

Answers to questions in

Lab 2: Edge detection & Hough transform

Name: PIETRO ALOVISI Program: CDATE

Instructions: Complete the lab according to the instructions in the notes and respond to the questions stated below. Keep the answers short and focus on what is essential. Illustrate with figures only when explicitly requested.

Good luck!

Question 1: What do you expect the results to look like and why? Compare the size of *dxtools* with the size of *tools*. Why are these sizes different?

Answers:

I was expecting that the result in *dxtools* would enhance the change in intensity only on the horizontal axis, while *dytools* would do the same but in the vertical direction. The different sizes are due to the fact that when we convolve we lose the pixels on the edge because the convolution centered in those pixel would require to know the pixels outside the image. In my case, with a filter $\text{del} \tau x = [-1/2, 0, 1/2]$, I lose the full leftmost and rightmost columns, leading to a new image size of 256X254.

Question 2: Is it easy to find a threshold that results in thin edges? Explain why or why not!

Answers:

It is not easy using this method, because there is a trade off between the resulting thickness of the edge and the amount of edges I can detect. This is due to the fact that if I use a high threshold I get only the sharpest changes in the intensity in the image, which only take 1 or 2 pixels in the image, obtaining thin edges. But, since most of the real edges are blurred and their intensity grows as a ramp, choosing a high threshold leads to few edges detected, but if I choose a lower threshold I would get a thicker edge, because I will not filter the blurred part.

Question 3: Does smoothing the image help to find edges?

Answers:

Short answer: yes. It can help to reduce noise, and so to avoid some “fake” edges, but the most important effect is that it helps in selecting the “scale” of the edges. For example, blurring out fine details of the house in `godthem256` leads to not recognize no more the wooden tiles of the house and the leaves in the tree and bushes.

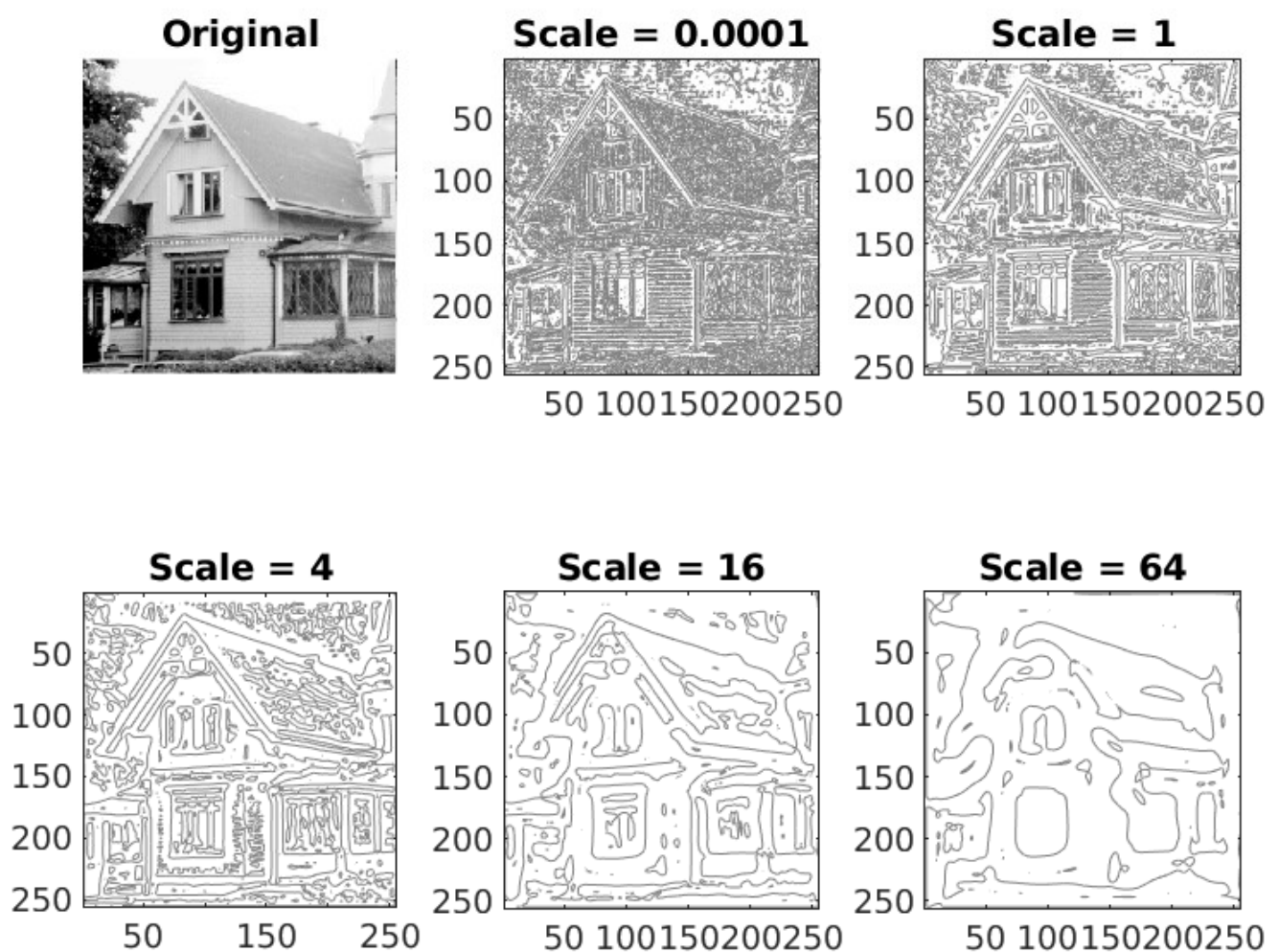
Question 4: What can you observe? Provide explanation based on the generated images.

Answers:

As I said before, the scale

Question 5: Assemble the results of the experiment above into an illustrative collage with the *subplot* command. Which are your observations and conclusions?

Answers:



Question 6: How can you use the response from *Lvv* to detect edges, and how can you improve the result by using *Lvvv*?

Answers:

Question 7: Present your best results obtained with *extractedge* for *house* and *tools*.

Answers:

Question 8: Identify the correspondences between the strongest peaks in the accumulator and line segments in the output image. Doing so convince yourself that the implementation is correct. Summarize the results of in one or more figures.

Answers:

Question 9: How do the results and computational time depend on the number of cells in the accumulator?

Answers:

Question 10: How do you propose to do this? Try out a function that you would suggest and see if it improves the results. Does it?

Answers:
