图像处理第二次作业
十种滤波器的实现
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原图像如下：

算术均值滤波器：

```
function []=meanValueFilter(filter_size)
img=imread('1.jpg');
[imgH,imgW]=size(img);
half_of_size=(filter_size-1)/2;
new_img=img;
for i=1+half_of_size:imgH-half_of_size
    for j=1+half_of_size:imgW-half_of_size
        img_temp=img(i-half_of_size:i+half_of_size,j-
half_of_size:j+half_of_size);

new_img(i,j)=sum(img_temp(:))/filter_size/filter_size;
    end
end
```

```
imshow(new_img);
end
```

结果：

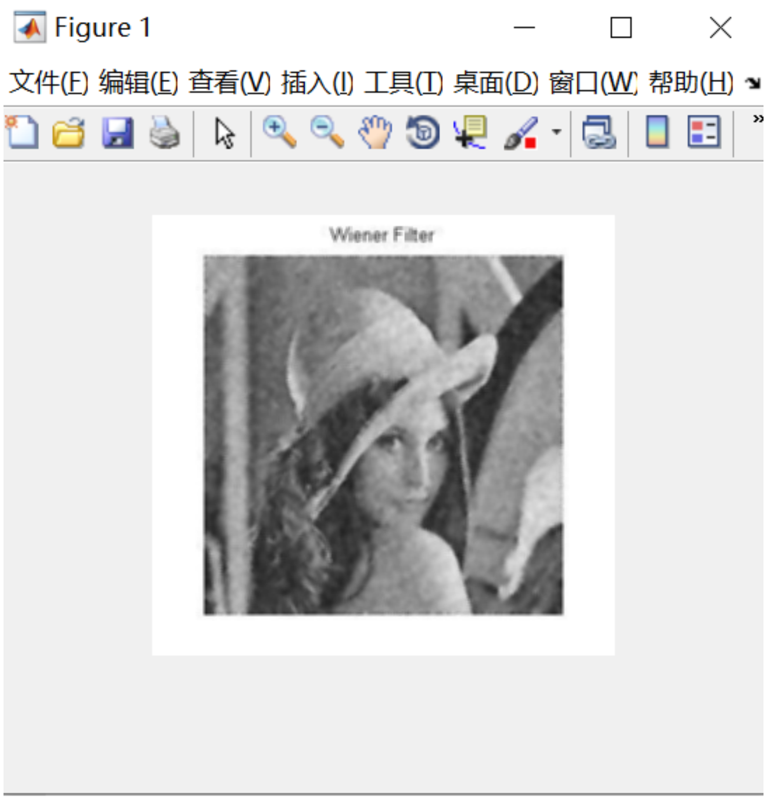


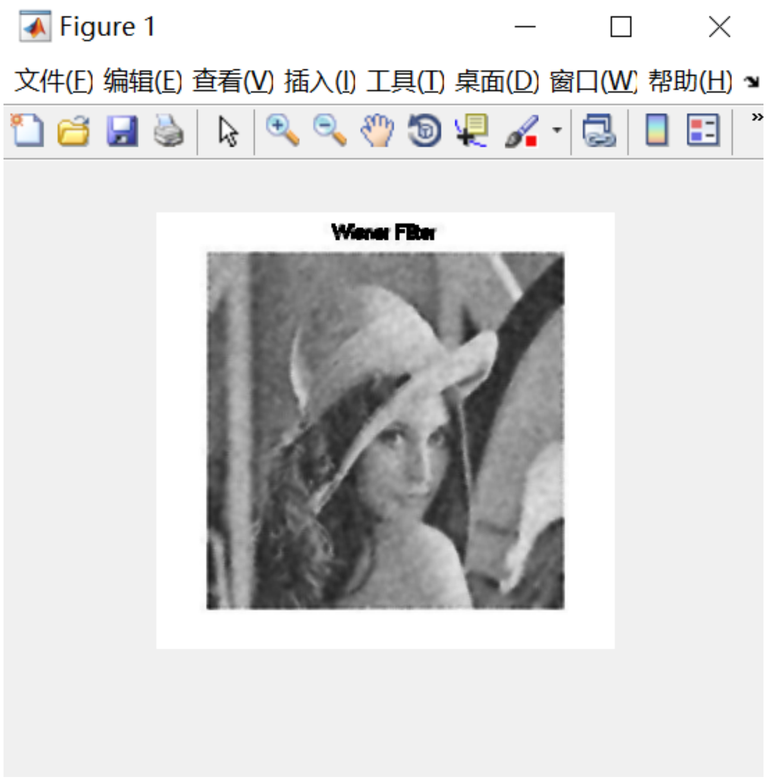
Figure 1
文件(F) 编辑(E) 查看(V) 插入(I) 工具(T) 桌面(D) 窗口(W) 帮助(H)
Wiener Filter

几何均值滤波器：

```
function []=GeometricMeanFilter(filter_size)
img=imread('1.jpg');
[imgH,imgW]=size(img);
half_of_size=(filter_size-1)/2;
new_img=img;
for i=1+half_of_size:imgH-half_of_size
    for j=1+half_of_size:imgW-half_of_size
        img_temp=img(i-half_of_size:i+half_of_size,j-
half_of_size:j+half_of_size);

new_img(i,j)=prod(img_temp(:))^(1/(filter_size*filter_siz
e));
    end
end
imshow(new_img);
end
```

结果：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Wiener Filter

谐波滤波器：

```
function []=HarmonicMeanFilter(filter_size)
img=imread('1.jpg');
[imgH,imgW]=size(img);
half_of_size=(filter_size-1)/2;
new_img=img;
for i=1+half_of_size:imgH-half_of_size
    for j=1+half_of_size:imgW-half_of_size
        img_temp=img(i-half_of_size:i+half_of_size,j-
half_of_size:j+half_of_size);
        img_temp2=1./img_temp;

new_img(i,j)=filter_size*filter_size/sum(img_temp2(:));
    end
end
imshow(new_img);
end
```

结果：

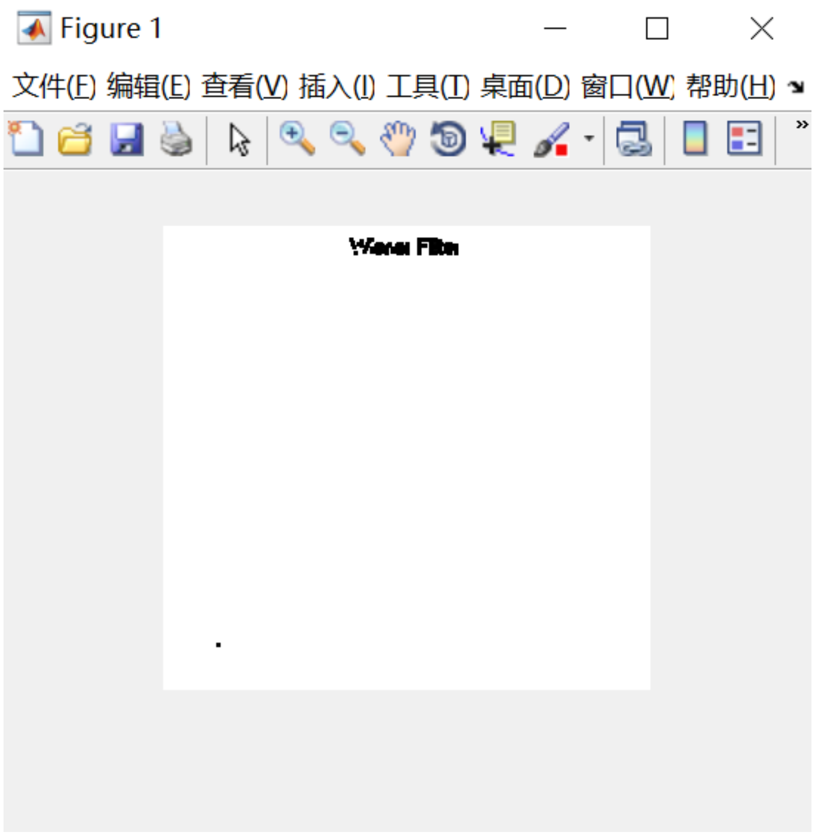
Figure 1
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Wiener Filter

反谐波滤波器：

```
function []=InverseHarmonicMeanFilter(filter_size,Q)
img=imread('1.jpg');
[imgH,imgW]=size(img);
half_of_size=(filter_size-1)/2;
new_img=img;
for i=1+half_of_size:imgH-half_of_size
    for j=1+half_of_size:imgW-half_of_size
        img_temp=img(i-half_of_size:i+half_of_size,j-
half_of_size:j+half_of_size);
        img_temp2=img_temp.^(Q+1);
        img_temp3=img_temp.^(Q);
        new_img(i,j)=sum(img_temp2(:))/sum(img_temp3(:));
    end
end
imshow(new_img);
end
```

结果：

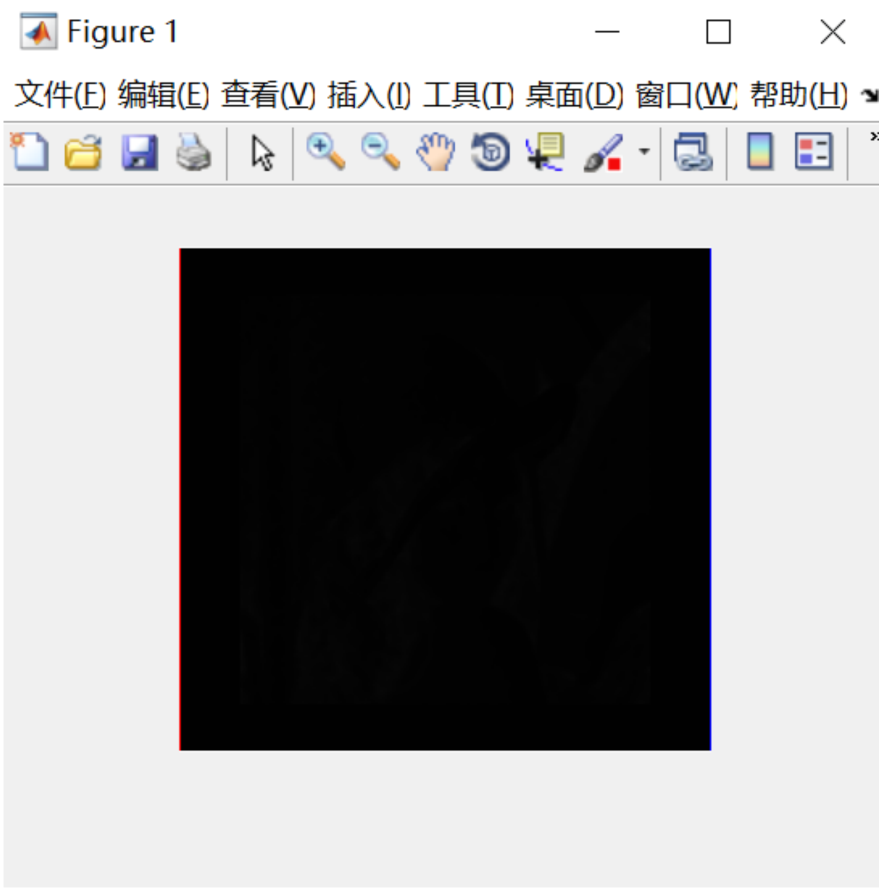
Figure 1
文件(F) 编辑(E) 查看(V) 插入(I) 工具(T) 桌面(D) 窗口(W) 帮助(H)

中值滤波器：

```
function []=MedianFilter(filter_size)
img=imread('1.jpg');
[imgH,imgW]=size(img);
half_of_size=(filter_size-1)/2;
new_img=img;
for i=1+half_of_size:imgH-half_of_size
    for j=1+half_of_size:imgW-half_of_size
        img_temp=img(i-half_of_size:i+half_of_size,j-
half_of_size:j+half_of_size);
        img_temp2=sort(img_temp(:));

new_img(i,j)=img_temp2((filter_size*filter_size)/2+0.5);
    end
end
imshow(new_img);
end
```

结果：

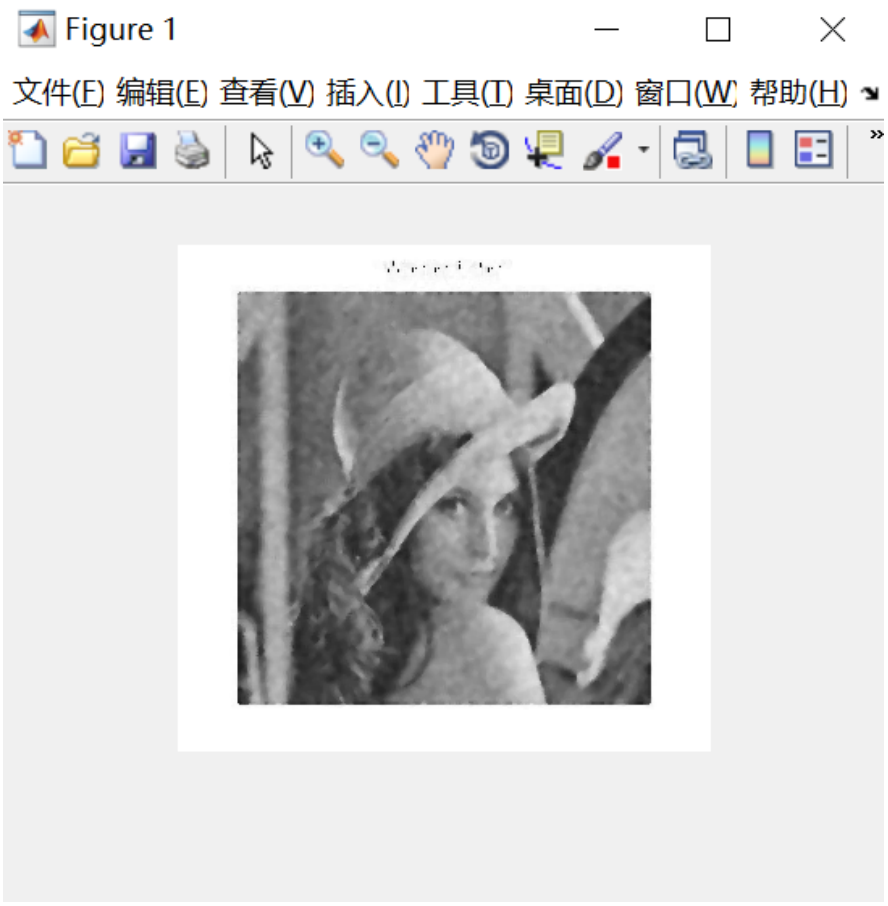
Figure 1
文件(F) 编辑(E) 查看(V) 插入(I) 工具(T) 桌面(D) 窗口(W) 帮助(H)

最大值滤波器：

```
function []=MaxFilter(filter_size)
img=imread('1.jpg');
[imgH,imgW]=size(img);
half_of_size=(filter_size-1)/2;
new_img=img;
for i=1+half_of_size:imgH-half_of_size
    for j=1+half_of_size:imgW-half_of_size
        img_temp=img(i-half_of_size:i+half_of_size,j-
half_of_size:j+half_of_size);
        img_temp2=sort(img_temp(:));
        new_img(i,j)=img_temp2(filter_size*filter_size);
    end
end
imshow(new_img);
end
```

结果：

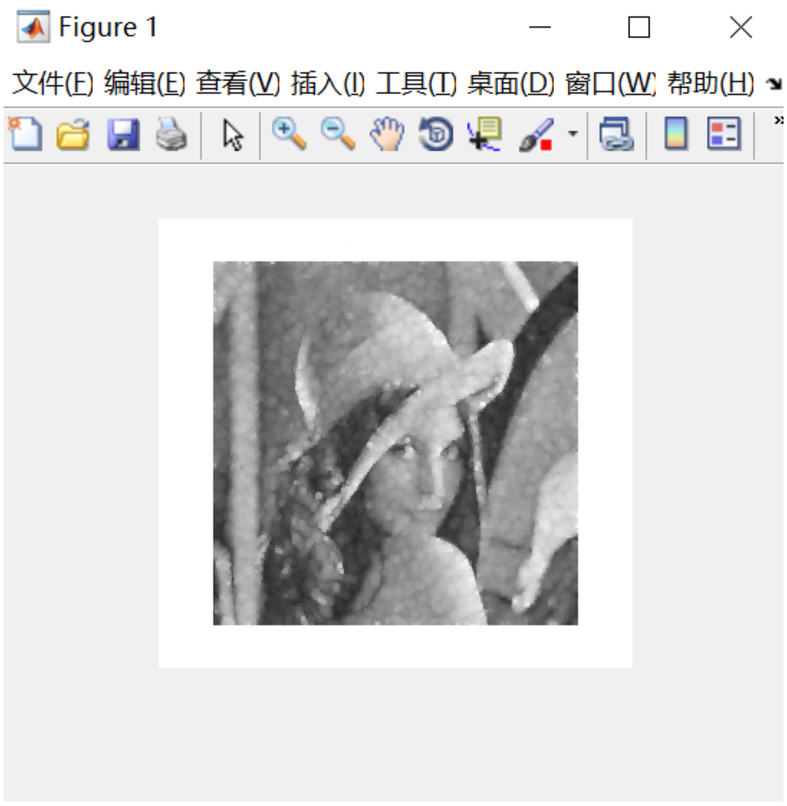
Figure 1
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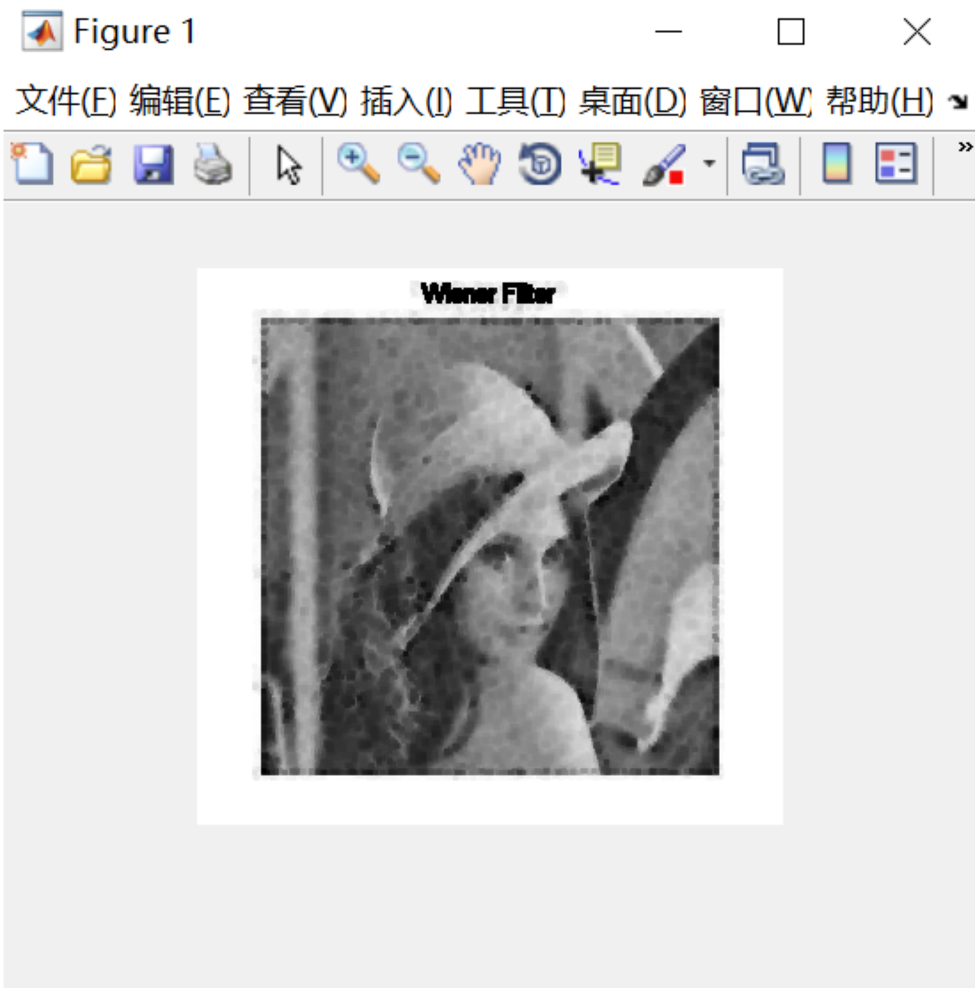
最小值滤波器：

```
function []=MinFilter(filter_size)
img=imread('1.jpg');
[imgH,imgW]=size(img);
half_of_size=(filter_size-1)/2;
new_img=img;
for i=1+half_of_size:imgH-half_of_size
    for j=1+half_of_size:imgW-half_of_size
        img_temp=img(i-half_of_size:i+half_of_size,j-
half_of_size:j+half_of_size);
        img_temp2=sort(img_temp(:));
        new_img(i,j)=img_temp2(1);
    end
end
imshow(new_img);
end
```

结果：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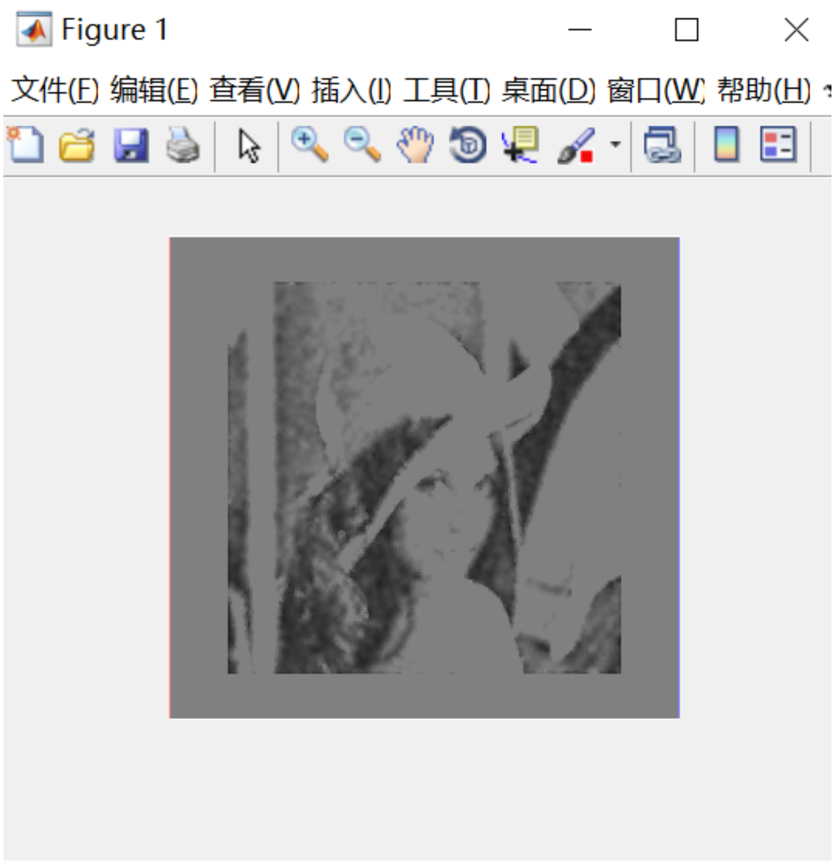
Wiener Filter

中点滤波器：

```
function []=MidPointFilter(filter_size)
img=imread('1.jpg');
[imgH,imgW]=size(img);
half_of_size=(filter_size-1)/2;
new_img=img;
for i=1+half_of_size:imgH-half_of_size
    for j=1+half_of_size:imgW-half_of_size
        img_temp=img(i-half_of_size:i+half_of_size,j-
half_of_size:j+half_of_size);
        img_temp2=sort(img_temp(:));

new_img(i,j)=(img_temp2(filter_size*filter_size)+img_temp
2(1))/2;
    end
end
imshow(new_img);
end
```

结果：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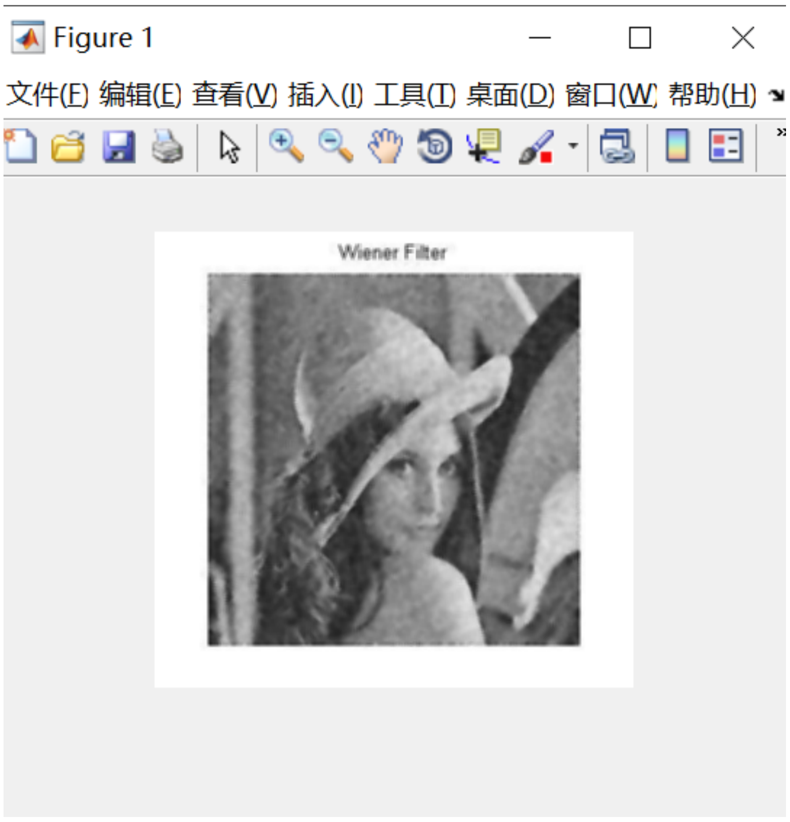
文件(F) 编辑(E) 查看(V) 插入(I) 工具(T) 桌面(D) 窗口(W) 帮助(H)

阿尔法滤波器：

```
function []=AlphaMeanFilter(filter_size,D)
img=imread('1.jpg');
[imgH,imgW]=size(img);
half_of_size=(filter_size-1)/2;
new_img=img;
for i=1+half_of_size:imgH-half_of_size
    for j=1+half_of_size:imgW-half_of_size
        img_temp=img(i-half_of_size:i+half_of_size,j-
half_of_size:j+half_of_size);
        img_temp2=sort(img_temp(:));
        if mod(D,2)==0
            D1=D/2;
            D2=D/2;
        else
            D1=D/2-0.5;
            D2=D/2+0.5;
        end
        img_temp3=img_temp2(D1+1:filter_size*filter_size-
D2);
```

```
new_img(i,j)=sum(img_temp3(:))/(filter_size*filter_size-
D);;
    end
end
imshow(new_img);
end
```

结果：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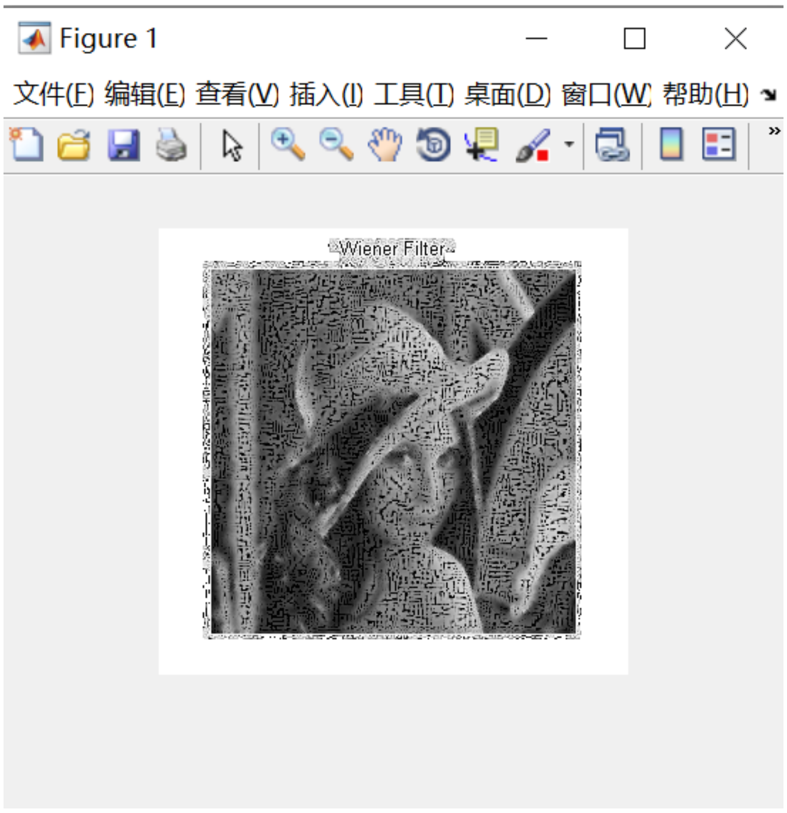
Wiener Filter

自适应滤波器：

```
function []=AdeptiveFilter(filter_size)
img=imread('1.jpg');
[imgH,imgW]=size(img);
half_of_size=(filter_size-1)/2;
new_img=img;
for i=1+half_of_size:imgH-half_of_size
    for j=1+half_of_size:imgW-half_of_size
        img_temp=img(i-half_of_size:i+half_of_size,j-
half_of_size:j+half_of_size);
        var_temp=var(double(img_temp(:)));
        new_img(i,j)=img(i,j)-
255*255*0.01./var_temp*(img(i,j)-
sum(img_temp(:))/filter_size/filter_size);
```

```
    end
end
imshow(new_img);
end
```

结果：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Wiener Filter

自适应中值滤波器：

```
function []=AdeptiveMedianFilter(filter_size)
img=imread('1.jpg');
[imgH,imgW]=size(img);
half_of_size=(filter_size-1)/2;
new_img=img;
for i=1+half_of_size:imgH-half_of_size
    for j=1+half_of_size:imgW-half_of_size
        window_size=1;
        while window_size<=half_of_size
            img_temp=img(i-window_size:i+window_size,j-
window_size:j+window_size);
            img_temp1=sort(img_temp(:));
            if mod(window_size,2)==0

Zmed=img_temp1((window_size*window_size)/2+1);
            else
```

```
Zmed=img_temp1((window_size*window_size)/2+0.5);
          end
          Zmin=img_temp1(1);
          Zmax=img_temp1(window_size*window_size);
          A1=Zmed-Zmin;
          A2=Zmed-Zmax;
          if A1>0 && A2<0
              break;
          else
              window_size=window_size+1;
          end
      end
      if window_size>filter_size
          new_img(i.j)=img(i,j);
      else
          B1=img(i,j)-Zmin;
          B2=img(i,j)-Zmax;
          if B1>0 && B2<0
              new_img(i,j)=img(i,j);
          else
              new_img(i,j)=Zmed;
          end
      end


   end
end
imshow(new_img);
end
```

结果：

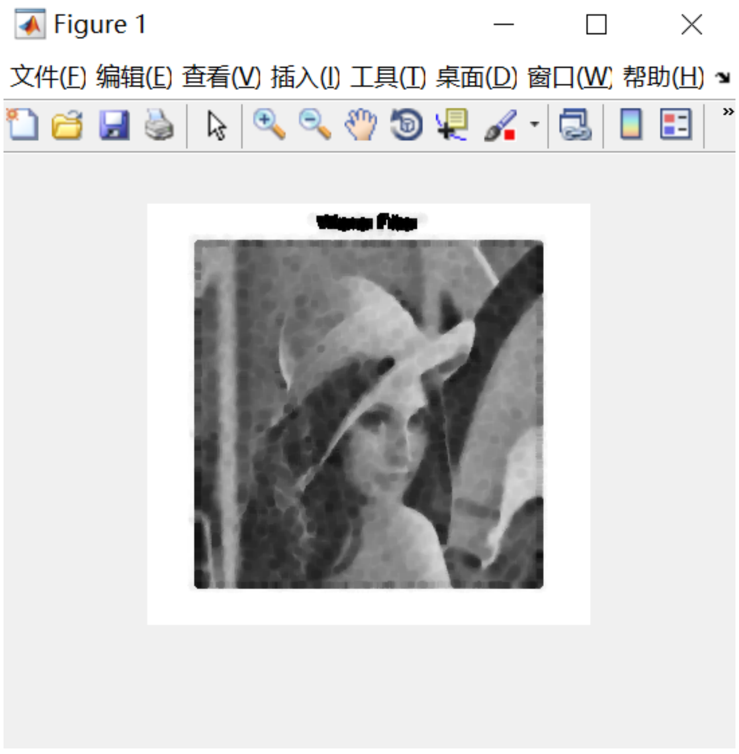
Figure 1
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Wiener Filter