Untitled21

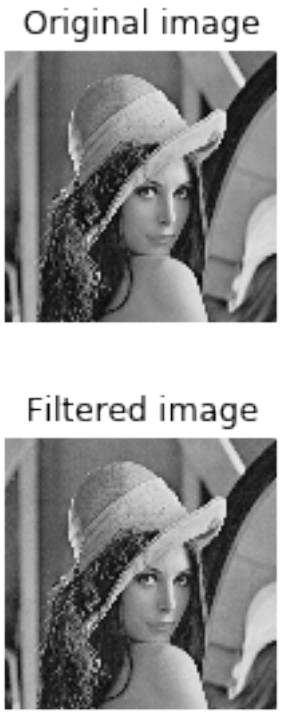
February 19, 2018

In [2]:
```
import numpy as np
import matplotlib.pyplot as plt
from mpl_toolkits.mplot3d import Axes3D
from matplotlib import cm
from matplotlib.ticker import LinearLocator, FormatStrFormatter
from PIL import Image
```

In [21]:
```
# Read a grayscale image file
lenagray = np.array(Image.open('/Users/shengwan/Desktop/lena512.bmp'))
height, width = lenagray.shape
print("Image size, height: %d, width %d" % (height, width))
# Define filter
filterheight = 3
filterwidth = 3
filterhalfheight = (filterheight - 1) // 2
filterhalfwidth = (filterwidth - 1) // 2
h = np.array([[1,-2,1],[-2,12,-2],[1,-2,1]]) / 9
print("Filter size, height: %d, width %d" % (filterheight, filterwidth))
lenanew = np.copy(lenagray)
for i in range(filterhalfheight, height - filterhalfheight):
    for j in range(filterhalfwidth, width - filterhalfwidth):
        pixelval = 0.0
        for k in range(i-filterhalfheight, i+filterhalfheight+1):
            for l in range(j-filterhalfwidth, j+filterhalfwidth+1):
                pixelval += lenagray[k, l] * h[i-k+filterhalfheight, j-l+filterhalfwi
        if pixelval < 0.0:
            pixelval = 0.0
        elif pixelval > 255.0:
            pixelval = 255.0
        lenanew[i, j] = pixelval
# Plot the results
plt.figure()
plt.subplot(211)
plt.imshow(lenagray, cmap=plt.cm.gray)
plt.axis('off')
plt.title('Original image')
plt.subplot(212)
plt.imshow(lenanew, cmap=plt.cm.gray)
```

```
        plt.axis('off')
        plt.title('Filtered image')
        plt.tight_layout(pad=0.4, w_pad=0.5, h_pad=1.0)
        plt.show()
```

```
Image size, height: 512, width 512
Filter size, height: 3, width 3
```




```
In [22]: img=Image.fromarray(lenanew).convert('L')
         img.show()
```

```
In [23]: img.save('/Users/shengwan/Desktop/Filter2-2.jpg')
```