Project 1 Questions

Instructions

- 4 questions.
- Write code where appropriate.
- Feel free to include images or equations.
- Please make this document anonymous.
- On upload, **Gradescope will ask you to assign question numbers to your pages**. Making each question end with a page break after your answer is a good way to ease this process.

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 scipy.ndimage.convolve and scipy.ndimage.correlate to experiment!

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 3×3 to 15×15 (for all odd and square sizes), and with image sizes from 0.25 MPix to 8 MPix (choose your own intervals)? Measure both using $scipy.ndimage.convolve$ or $scipy.ndimage.correlate$ to produce a matrix of values. Use the $skimage.transform$ module to vary the size of an image. Use an appropriate charting function to plot your matrix of results, such as $Axes3D.scatter$ or $Axes3D.plot\_surface$.

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

Image: RISDance.jpg (in the .tex directory).

A4: Your answer here.