

Robot Vision Assignment 1

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Part 1

Question 1.1

The similarities and differences between passive stereo 3D coordinate measurement and active 3D coordinate measurement.

All stereo 3D coordinate measuring is used to determine the depth of a certain pixel in an image of data, but the methods used is what differentiates them into passive and active methods. Passive systems require no other sensors or light sources, whilst an active system requires additional sensor such a LIDAR which requires a laser, or some method may use external lights that aren't naturally present in the scene.

The advantage of passive systems is that they are normally smaller and cheaper compared to active system, making them ideal to be attached to small robots. Whereas due to the inclusion of the external sensors the data received from active systems is normally more precise and more detailed making them suitable for applications such as high detail archaeological object mapping and driverless cars, lidar systems which have the advantage of a 360 degrees view.

Question 1.2

The outcome of convoluting the matrix with the kernel is shown below, this is the output when it is set to be the same size as the input matrix.

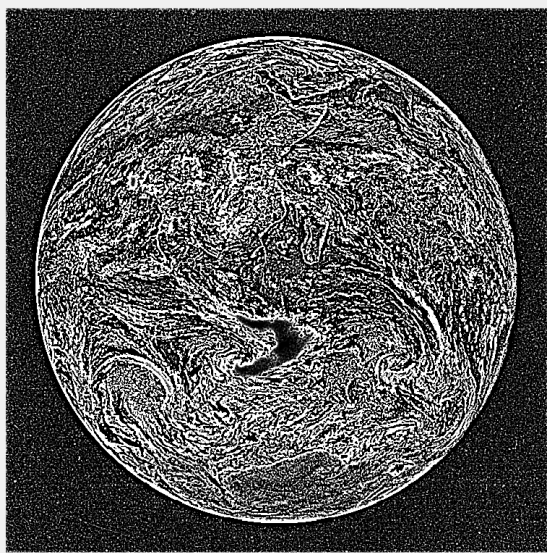
-39	368	210
-368	-228	-402
-35	74	-19

The kernel is the Laplacian kernel used in a Laplacian filter. This kernel approximates the second derivative measurement of an image. The Laplacian of an image highlights regions of rapid intensity change and is therefore often used for edge detection.

Part 2

Question 2.1

- Blue Marble



- Chicago downtown arial view

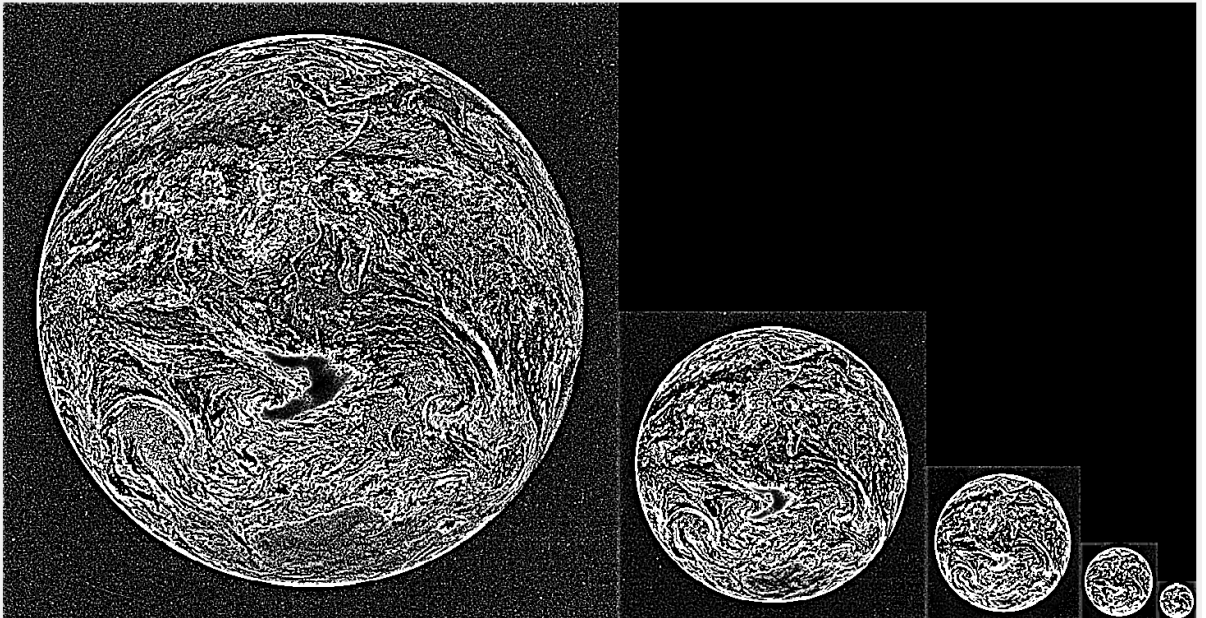


- Mallards in golden gate park

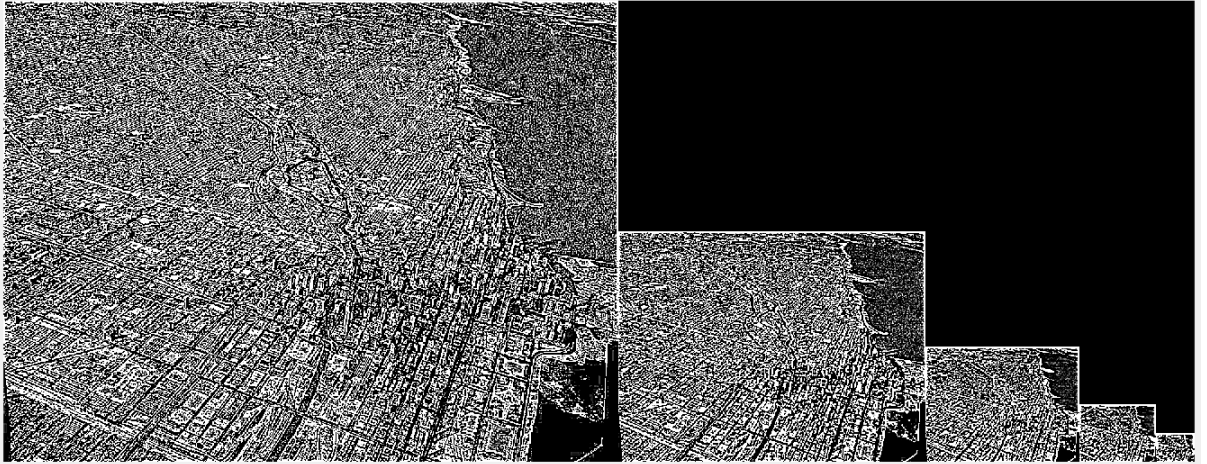


Question 2.2

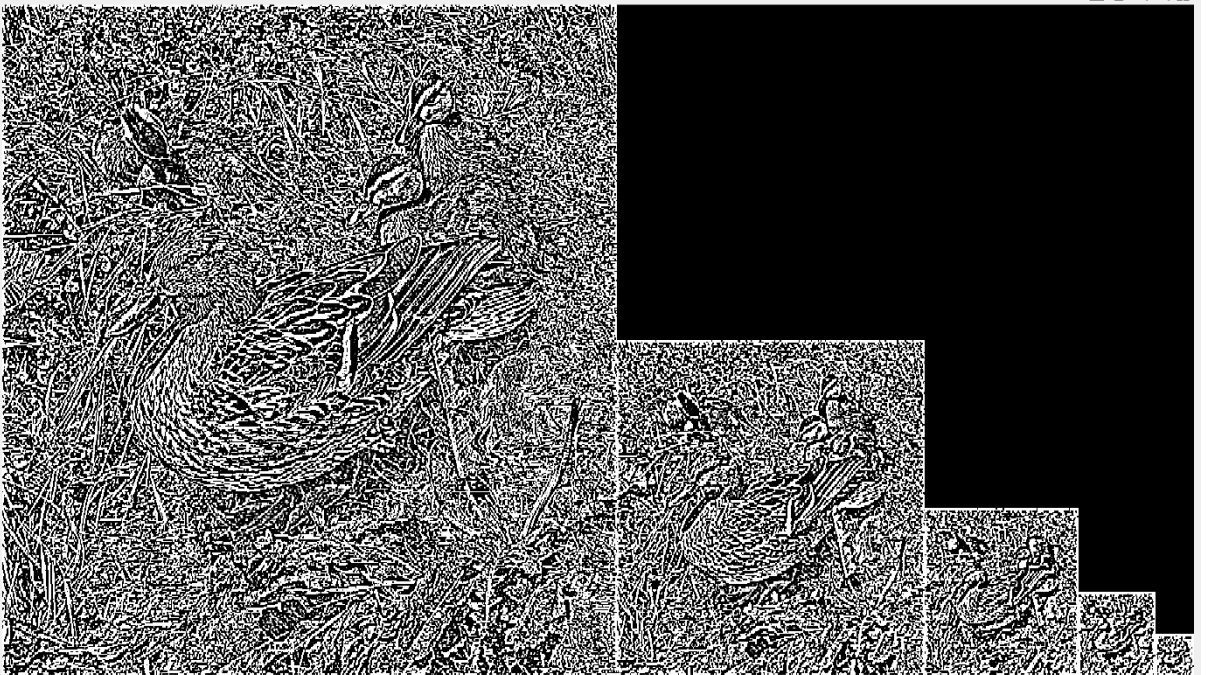
- Blue Marble



- Chicago downtown arial view



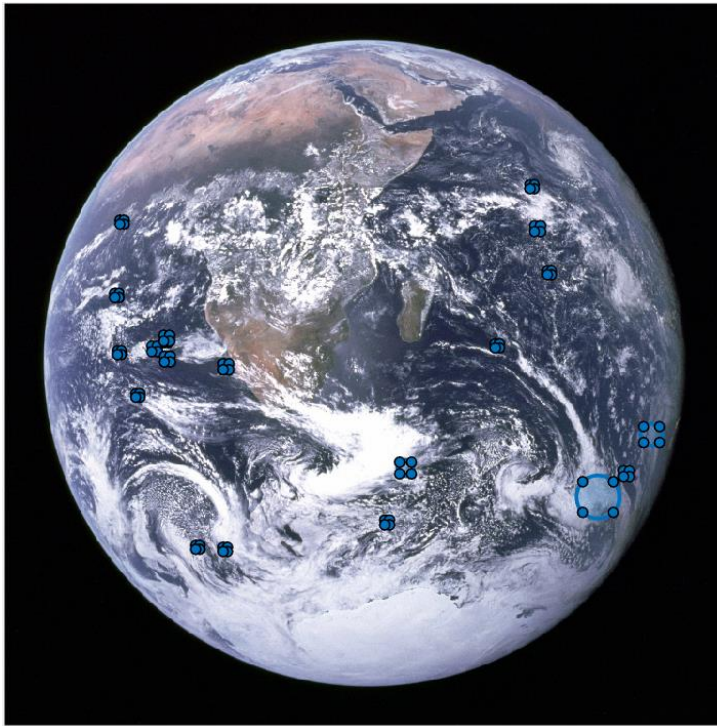
- Mallards in golden gate park



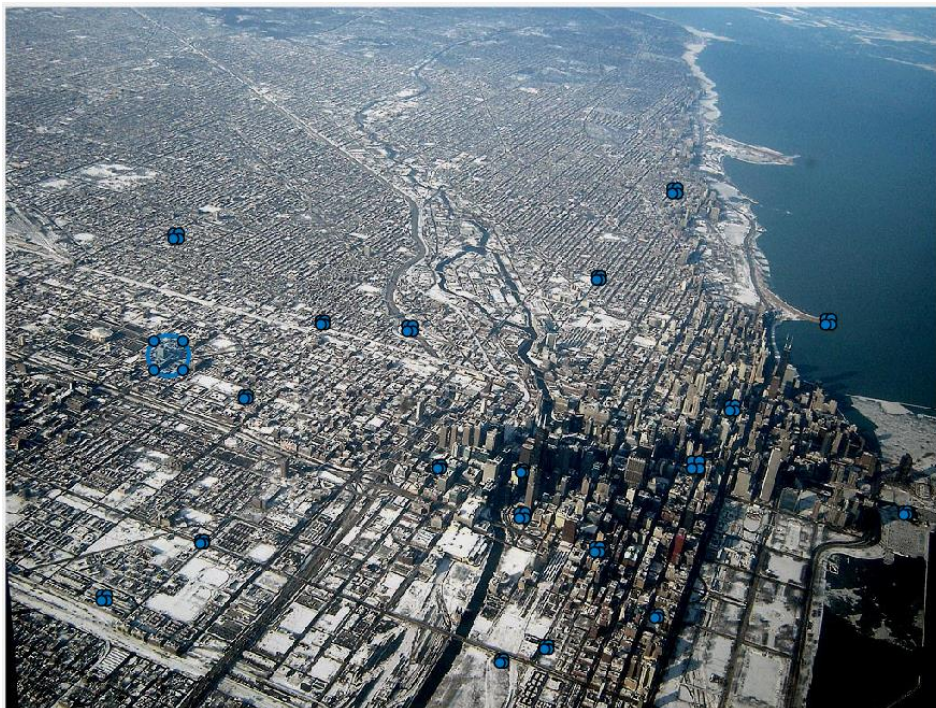
Question 2.3

The feature detection was achieved by looking for features that are shared through out the scaled images.

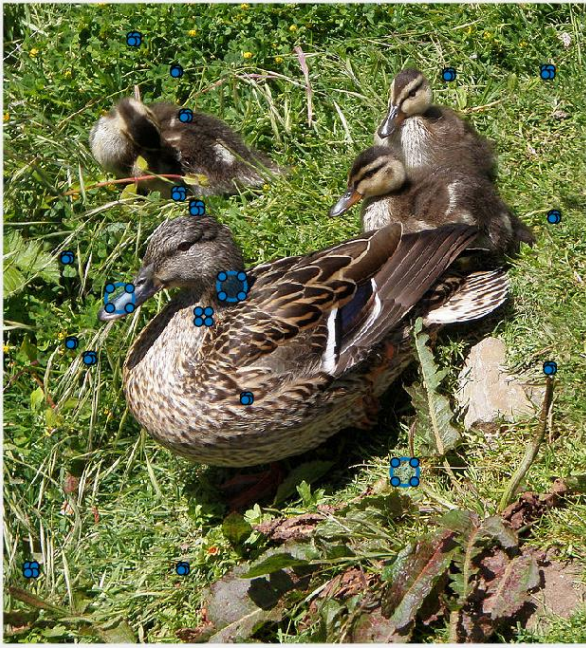
- Blue Marble



- Chicago downtown arial view



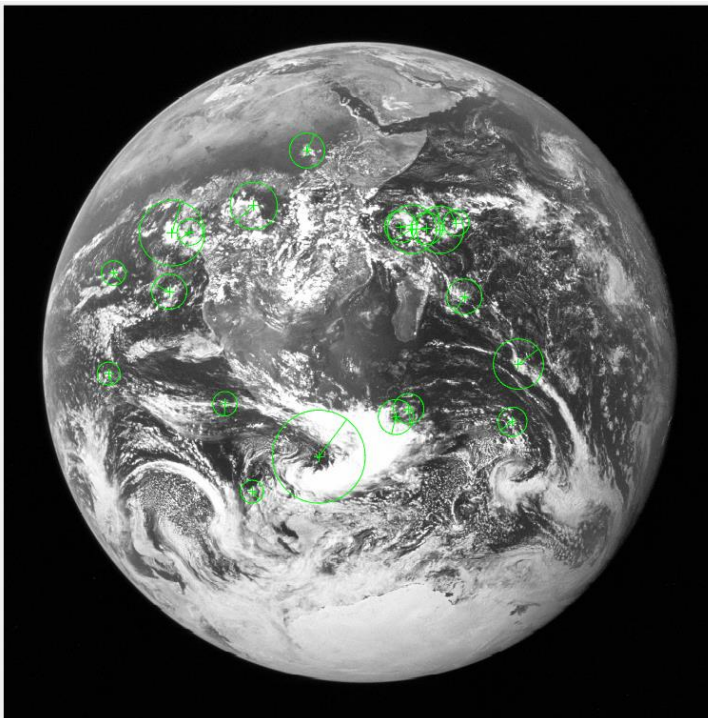
- Mallards in golden gate park



Question 2.4

Only the top 20 features are shown, this is for speed purposes.

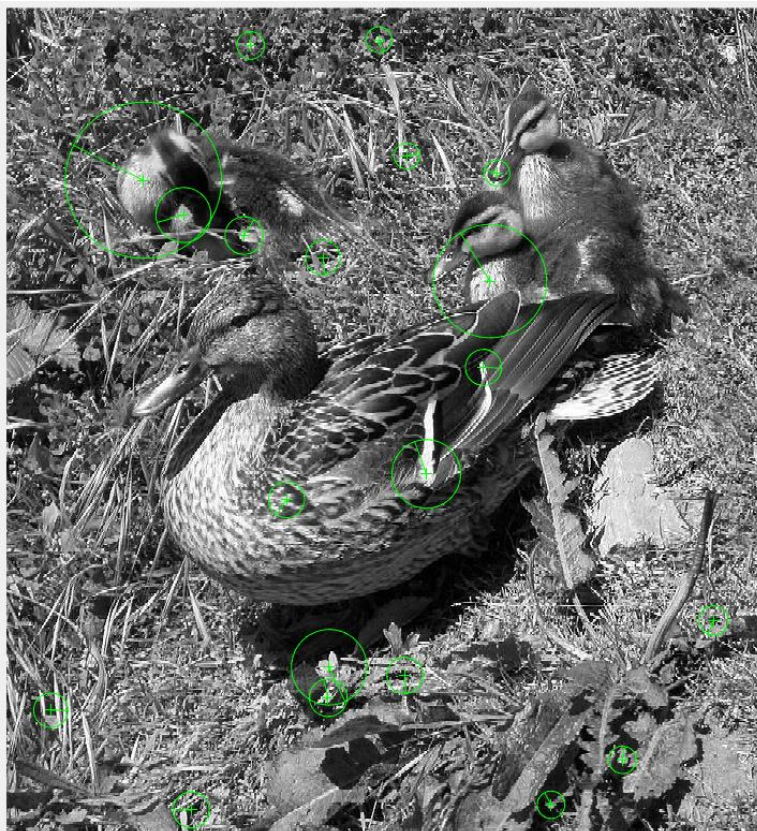
- Blue Marble



- Chicago downtown arial view

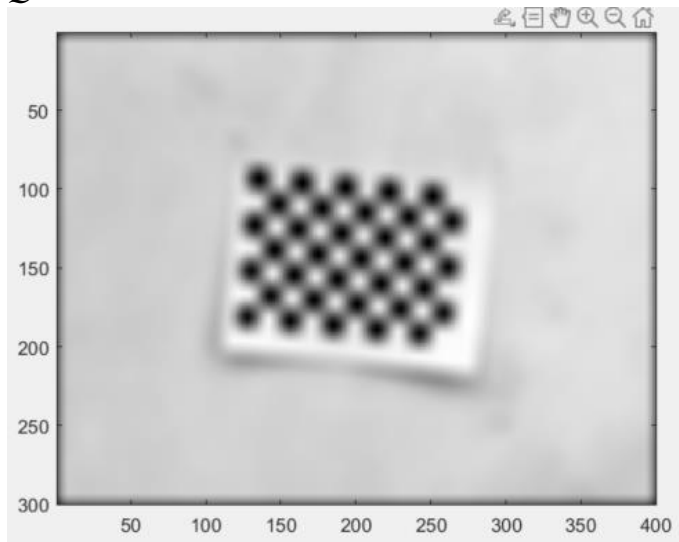


➤ Mallards in golden gate park

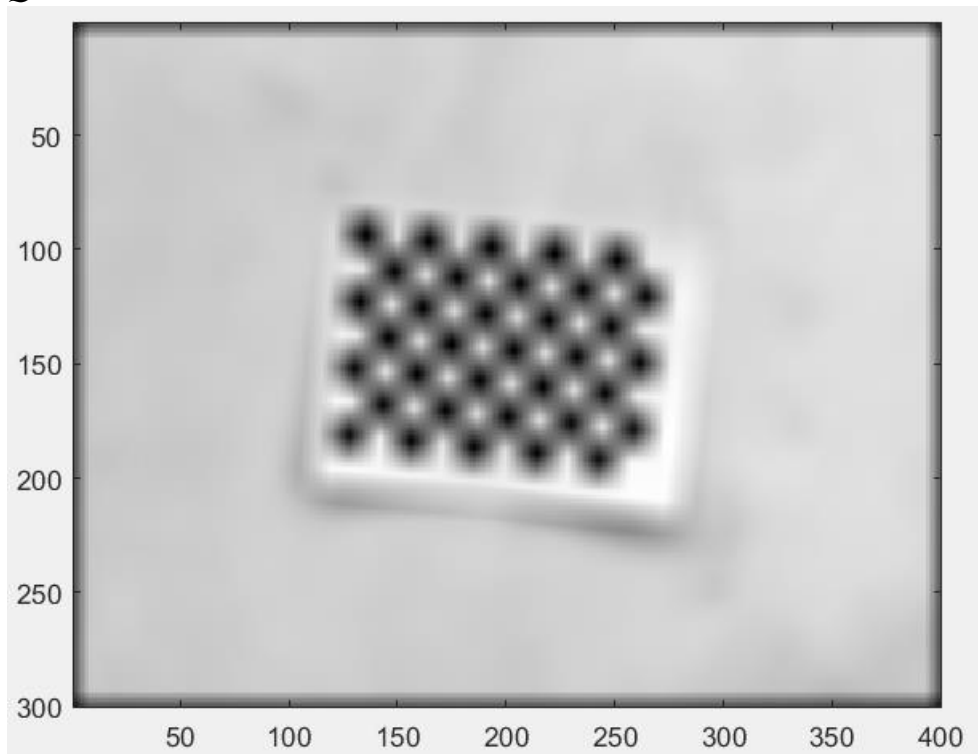


Part 3

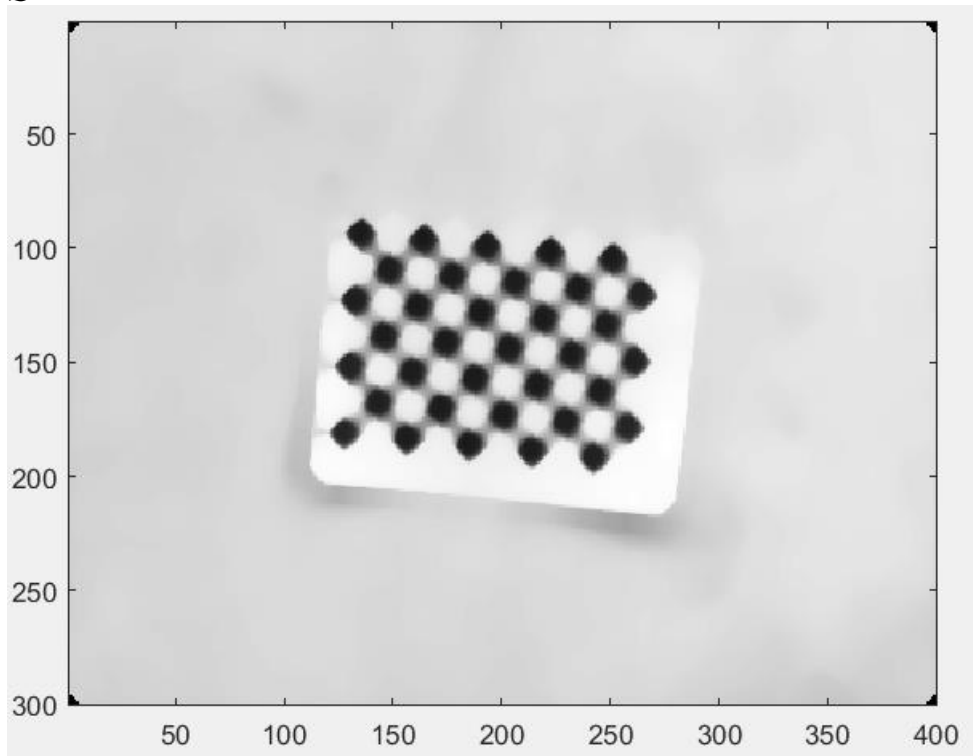
Question 3.1



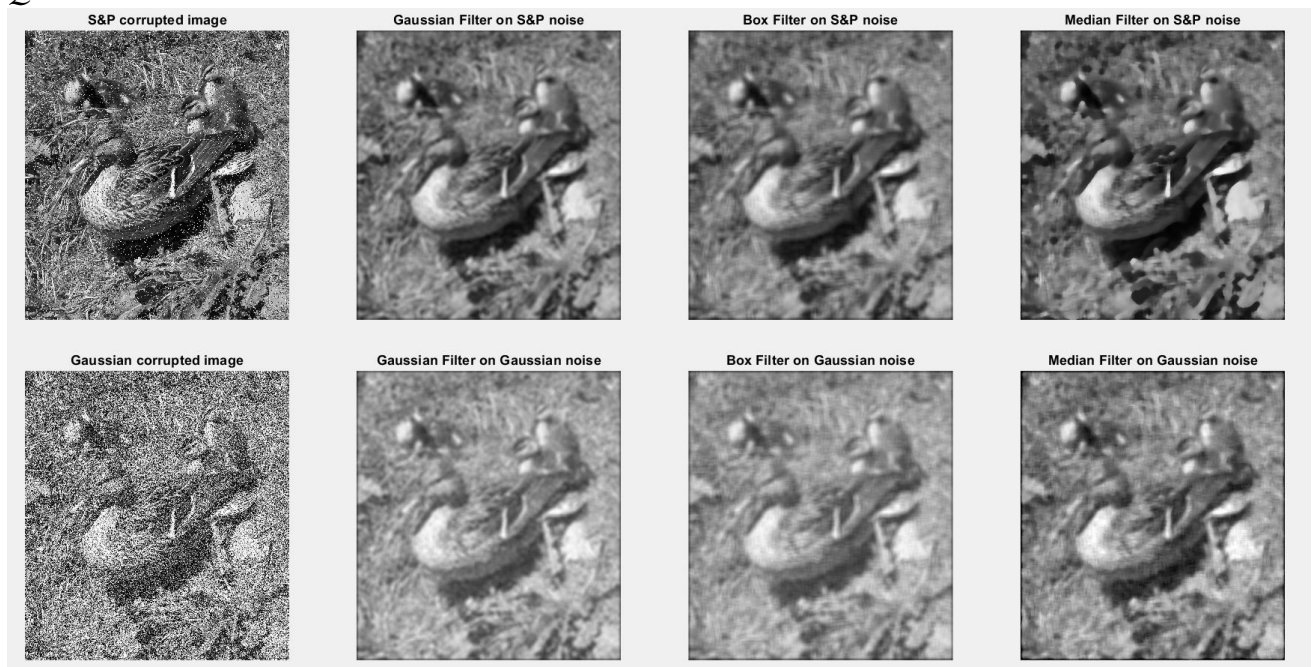
Question 3.2



Question 3.3



Question 3.4



For Salt and Pepper noise I believe that the gaussian filter works best as the noise is reduced massively but there is still detail present in the image.

The filter that performs the best on the gaussian noise is the median filter as the noise is gone but detail is still preserved

For the best for both types of noises simultaneously I would choose the box filter as it performs the best for both images.

Part 4

Question 4.1

Outcomes for each dice image

- Dice 1



- Dice 2



- Dice 3



- Dice 4

