

## Homework 2 Questions

### Instructions

- 4 questions.
- Write code where appropriate.
- Feel free to include images or equations.
- Please make this document anonymous.
- **Please use only the space provided and keep the page breaks.** Please do not make new pages, nor remove pages. The document is a template to help grading.
- If you really need extra space, please use new pages at the end of the document and refer us to it in your answers.

### Questions

**Q1:** Explicitly describe image convolution: the input, the transformation, and the output. Why is it useful for computer vision?

**A1:** Your answer here.

**Q2:** What is the difference between convolution and correlation? Construct a scenario which produces a different output between both operations.

*Please use `imfilter` to experiment! Look at the 'options' parameter in MATLAB Help to learn how to switch the underlying operation from correlation to convolution.*

**A2:** Your answer here.

**Q3:** What is the difference between a high pass filter and a low pass filter in how they are constructed, and what they do to the image? Please provide example kernels and output images.

**A3:** Your answer here.

**Q4:** How does computation time vary with filter sizes from  $3 \times 3$  to  $15 \times 15$  (for all odd and square sizes), and with image sizes from 0.25 MPix to 8 MPix (choose your own intervals)? Measure both using *imfilter* to produce a matrix of values. Use the *imresize* function to vary the size of an image. Use an appropriate charting function to plot your matrix of results, such as *scatter3* or *surf*.

Do the results match your expectation given the number of multiply and add operations in convolution?

See RISDance.jpg in the attached file.

**A4:** Your answer here.