Introduction to Image Processing Lab3
Spatial Filtering

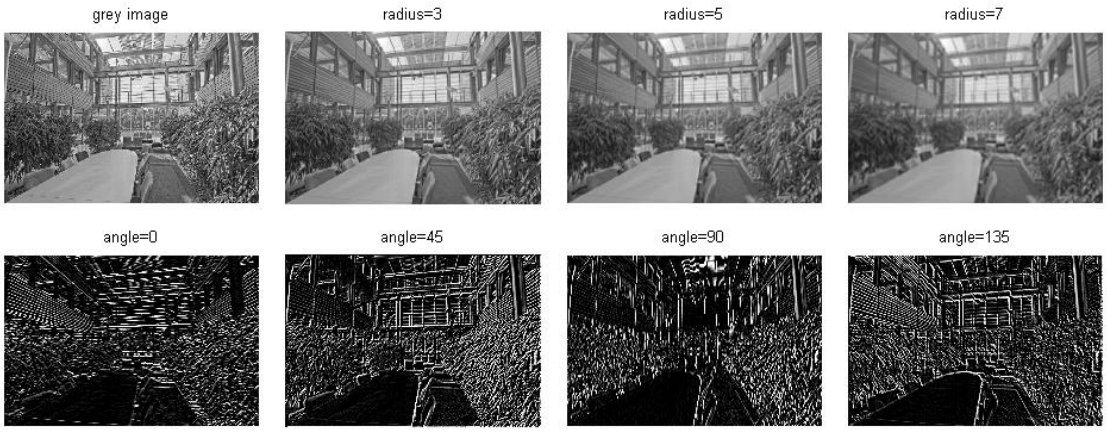
In this lab, we will do experiments on spatial filtering. Firstly, please read an image from disk (you can still use the image in lab 1) to the Matlab workspace. Convert it to a grey image and normalize its value to (0, 1).

1. Generate a filter mask using the following code:
   ```
   radius=3;
   filter=ones(radius,radius)/(radius*radius);
   ```
   Perform spatial filtering with the above generated template and display the output image.

2. Change radius to 5 or 7, and use the newly generated masks to filter the original image. Compare the difference between different outputs.

3. Generate another filter mask using the following code:
   ```
   base_filter=[0 0 0 0 0;1 1 1 1 1;0 0 0 0 0;-1 -1 -1 -1 -1;0 0 0 0 0];
   angle=0;
   filter=imrotate(base_filter,angle,'crop');
   ```
   Perform spatial filtering with the above mask and display the output image.

4. Change angle to 45, 90 and 135. Use the newly generated masks to filter the original image. Compare the difference between different outputs.



Tips:

1. To perform filtering, you can use the function imfilter, but we also suggest you to write the code by yourself. Let $I(x,y)$ denotes the grey value at position (x,y) in the original image. w and h represents the width and height of the filter mask F, then the filtered output $I_{new}(x,y) = \sum_{i=1}^{w}\sum_{j=1}^{h} I\left(x+i-\frac{w+1}{2}, y+j-\frac{h+1}{2}\right) * F(i,j)$
2. You can use fspecial function to create some other predefined 2-D filters. Try to filter the original image using these new filters and see the outputs.