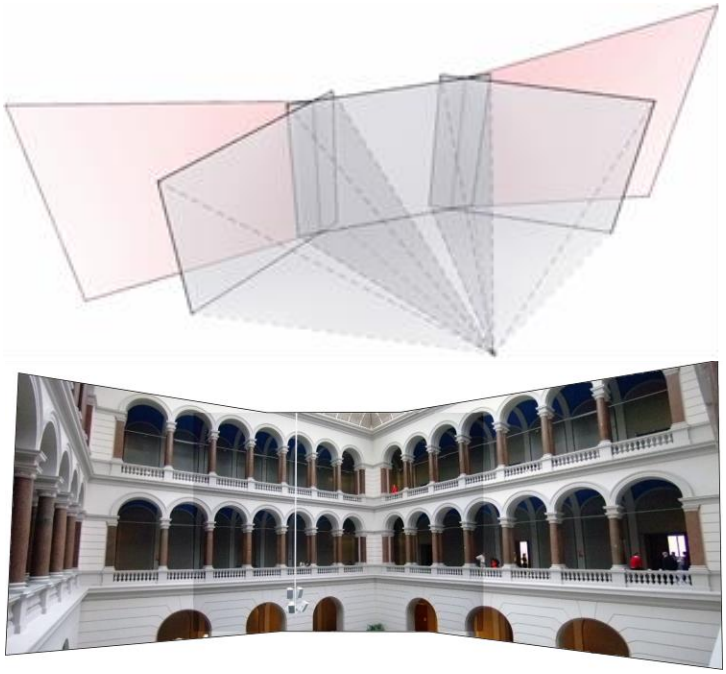
Photogrammetric Computer Vision
Assignment 2

Winter Semester 20/21

Submission Deadline: 29.11.20 13:30 pm

III. Projective Transformation (Homography)

In this exercise, a fundamental *projective transformation* should be realized. The task consists of rectifying images geometrically and stitching them together, so that a *panoramic image mosaic* is generated.



1. **Image acquisition:** Take pictures with a digital camera, which *overlap at least 30 percent in horizontal direction*. Produce thereby *three images without disparities* (i.e. turn around the projection center or choose a planar object).

2. **Correspondence analysis:** Transfer the three images into the computer (`imread`) and measure *interactively* (`figure, imshow, ginput`) at least *four corresponding image points* $\mathbf{x} \leftrightarrow \mathbf{x}'$ between two neighboring images.

3. **Homography computation:** Implement an own function in MATLAB to estimate a 2D homography using the singular value decomposition (`mean, abs, svd, reshape`). Compute the homography matrix $\mathbf{H}_{12}$ from first to second image.

4. **Projective rectification:** Use the provided auxiliary program `geokor.m` and the estimated homography to *adapt* the first image to the second one (`geokor` *combines* the respective frames to a common mosaic image). Then, compute the homography $\mathbf{H}_{32}$ from third image to the intermediate mosaic image and stitch them together.

5. **Visualization:** Show the produced panoramic image on the screen.

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