Università della Svizzera italiana

Faculty of Informatics

Computer Vision & Pattern Recognition

Spring 2023

Project, Part 1

May 4, 2023

Problem 1 [15 points]

Consider the pixel image A "`house1.png`" (you can find it on iCorsi) and write a program for rectifying the house front that contains the red window and the blue door affinely. Following the lecture, this amounts to the following tasks:

1. Identify at least two sets of parallel lines in this house front (e.g., the top edge of the window and the door, the bottom edge of the window, and the bottom edge of the house form a set of three parallel lines). You can use the Hough transform to identify lines, or any other means to get the coordinates of specific points on those lines. ~~If you do not manage to do this, you can read off the coordinates of those points manually (but this will give less points).~~
2. Compute the intersection points of these sets of parallel lines (ideally, all parallel lines from one set intersect in a common point, but due to inaccuracies in the determination of the line coordinates, they may intersect in different points; in that case, find the intersection point by using a simple least squares method, i.e., find the point that is closest to all different intersection points).
3. Map back the line that connects the intersection points (if you take more than two sets of parallel lines, you may again have to find the best-fitting line to the intersection points) to the line at infinity and apply this transformation to the given image, resulting in an image B.

The *affinely rectified* image B can now be used to determine affine properties. Use this fact to figure out the area of the door, under the assumption that the area of the window is $1\mathrm{m}^2$.

Hand in your code, a short description of your solution, the result image B, and your estimate of the area of the door.

Solutions (one per team of up to 3 students) must be returned on June 16, 2023 via iCorsi