Answers to questions in

Lab 2: Edge detection & Hough transform

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**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!

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**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:





Image *tools* is 256x256 pixels whereas *dxtools* and *dytools* are 254x254 pixels. When we convolute the image with the Sobel operator, which is a 3x3 matrix, the evaluated pixel in *tools* will be the central pixel in the Sobel matrix. Therefore, we can’t evaluate the pixels on the edges of tools as we need additional pixels along the edge, see *Figure* *1*. That means that we lose either a row or column of pixels on either side of *tools*. This behavior occurs because we used ‘valid’ in the conv2() function.

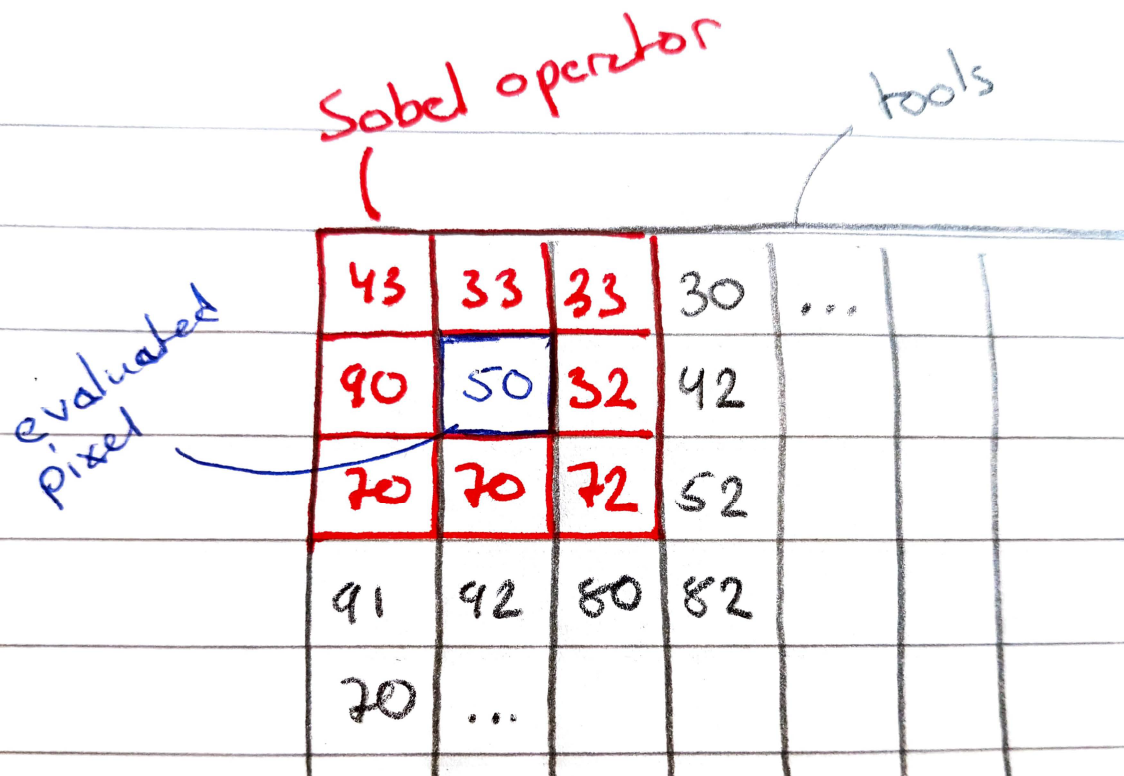


Figure 1. Sobel operator along the edge of tools

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

Answers:









Figure 3. w/ Gaussian blur

No, because an edge might vary in magnitude and thickness along its path. Therefore, there isn’t a specific threshold value that results in thin edges without removing a large chunk of the edges entirely. This magnitude and thickness difference are especially evident from the top of the roofline compared to the lower sections which are a lot thicker.

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

Answers:

Yes, because by smoothing out the edges they become more consistent and therefore easier to find. Given Figure 2 and Figure 3 for *t* values 25000 and 10000 we can see that the edges are better defined Gaussian blur been applied at the start.

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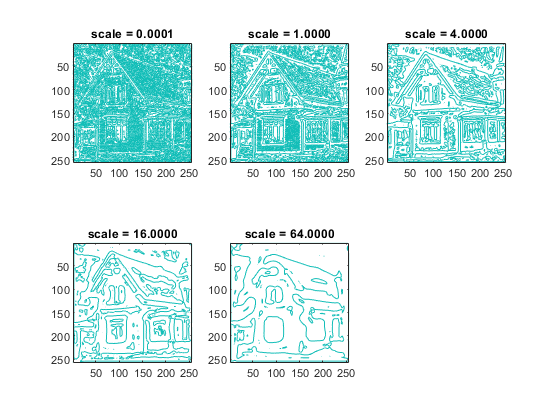
**Question 4**: What can you observe? Provide explanation based on the generated images.

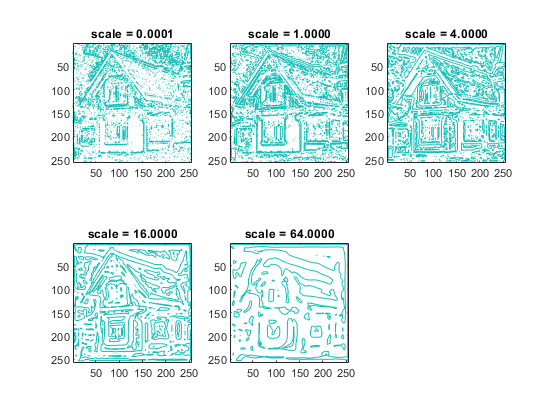
Answers:

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

Answers:







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

Answers:

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

Answers:

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**Question 8**: Identify the correspondences between the strongest peaks in the accu-mulator 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:

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

Answers:

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**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:

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