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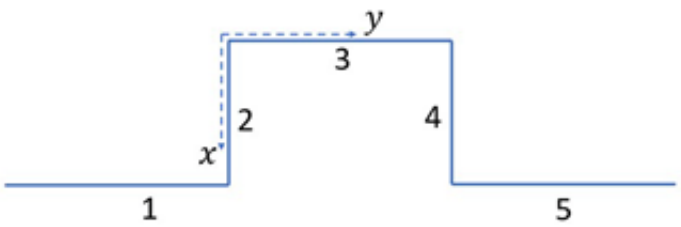
IACV Homework 2021-2022

For the homework of the ICAV course we will use the following image of Villa Melzi d'Eril :

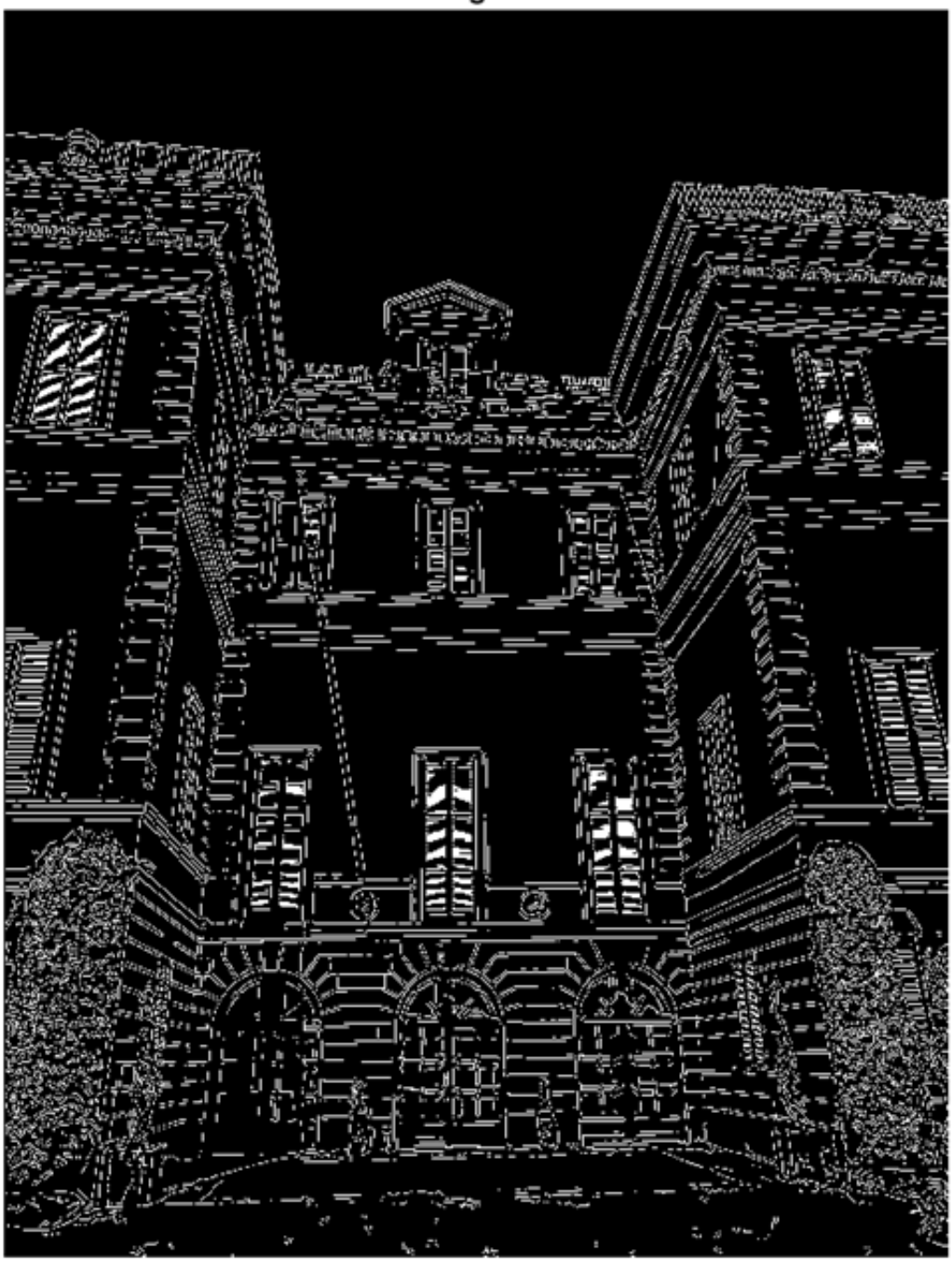
The task is to perform feature extraction in this image then , reconstruction of the horizontal section , then to find the camera calibration reconstruct the vertical facade and finally determine the between facade 3 and the camera reference where facade 3 is shown in picture:



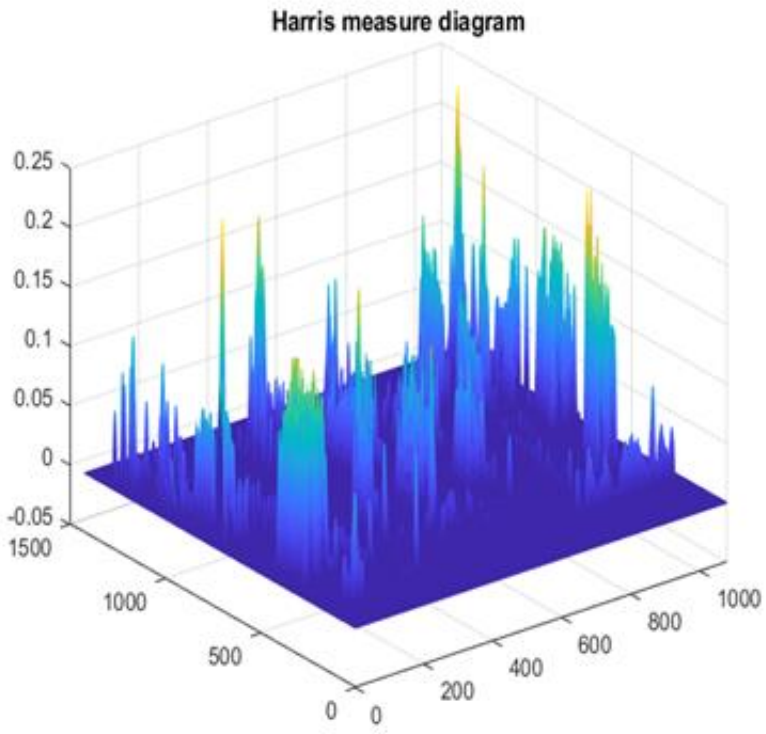
Original image in grayscale :

original image

I use the canny method for edge detection , with the following result:



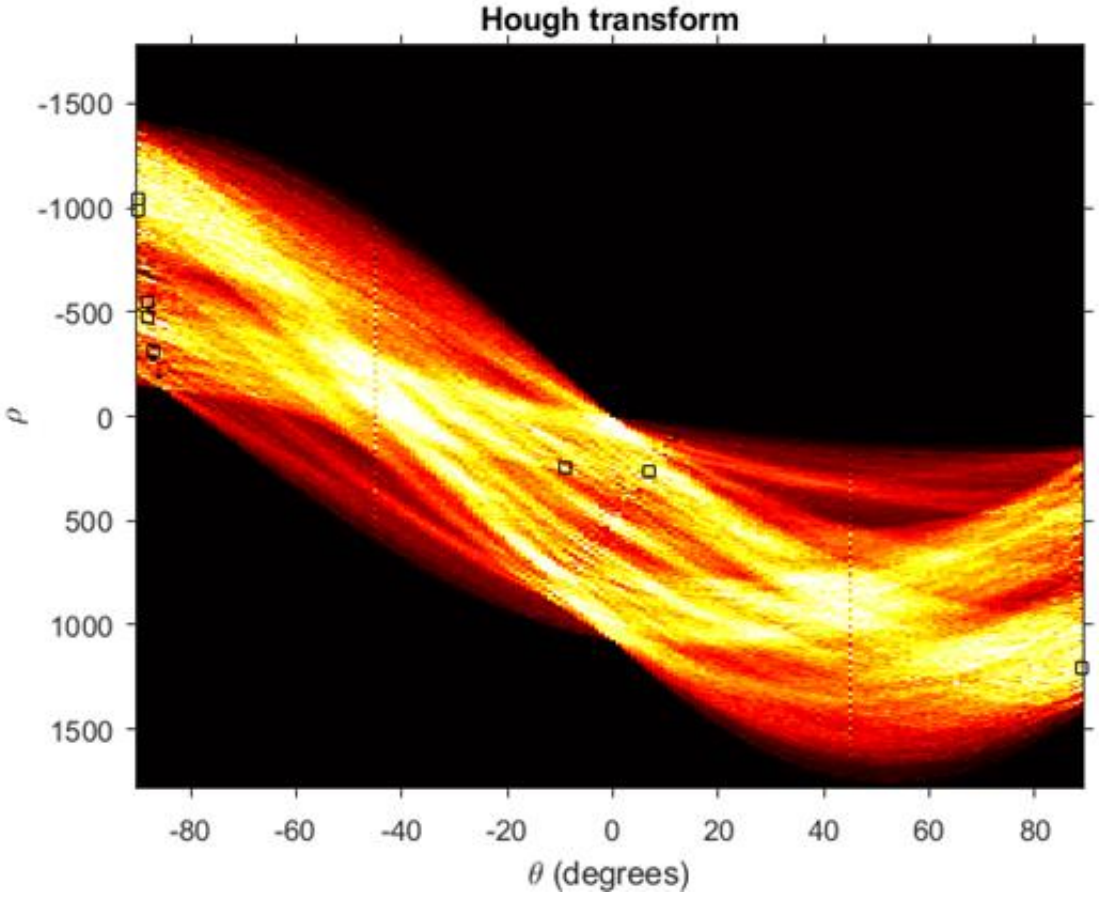
Then we compute the Harris measure and the equivalent diagram :


Harris measure diagram
0.25
0.2
0.15
0.1
0.05
0
-0.05
1500
1000
500
0
0
200
400
600
800
1000

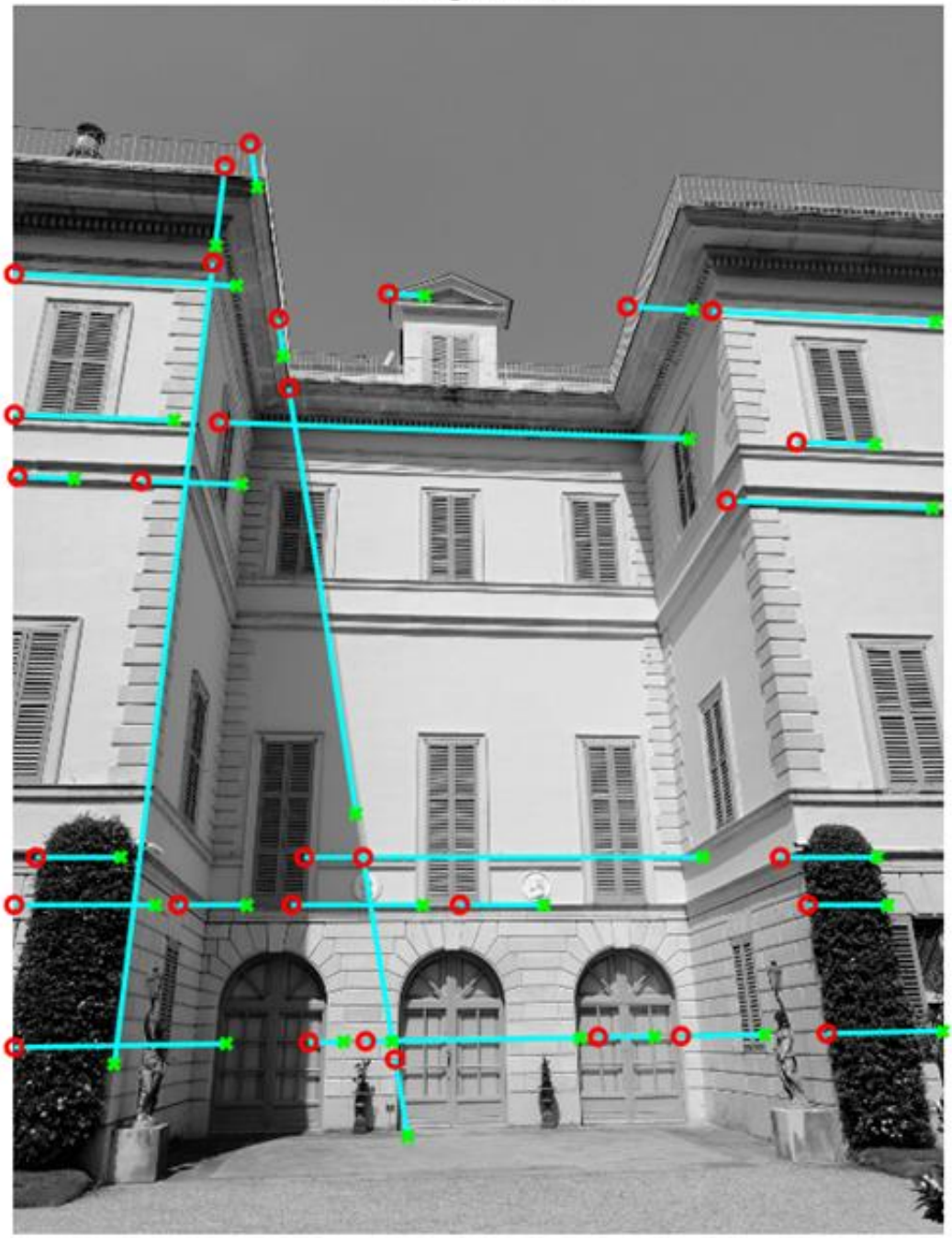
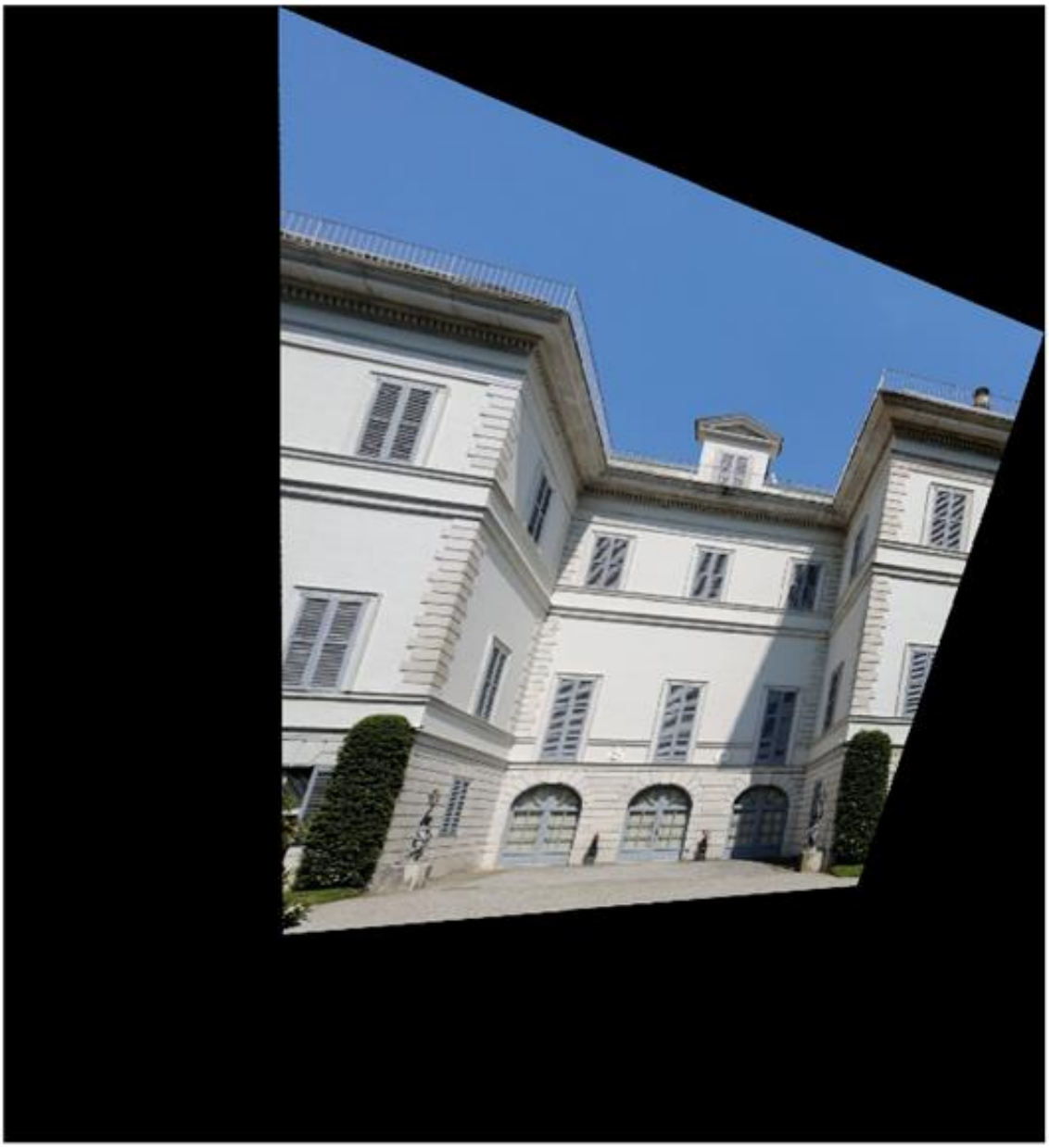
The local maxima of the Harris measure plotted on top of the image :

In here we can do the comparison of the method we used with the prebuild detectHarrisFeatures function, We can see that the prebuild function focuses mainly on the windows of the house .

Afterwards in order to extact straight lines we use the Hough transform :


Hough transform
-1500
-1000
-500
0
500
1000
1500
ρ
-80
-60
-40
-20
0
20
40
60
80
θ (degrees)

Straight Lines



Now in order to perform the affine transformation we need to , I manually select 2 pairs of parallel lines , then compute their vanishing points and then through them the affine transformation of the horizontal facade . Afterwards using that we can perform metric rectification .