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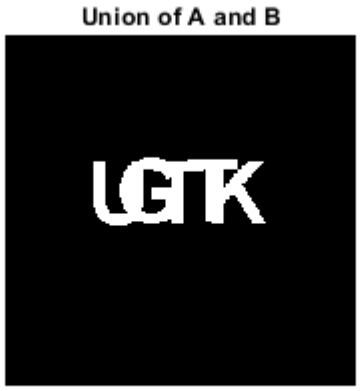
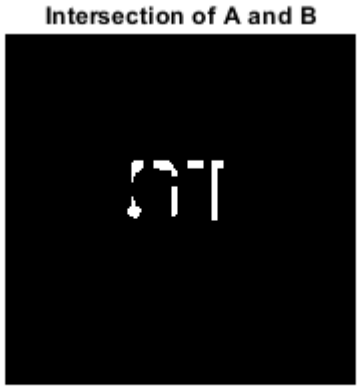
ex1

```
A=imread('utk.tif');
B=imread('gt.tif');
imshow(not(A));
title('Complement of A');
```

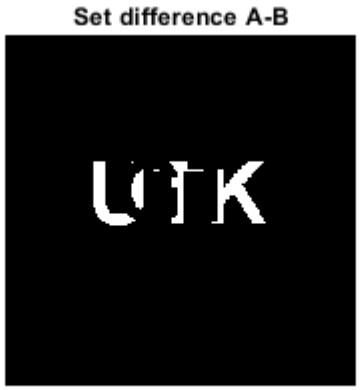

```
imshow(or(A,B));
title('Union of A and B');
```




```
imshow(and(A,B));
title('Intersection of A and B');
```




```
imshow(A&(~B));
title('Set difference A-B');
```



EX2

```
t=imread('text.tif');
sq=ones(3,3);
td=imdilate(t,sq);
sq1=ones(2,2);
td1=imdilate(t,sq1);
imshow(td)
title('Dilate 3 times');
```

Dilate 3 times

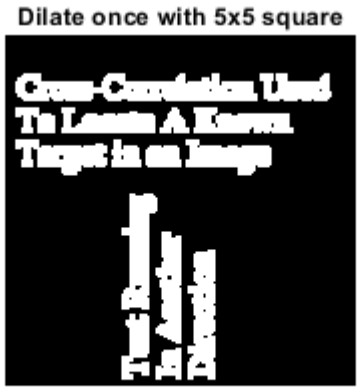

```
imshow(td1)
title('Dilate twice')
```

Dilate twice


```
sq2=[0 1 0;1 1 1;0 1 0];
td2=imdilate(t,sq2);
imshow(td2);
title('Dilate once with diamond structuring element');
```

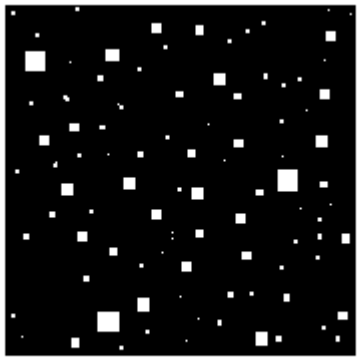
Dilate once with diamond structuring element

```
sq3=ones(5,5);
td3=imdilate(t,sq3);
imshow(td3);
title('Dilate once with 5x5 square');
```

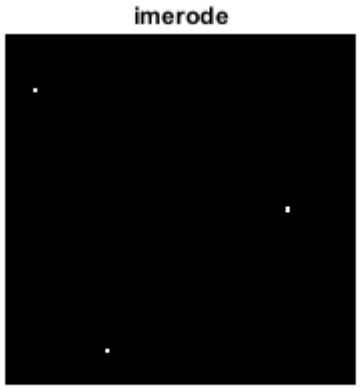


ex4

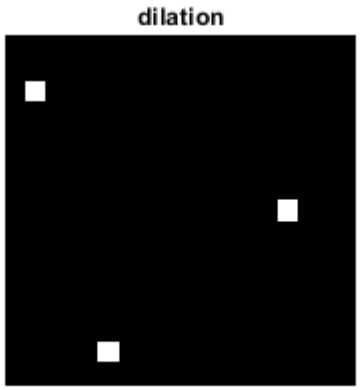
```
s=imread('small-squares.tif');
imshow(s)
```



```
sq4=ones(13,13);
td4=imerode(s,sq4);
imshow(td4)
title('imerode')
```

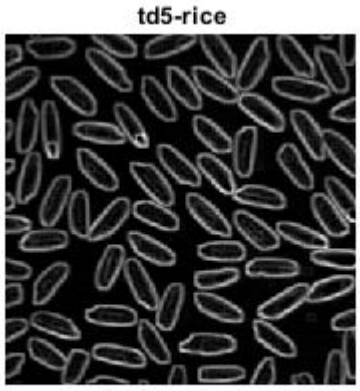



```
sq5=ones(13,13);
td5=imdilate(td4,sq5);
imshow(td5)
title('dilation')
```

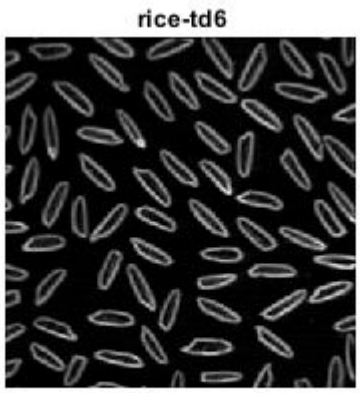


ex5

```
rice=imread('rice.tif');
r=rice > 110;
sq=ones(5,5);
td5=imdilate(rice,sq);
imshow(td5-rice,[])
title('td5-rice')
```

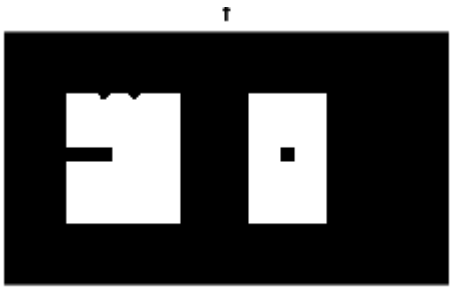



```
r=rice > 110;
sq=ones(5,5);
td6=imerode(rice,sq);
imshow(rice-td6,[])
title('rice-td6')
```

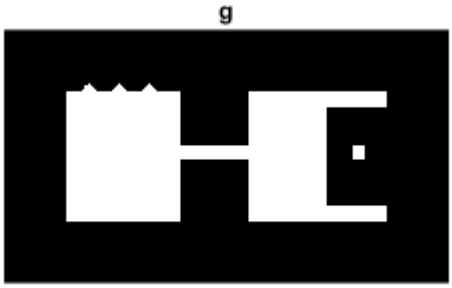


ex6

```
I=imread('shapes.tif');
b1=ones(20, 20);
f=imopen(I, b1);
g=imclose(I, b1);
imshow(f)
title('f')
```




```
imshow(g)
title('g')
```




```
fin=imread("noisy-fingerprint.tif");
b=ones(3,3);
f1=imopen(fin, b);
g1=imclose(fin, b);
imshow(and(f1,g1))
title('f1')
```


```
imshow(and(g1,f1))
```

ex7

```
A=[0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0;
0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0;
0 0 1 0 0 0 1 1 1 1 0 0 0 0 0 0;
0 1 1 1 0 0 0 0 0 0 0 0 1 1 0 0;
0 0 1 0 0 0 1 0 0 0 0 0 1 1 1 0;
0 0 0 0 0 1 1 1 0 0 0 0 0 1 0 0;
0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0;
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0]
```

```
A = 8×16
     0     0     0     0     0     0     0     0     0     0     0     0     0 ···
     0     0     1     0     0     0     0     0     0     0     0     0     0
     0     0     1     0     0     0     1     1     1     1     0     0     0
     0     1     1     1     0     0     0     0     0     0     0     0     1
     0     0     1     0     0     0     1     0     0     0     0     0     1
     0     0     0     0     0     1     1     1     0     0     0     0     0
     0     0     0     0     0     0     1     0     0     0     0     0     0
     0     0     0     0     0     0     0     0     0     0     0     0     0
```

```
imshow(A,'InitialMagnification',1000)
```

```
sq2=[0 1 0;1 1 1;0 1 0];
a1=imerode(A,sq2);
imshow(a1,'InitialMagnification',1000)
```

```
q=[1 1 1 1 1;1 1 0 1 1;1 0 0 0 1;1 1 0 1 1;1 1 1 1 1];
a0=~A
```

```
a0 = 8×16 logical array
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
   1   1   0   1   1   1   1   1   1   1   1   1   1   1   1   1
   1   1   0   1   1   1   0   0   0   0   1   1   1   1   1   1
   1   0   0   0   1   1   1   1   1   1   1   1   0   0   1   1
   1   1   0   1   1   1   0   1   1   1   1   1   0   0   0   1
   1   1   1   1   1   0   0   0   1   1   1   1   1   0   1   1
   1   1   1   1   1   1   0   1   1   1   1   1   1   1   1   1
   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1   1
```

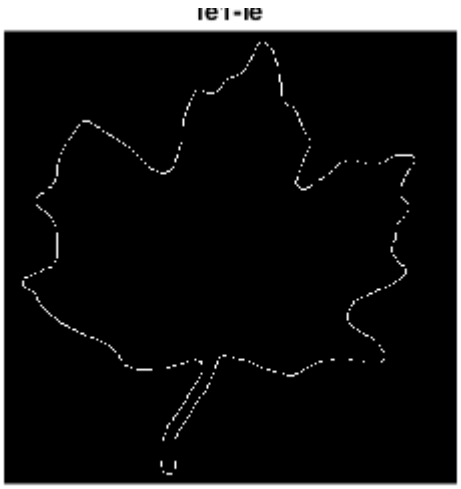
```
imshow(a0,'InitialMagnification',1000)
```

```
a2=imerode(a0,q);
imshow(a2,'InitialMagnification',1000)
```

```
imshow(and(a1,a2),'InitialMagnification',1000)
```

ex8

```
le=imread("Fig1108(a)(mapleleaf).tif");
sq=ones(3,3);
le1=imdilate(le,sq);
imshow(le1-le,[])
title('le1-le')
```




```
le2=imerode(le1,sq);
le3=regfill(le1-le2,[254,254],sq);
imshow(le3)
title('le3')
```

```
function out=regfill(im, pos, kernel)
% im: input image
% pos: initial (x,y)
% kernel: filling kernel
current=zeros(size(im));
last=zeros(size(im));
last(pos(1), pos(2))=1;
current=imdilate(last, kernel) & ~im;
while any(current(:) ~= last(:)),
last=current;
current=imdilate(last, kernel) & ~im;
end;
out=current;
end
```