in performing the color-to-grayscale image conversion.
- ☐ Compute I_x and I_y correctly by finite differences.
- ☐ Construct images of I_x^2 , I_y^2 , and $I_x I_y$ correctly.
- ☐ Compute a proper filter size for a Gaussian filter based on its sigma value.
- ☐ Construct a proper 1D Gaussian filter.
- ☐ Smooth a 2D image by convolving it with two 1D Gaussian filters.
- ☐ Handle the image border using partial filters in smoothing.
- ☐ Construct an image of the corneriness function R correctly.
- ☐ Identify potential corners at local maxima in the image of the corneriness function R .
- ☐ Compute the corneriness value and coordinates of the potential corners up to sub-pixel accuracy by quadratic approximation.
- ☐ Use the threshold value to identify strong corners for output.

You can compare your result against the sample output for checking the correctness of your program.

Submission

Points to note when submitting your assignment:

- You should include a `readme.txt` file describing the features you have implemented, especially when you have turned in a partially finished implementation.
- Pack your source code `assign2.py` and the `readme.txt` into a zip file, and submit it through Moodle.
- No late submission will be accepted.

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