COMP9517: Computer Vision

2024 T3 Lab 1 Specification

Maximum Marks Achievable: 2.5

This lab is **worth 2.5% of the total course mark**.

The lab must be submitted online. Instructions for submission will be posted closer to the deadline. **Deadline for submission is Week 3, Friday 27 September 2024, 18:00:00 AET.**

Objective: This lab revisits important concepts covered in the Week 1 and Week 2 lectures and aims to make you familiar with implementing specific algorithms.

Software: You are required to use OpenCV 3+ with Python 3+ and submit your code as a Jupyter notebook (see coding and submission requirements below). In the tutor consultation session this week, your tutors will give a demo of the software to be used, and you can ask any questions you may have about this lab.

Materials: The sample images to be used in this lab are available via WebCMS3.

Submission: All code and requested results are assessable after the lab. Submit your source code as a Jupyter notebook (.ipynb file) that includes all output and answers to all questions (see coding requirements at the end of this document) by the above deadline. The submission link will be announced in due time.

Task 1 (0.75 mark)

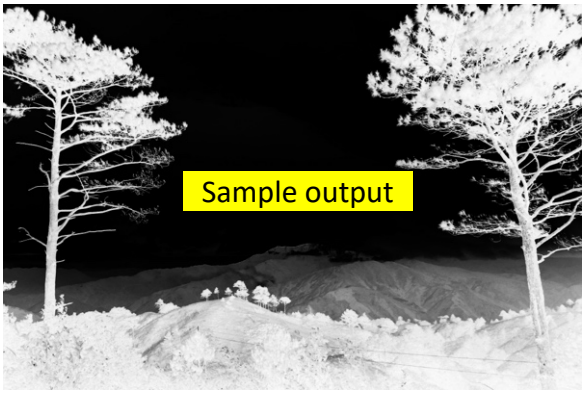
Your friend has been invited to participate in an art project called “Balance in Brightness” that involves creating and comparing images with their “antiforms”. He has captured a nice picture of dark trees against a bright sky and snowy mountains during daylight (see the picture below on the left) and he asks you to help him with his project.

The idea is to create a nighttime version of the picture, where the tree and its immediate surroundings are illuminated but the background is now dark (see the result below on the right). Use intensity inversion and gamma correction to accomplish this task.

In your notebook, display the input and the final output image side by side.

Input

Output



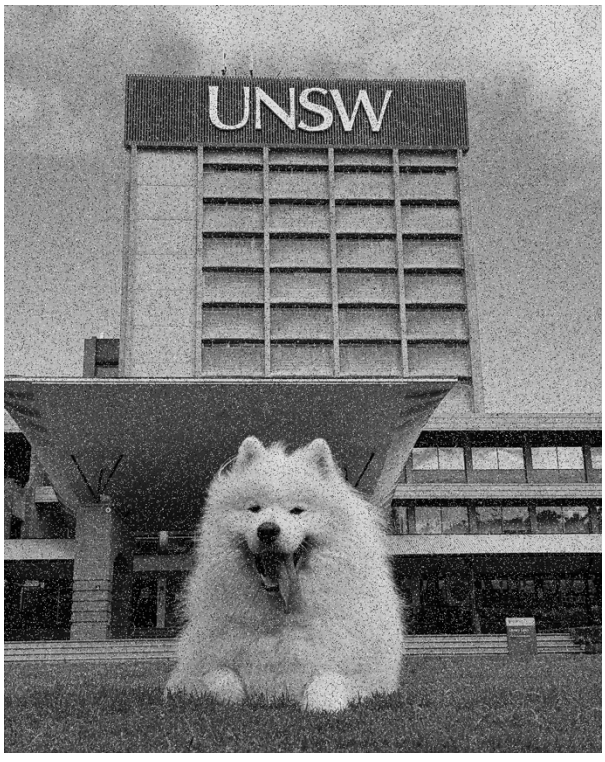
Task 2 (0.75 mark)

Your friends met Jasper at the main library last week and took a lot of pictures with him. When they returned home and looked through their photos, they saw the camera bugged out and one of the photos (see below) was very noisy. You are asked to help them restore the photo.

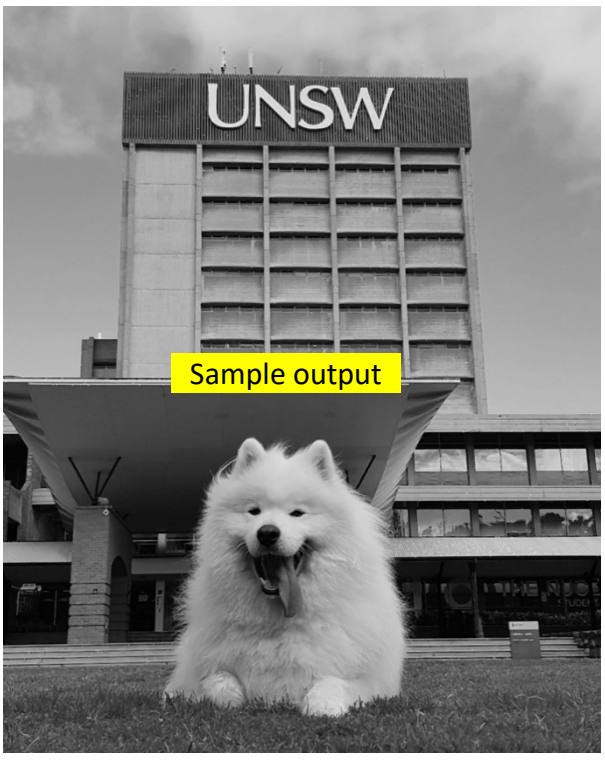
As you remember from the computer vision course, there are different filtering methods to reduce noise in images, such as mean (uniform), Gaussian, and median filtering. Experiment with these filtering methods to find out which one best reduces the noise in this photo.

In your notebook, display the noisy input photo and the corrected photo side by side, mention which filtering method you have used, and explain based on the underlying principles taught in the course why this method is the right choice.

Input



Output



Task 3 (1 mark)

Another one of your friend's vacation pictures (see below) was a bit blurred. You remember from the course that there are different methods to sharpen images, such as unsharp masking and by using the Laplacean filter, so you decide to try these out.

In your notebook, display the blurred input photo and the corrected photo side by side, mention which sharpening method you have used, and explain based on the underlying principles taught in the course why this method is the right choice.

Input

Output

Coding Requirements

Make sure that in your Jupyter notebook, the input images are readable from the location specified as an argument, and all output images and other requested results are displayed in the notebook environment. All cells in your notebook should have been executed so that the tutor/marker does not have to execute the notebook again to see the results.

Released: 16 September 2024