Mathematisch-Naturwissenschaftliche
Fakultät

Fachbereich Informatik
Arbeitsbereich Visual Computing

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# Bildverarbeitung I (Prof. Schilling)
## WS 2022/2023

### Assignment 6

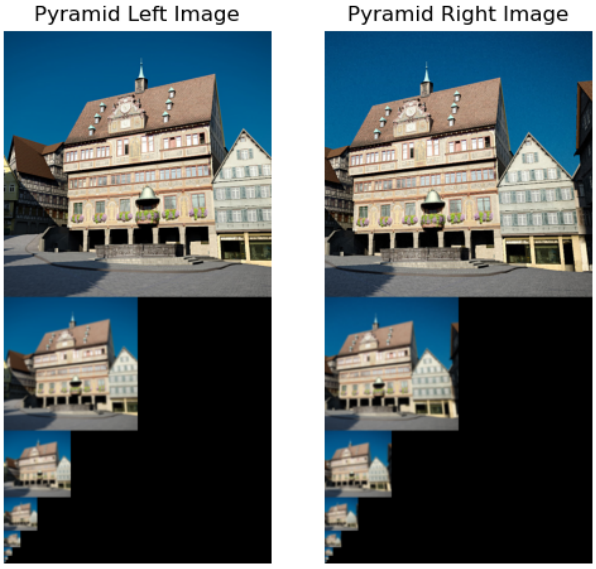
## Remarks

Please submit your exercises in ILIAS before 23:55 on the closing date. At least one member of the group must be present at our biweekly tutorial, beeing prepared to explain *each* exercise. Random groups will be asked to present their solutions.

### Exercise 12: Multiscale Image Alignment [8 points]

In this exercise you are going to align two images efficiently using a recursive multiscale approach to calculate the necessary transformation (in this case only translation). Please insert your code in the provided file `exercise_12.py`.

a) Gaussian pyramid [2 points]: Complete the function `gaussian_pyramid`, that generates a Gaussian pyramid for a given image and returns all of the pyramid levels in a `list`. *Hint:* You may use the function `gauss_filter` defined in `utils.py` to apply a low pass filter. Set this function's arguments `stride_x`=2 and `stride_y`=2 to obtain an image that is already subsampled.



b) Image Translation [3 points]: Complete the function `compute_translation` that calculates the optimal translation between two images, in a way similar to bisection, using their image pyramids. You have to start at the second-lowest level (the level where the shape is $2 \times 2$ for a square-image) and use an appropriate error metric (e.g., mean absolute error).

c) Image Blending [3 points]: Complete the function `blend_images` that stitches two images together using a given transformation. Note that the overlapping area should be the average of both images.