

Due on 25 February 2025

Computer vision - Assignment 3

1. Download the image [“moon.jpg”](#). Apply the following spatial filters to the image and compare the results by plotting the images side-by-side:
 - (a) Box filter with kernel size 9×9
 - (b) Gaussian filter
 - (c) Laplacian filter - apply the filter and display the Laplacian. Then use appropriate image addition to enhance the edges. Display the result.
 - (d) Sobel filter

What are your observations about the effects of each of these filters on the given image?

2. On the Viola-Jones algorithm (refer to the [paper](#)):
 - (a) State the main steps and features of the Viola-Jones algorithm.
 - (b) Consider an image of size 6×6 filled with integers between 0 and 7 as follows:

0	0	2	3	0	0
0	2	3	3	2	0
0	0	5	7	0	0
0	0	2	4	0	0
1	2	0	0	1	0
1	0	0	0	1	0

Make a list (and give a count) of all the rectangle features that will be calculated by the VJ algorithm for this image.

- (c) For the image in part (ii), compute the integral image and explain the comment below Figure 3 of the Viola-Jones paper.
 - (d) Use the above part to calculate the values of the rectangle features. It is recommended that you program a suitable code for this calculation.
3. The exercise set of Chapter 3 from the book by Gonzalez and Woods is [here](#). Several questions in this set have been marked in red. Solve the following problems:
 - (a) 3.23
 - (b) 3.24
 - (c) 3.46

You are encouraged to read through and think about solutions for the rest of the marked problems.