Homework 6 for **Kun**

Introduce to image process

All codes are attached on the last page.

Q1 Erosion and Dilation

```
% Q1
I = im2uint8(rgb2gray(imread("lena_std.tif")));
imshow(I), title("Original Image");
bin = imbinarize(I);
imshow(bin), title("Binarized Image");
se = strel('disk',2);
q1 = imerode(imerode(bin,se),se);
q1 = imdilate(imdilate(q1,se),se);
q1_r = imdilate(imdilate(bin,se),se);
q1_r = imerode(imerode(q1_r,se),se);
imshow(q1), title("Eroded and Dilated Image");
imshow(q1_r), title("Dilated and Eroded Image");
```

Res:

Compare to Erode first, dilated first lost more details.

Q2 Opening and Closing

```
% Q2
se = strel('disk',2);
q2 = imopen(imopen(bin,se),se);
q2 = imclose(imclose(q2,se),se);
q2_r = imclose(imclose(bin,se),se);
q2_r = imopen(imopen(q2_r,se),se);
imshow(q2), title("Opened and Closed Image");
imshow(q2_r), title("Closed and Opened Image");
```

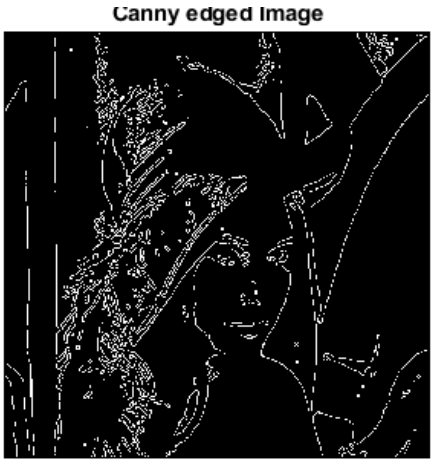
Res

Compared to Q1, Opening and Closing operation may cause more detail losing. However, erode first keep more medium size details and kick-out more small size details than other 3 images.

Q3 Boundary Extraction

```
23  % Q3
24  se = strel('disk',2);
25  beta = imerode(bin,se);
26  q3 = bin-beta;
27  imshow(q3), title("Boundary Extracted Image");
28  ed = edge(bin,'canny');
29  imshow(ed), title("Canny edged Image");
```

Res:



So, the boundary extraction and canny operator applied images are highly similar. Canny operator saved more details, but boundary extraction can identify edge with more accuracy.

```
% Q1
I = im2uint8(rgb2gray(imread("lena_std.tif")));
imshow(I), title("Original Image");
bin = imbinarize(I);
imshow(bin), title("Binarized Image");
se = strel('disk',2);
q1 = imerode(imerode(bin,se),se);
q1 = imdilate(imdilate(q1,se),se);
q1_r = imdilate(imdilate(bin,se),se);
q1_r = imerode(imerode(q1_r,se),se);
imshow(q1), title("Eroded and Dilated Image");
imshow(q1_r), title("Dilated and Eroded Image");


% Q2
se = strel('disk',2);
q2 = imopen(imopen(bin,se),se);
q2 = imclose(imclose(q2,se),se);
q2_r = imclose(imclose(bin,se),se);
q2_r = imopen(imopen(q2_r,se),se);
imshow(q2), title("Opened and Closed Image");
imshow(q2_r), title("Closed and Opened Image");


% Q3
se = strel('disk',2);
beta = imerode(bin,se);
q3 = bin-beta;
imshow(q3), title("Boundary Extracted Image");
ed = edge(bin,'canny');
imshow(ed), title("Canny edged Image");
```