**CPSC 425 - Assignment 1**

Eloise Peng

13812169

Sept. 24, 2019

Part 1

Q1:

functions:

A picture containing object

Description automatically generatedA screenshot of a cell phone

Description automatically generated

outputs

A screen shot of a computer

Description automatically generated

Q2:

functions:

A screenshot of a cell phone

Description automatically generated

output:

A picture containing indoor, wall

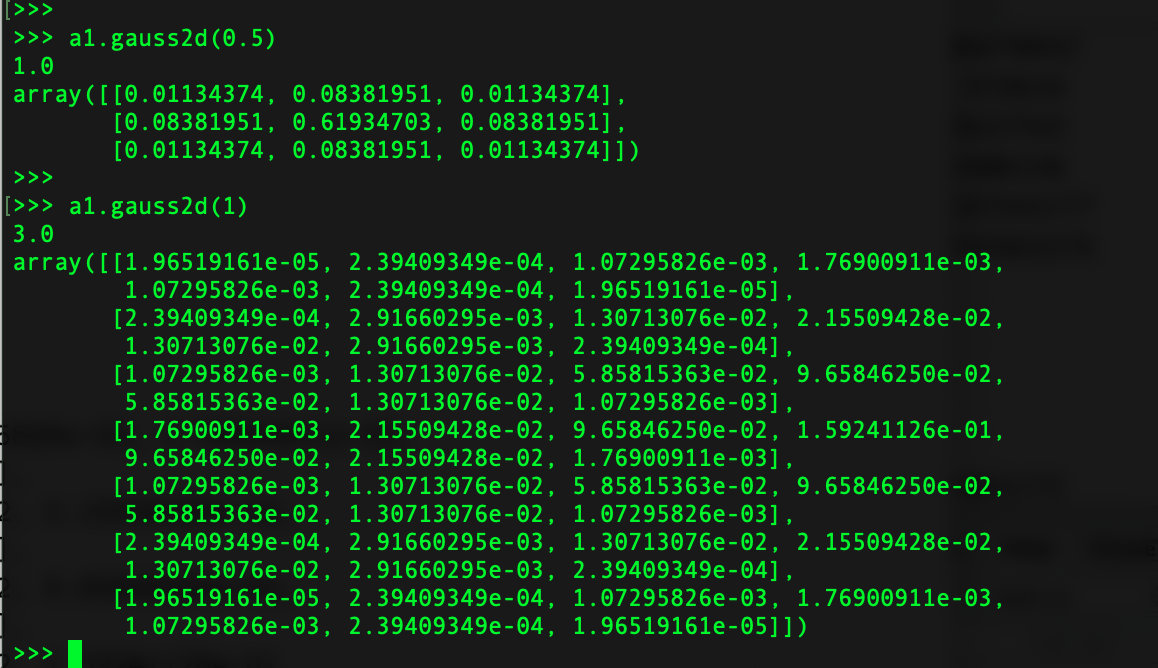
Description automatically generated

Q3

functions:



output:



Q4:

a) ‘signal.convolve2d’ and ‘signal.correlate2d’ will produce a different result when the filter is non-symmetric.

b)

A close up of a screen

Description automatically generated

c)

A picture containing object

Description automatically generated

A brown and white dog looking at the camera

Description automatically generated

Q5:

Since Gaussian kernels are separable, we can separate the 2D array into 2 vectors, and convolve each row and column accordingly. The new operation will reduce the runtime from

O(m^2 + n ^2) to O(m^2 + 2n).

Part 2

function:

A screenshot of a cell phone

Description automatically generated

Q1: Picked sigma = 5

>>> a1.lohipass\_filter('dog.jpg', 5, False)

A dog looking at the camera

Description automatically generated

Q2: Picked sigma = 5

>>> a1.lohipass\_filter(cat.jpg', 5, True)

A cat that is looking at the camera

Description automatically generated

Q3: A screenshot of a cell phone

Description automatically generated

demos:

#1

>>> a1.hybrid\_filter('dog.jpg','cat.jpg',5,8)

A close up of a cat looking at the camera

Description automatically generated

#2

>>> a1.hybrid\_filter('2b\_marilyn.bmp','2a\_einstein.bmp',9, 2)

A close up of a person

Description automatically generated

#3

>>> a1.hybrid\_filter('hp\_lego1.jpeg', ‘hp\_lego1.png',2,8)

A picture containing toy, LEGO

Description automatically generated

#4

>>> a1.hybrid\_filter('4a\_bird.bmp','4b\_plane.bmp',3, 20)

A fighter jet flying through a blue sky

Description automatically generated