|  |
| --- |
| 國立臺中科技大學-資工二 訊號與系統 第八次作業 |

若輸出訊號為：

脈衝響應為：

求系統的輸入訊號。

|  |
| --- |
| from scipy import signal  import numpy as np  import matplotlib.pyplot as plt  h=np.array([1,2,-1])  y=np.array([1,4,4,3,5,-3])  x,remainder=signal.deconvolve(y,h)  print("x:",x)  plt.figure(1)  plt.stem(x) |
|  |

1. 使用平均濾波器(濾波器大小為3、5、7)濾除含有雜訊之訊號，並顯示其結果。

|  |
| --- |
| import numpy as np  import matplotlib.pyplot as plt  import numpy.random as random  filter\_size=7  t=np.linspace(0,1,200,endpoint=False)  x=10\*np.cos(2\*np.pi\*5\*t)  noise\_x=x+random.uniform(-5,5,200)  h=np.ones(filter\_size)/filter\_size  y=signal.convolve(noise\_x,h,mode='same')  plt.figure()  plt.rcParams['figure.figsize']=(20,4)  f,((ax11,ax12,ax13))=plt.subplots(1,3)  ax11.plot(t,x)  ax11.set\_title('Original Signal')  ax11.set\_xlabel('t(seconds)')  ax11.set\_ylabel('Amplitude')  ax12.plot(t,noise\_x)  ax12.set\_title('Signal with Noise')  ax12.set\_xlabel('t(seconds)')  ax12.set\_ylabel('Amplitude')  ax13.plot(t,y)  ax13.set\_title('Filtered Signal')  ax13.set\_xlabel('t(seconds)')  ax13.set\_ylabel('Amplitude')  plt.show() |
|  |

1. 使用高斯濾波器(標準差為1、2、3)濾除含有雜訊之訊號，並顯示其結果。

|  |
| --- |
| import numpy as np  import matplotlib.pyplot as plt  from scipy.signal.windows import gaussian  import numpy.random as random  t=np.linspace(0,1,200,endpoint=False)  x=10\*np.cos(2\*np.pi\*5\*t)  noise\_x=x+random.uniform(-5,5,200)  sigma=1  filter\_size=6\*sigma+1  gauss=gaussian(filter\_size,sigma)  sum=np.sum(gauss)  gauss=gauss/sum  y=signal.convolve(noise\_x,gauss,mode='same')  plt.figure()  plt.rcParams['figure.figsize']=(20,4)  f,((ax21,ax22,ax23))=plt.subplots(1,3)  ax21.plot(t,x)  ax21.set\_title('Original Signal')  ax21.set\_xlabel('t(seconds)')  ax21.set\_ylabel('Amplitude')  ax22.plot(t,noise\_x)  ax22.set\_title('Signal with Noise')  ax22.set\_xlabel('t(seconds)')  ax22.set\_ylabel('Amplitude')  ax23.plot(t,y)  ax23.set\_title('Filtered Signal')  ax23.set\_xlabel('t(seconds)')  ax23.set\_ylabel('Amplitude')  plt.show() |
|  |