```
% Noise Removal
% 19BAI10150 - AAYUSH MISHRA
% Computer Vision - Practical 2
```

```
I = imread('eight.tif')
```

I = 242×308 uint8 matrix
```
   225   225   225   226   226   226   226   226   226   226   226   226   226 ···
   225   225   225   226   226   226   225   226   226   225   226   226   226
   226   226   225   226   226   226   226   226   226   226   226   226   228
   226   226   225   226   226   226   226   226   226   226   225   226   226
   225   226   225   225   226   226   226   226   226   226   225   226   226
   225   225   224   226   226   226   225   226   226   226   225   226   225
   226   225   225   226   226   226   226   228   226   226   226   226   228
   226   226   225   226   226   226   226   226   226   226   226   226   228
   226   226   226   226   226   226   226   228   226   226   226   226   228
   226   226   226   226   226   226   226   226   226   226   226   228   228
    ⋮
    ⋮
```

```
figure()
imshow(I)
```



```
% Add noise
J = imnoise(I,'salt & pepper',0.05)
```

J = 242×308 uint8 matrix
```
   225   225   225   226   226   226   226   226   226   226   226   226   226 ···
```

1

```
225   255   225   226   226   226   225   226   226   225   226   226   226
226   226   225   226     0   226   226   226   226   226   255   226   228
226   226   225   226   226   226   226   226   226   226   225   226   226
225   226   225   225   226   226   226   226   226   226   225   226   226
225   225   224   226   226     0   225   226   226     0   225   226   225
226   225   225   226   226   226   226   228   226   226   226   226   228
226   226   225   226   226   226   226   226   226   226   226   226   228
226   226   226   226   226   226   226   228   226   226   226   226   228
226   226   226   226   226   226   226   226   226   226   226   228   228
  .
  .
  .
```
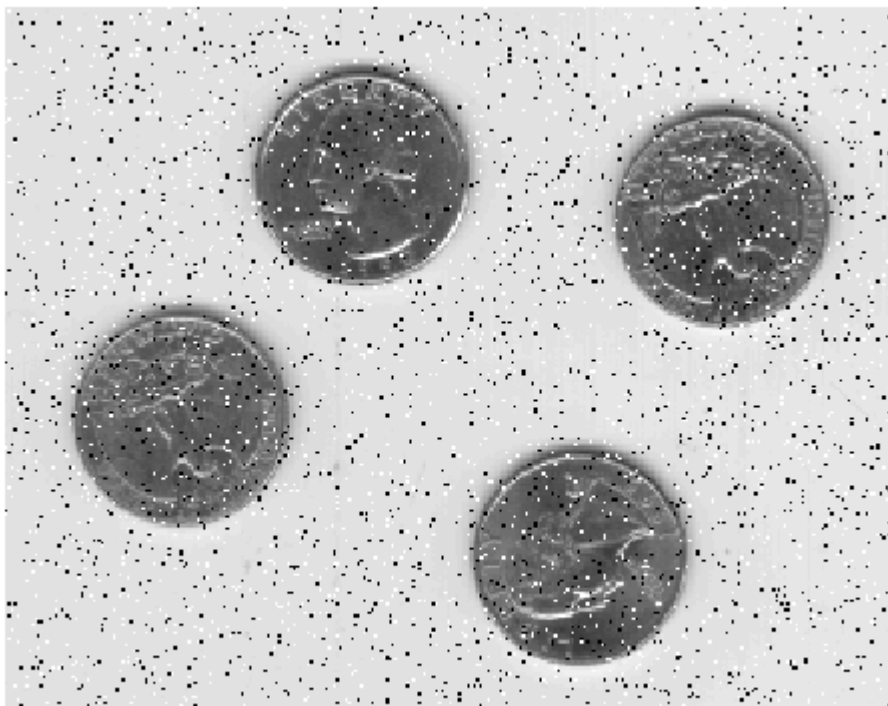
```
figure()
imshow(J)
```



```
% Use Averaging Filter
avg_result = filter2(fspecial('average',3),J)/255
```
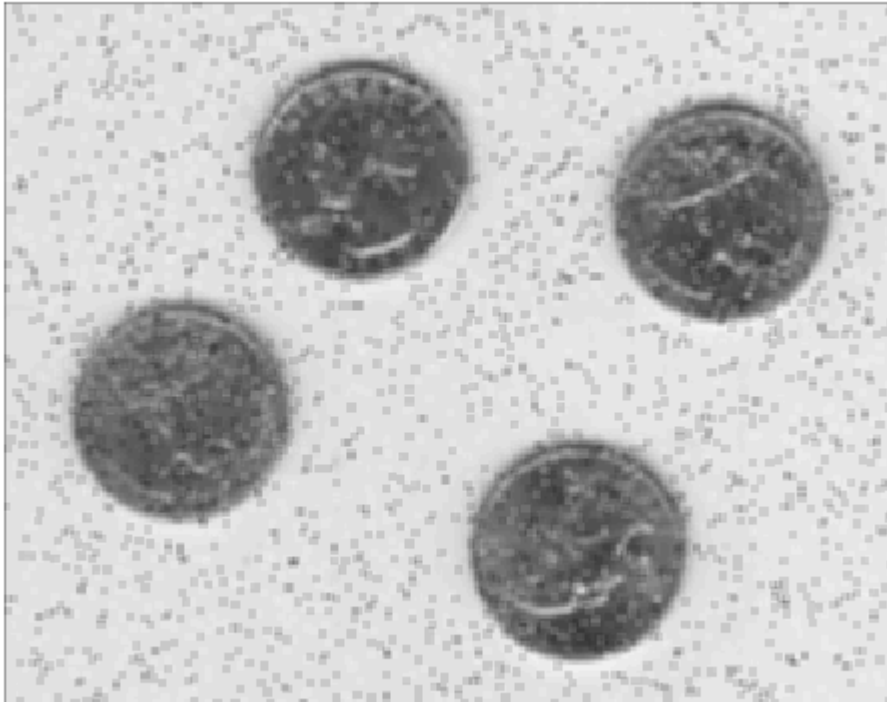
```
avg_result = 242×308
    0.4052    0.6013    0.6022    0.5900    0.5908    0.5904    0.5904    0.5904 ...
    0.6022    0.8963    0.8972    0.7865    0.7878    0.7874    0.8858    0.8858
    0.6031    0.8972    0.8976    0.7865    0.7878    0.7874    0.8858    0.8858
    0.5904    0.8845    0.8845    0.7861    0.7874    0.7878    0.8863    0.8863
    0.5895    0.8832    0.8837    0.8841    0.7874    0.7874    0.7874    0.8858
    0.5891    0.8828    0.8832    0.8841    0.7874    0.7874    0.7882    0.8867
    0.5895    0.8832    0.8837    0.8845    0.7878    0.7874    0.7882    0.8867
    0.5904    0.8850    0.8850    0.8854    0.8863    0.8863    0.8880    0.8880
    0.5908    0.8858    0.8858    0.8858    0.8863    0.8863    0.8871    0.8871
    0.5908    0.8858    0.8858    0.8858    0.8863    0.7878    0.7895    0.7895
```
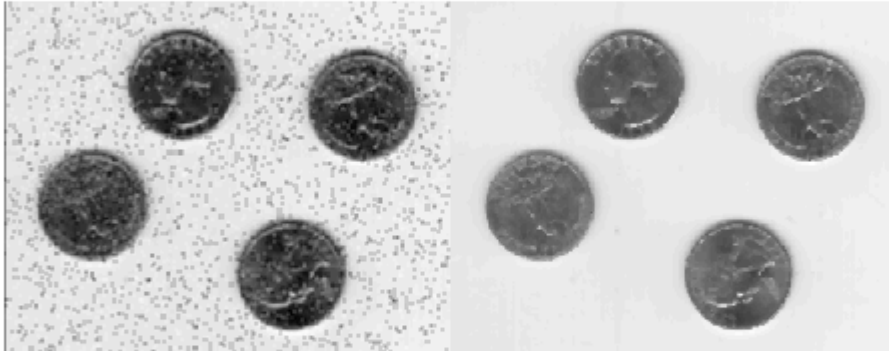
```
    :
    :
```

```
figure()
imshow(avg_result)
```



```
% Use Median Filter
median_result = medfilt2(J)
```

```
median_result = 242×308 uint8 matrix
      0   225   225   225   226   226   226   226   226   226   226   226   226 ···
    225   225   226   226   226   226   226   226   226   226   226   226   226
    226   226   226   226   226   226   226   226   226   226   226   226   226
    226   226   226   225   226   226   226   226   226   226   226   226   226
    225   225   225   226   226   226   226   226   226   226   226   226   226
    225   225   225   226   226   226   226   226   226   226   226   226   226
    225   225   225   226   226   226   226   226   226   226   226   226   226
    226   226   226   226   226   226   226   226   226   226   226   226   228
    226   226   226   226   226   226   226   226   226   226   226   226   228
    226   226   226   226   226   226   226   226   226   226   226   228   228
      :
      :
```
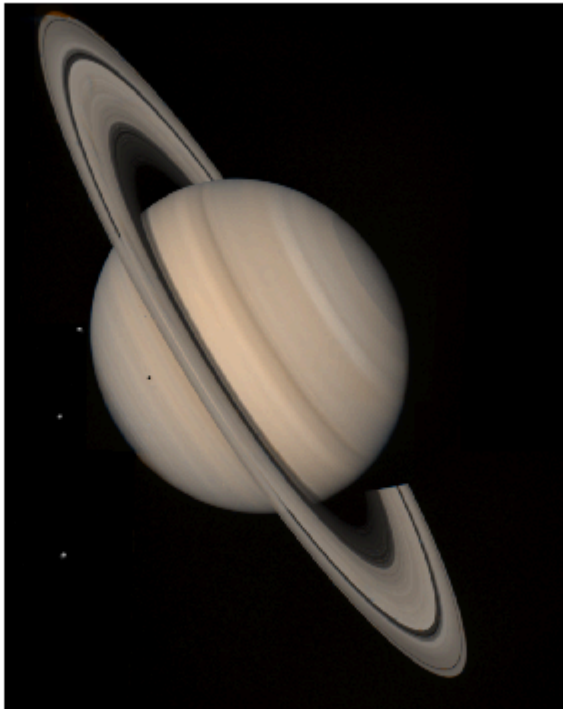
```
imshowpair(avg_result,median_result,'montage')
```

```
% Using Adaptive filtering
x = imread('saturn.png')
```

```
x = 1500×1200×3 uint8 array
x(:,:,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      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      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      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      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      0      0      0      0      0      0      0      0      0      0      0
      :
      :
      :
```
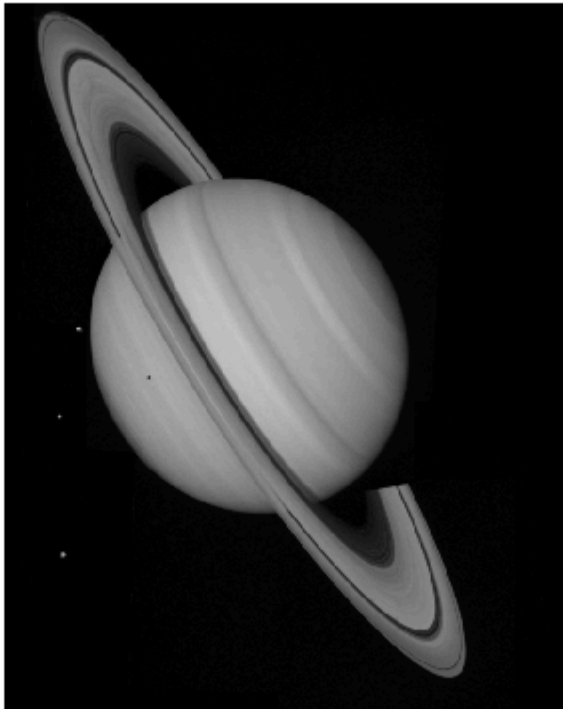
```
imshow(x)
```

```
I = im2gray(x)
```

I = 1500×1200 uint8 matrix

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	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	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	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
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	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	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	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

⋮

```
imshow(I)
```

```matlab
Y = imnoise(I,'gaussian',0,0.025)
```

Y = 1500×1200 uint8 matrix

```
   74    0    0   23    8    0   14    0    0    0    0    0    0 ...
    0   17   10   41   56    0    0    9    0   24    0    0    0
    0    0    5    0   12   29   59    0    0   68   15    8    4
    1   13   54    0   43    0   28    0   17    0    0    0    0
    0    0   16   10    0    0   45   57   36    0   53    7    0
    0    0   54    0    0   16    0   17    0    0    0   14   19
   51   24    0    0    0   15   58    0    0    0    0    7    0
    0   63    9    0    0   21    5    0    0    0    0   91    0
    0    0    0    0    0    0    0   15   79    0    0    0    7
    0    0    9   31    0   44    0    8   75   15    0    0   53
    :
    :
    :
```
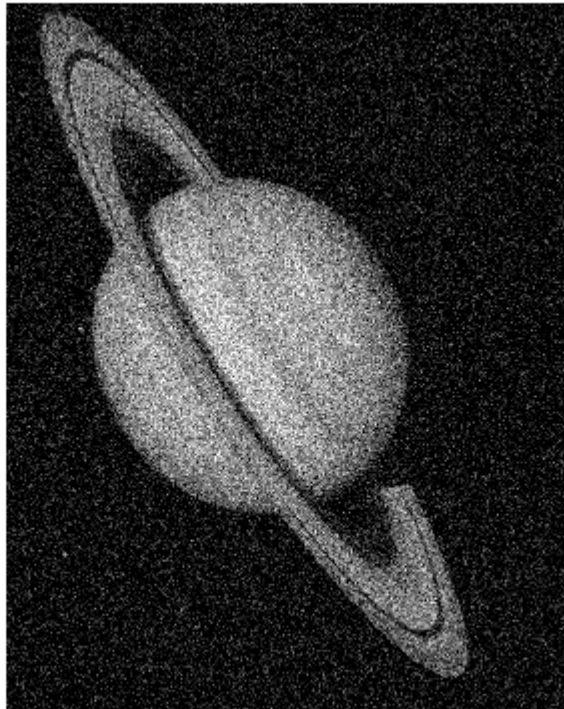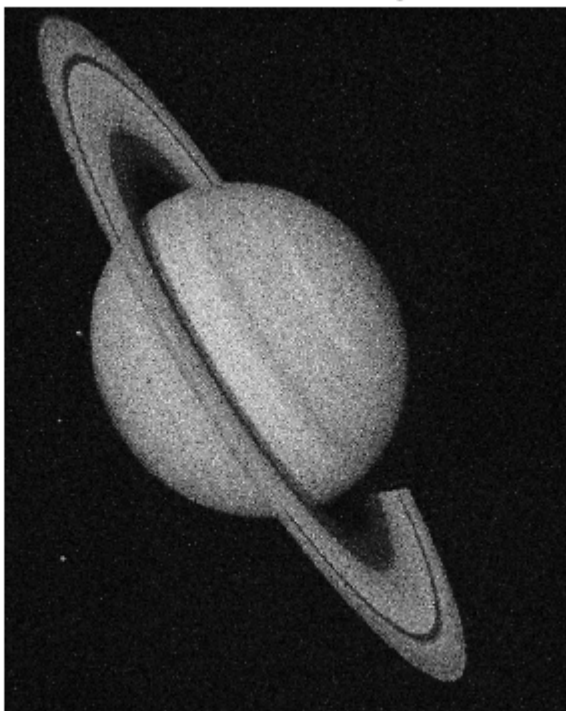
```matlab
imshow(Y)
title('Image with Gaussian Noise')
```

Image with Gaussian Noise


```
result = wiener2(Y,[5,5])
```

result = 1500×1200 uint8 matrix
```
    4     7    10     8    10    10     7     8     8     5     5     5     3     4     4     7 ...
    7    10    14    12    15    13    11    10     9     6     5     5     3     8     8    11
    8    11    15    13    18    17    17    15    17    12     9     7     9    13    13    17
    7     9    13    15    19    17    17    16    17    13    11     9    13    15    15    29
    9     9    11    12    18    16    17    18    18    12    10     9    13    15    24    18
   11    12    14    14    15    13    14    13    13    12    10     9    16    15    34    17
    9     9     9     9    10    10    15    15    15    15    13     9    18    22    22    22
    8    10    10    11    10     9    14    15    11    13    14    10    14    19    21    19
   10    11    15    17    14    13    14    13    13    15    16    12    13    15    16    17
    8     9    15    17    12    13    13    13    20    19    17    16    19    16    16    14
    :
    :
```

```
figure()
imshow(result)
title('Noise free Image')
```

Noise free Image

```
% 19BAI10150 - AAYUSH MISHRA
```