

--Gaussian Kernel Convolution-- and -- Central Difference--

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#python3

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#Purpose:

1. Read input data and compute derivative with central difference kernel (the input data points should be greater than 5, so it can test the convolution implementation scalability).
2. Perform convolution with Gaussian kernel to realize noise removal (low pass filtering) operation.

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In [6]: #program for --Gaussian Kernel Convolution-- and --Central Difference--
#Code by: TUSHAR TARIHALKAR ; SJSU ID 013592202
import numpy as np
import math

print("input length: ")
uLen = int(input())
print("sigma input: ")
sigma = int(input())
kLen = 3

a=[] #input
g=[] #guass kernel
x=[-1, 0, 1]
o=[] #output guassian kernel
c=[] #output central difference

print("input values: ")
for i in range(uLen):
    a.append(int(input()))
print("Gaussian convolution kernel values: ")
for i in range(kLen):
    g.append(((np.exp(-(x[i]**2)/(2*sigma**2)))/((math.sqrt(2*3.142))*sigma))/2)

lenA = uLen-kLen+1
for i in range(lenA):
    f=0
    h=0
    for j in range (kLen):
        f=g[j]*a[i+j]+f
        h=x[j]*a[i+j]+h
    o.append(f)
    c.append(h)

print("Guassain convolution output for noise Removal ")
print(o)
print("Diff output")
print(c)

```

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input length:
12
sigma input:
1
input values:
8
5
9
6
4
7
3
8
6
3
7
5

```

Gaussian convolution kernel values:

Guassain convolution output for noise Removal

[3.0539088772726757, 3.1258765989159683, 2.769457009191809, 2.370540590180135,
2.24305010231759, 2.41303741946765, 2.684463350616779, 2.527501970398457, 2.171
0823806742985, 2.364027621714266]

Diff output

[1, 1, -5, 1, -1, 1, 3, -5, 1, 2]

In []: