Problem Statement:

Read a color image. Add salt and pepper noise to it. Use a 3 x 3 median filter to remove the noise.

Importing the required libraries

In [1]:
```
import cv2
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

Taking a color image as input

In [2]:
```
img=cv2.imread('ComputerVision/DATA/dog_backpack.jpg')
```

In [3]:
```
type(img)
```

Out[3]:
```
numpy.ndarray
```

Printing the image taken as input

In [4]:
```
img=cv2.cvtColor(img,cv2.COLOR_BGR2RGB)
plt.figure(figsize=(18,12))
plt.imshow(img)
```

Out[4]:
```
<matplotlib.image.AxesImage at 0x7f7d225b4d00>
```

In [5]:
```
img.shape
```

Out[5]:
```
(1401, 934, 3)
```

Adding Salt and Pepper Noise to the image

In [6]:
```
# Salt and Pepper noise cannot be added to color image. Therefore we have to convert the g
```

In [7]:
```
img=cv2.cvtColor(img,cv2.COLOR_BGR2GRAY)
```

In [8]:
```
plt.figure(figsize=(18,12))
plt.imshow(img,cmap='gray')
```

Out[8]:
```
<matplotlib.image.AxesImage at 0x7f7d20394fd0>
```

In [9]:
```
img.shape
```

Out[9]:
```
(1401, 934)
```

In [10]:
```
noisy_img=img.copy()
```

Adding Salt Noise

In [11]:
```
n_salt=np.random.randint(50000,100000)
```

In [12]:
```
for i in range(0,n_salt):
    x=np.random.randint(0,img.shape[0])
    y=np.random.randint(0,img.shape[1])
    noisy_img[x,y]=255
```

In [13]:

```
plt.figure(figsize=(18,12))
plt.imshow(noisy_img,cmap='gray')
```

Out[13]:
```
<matplotlib.image.AxesImage at 0x7f7d20301d00>
```

Adding Pepper Noise

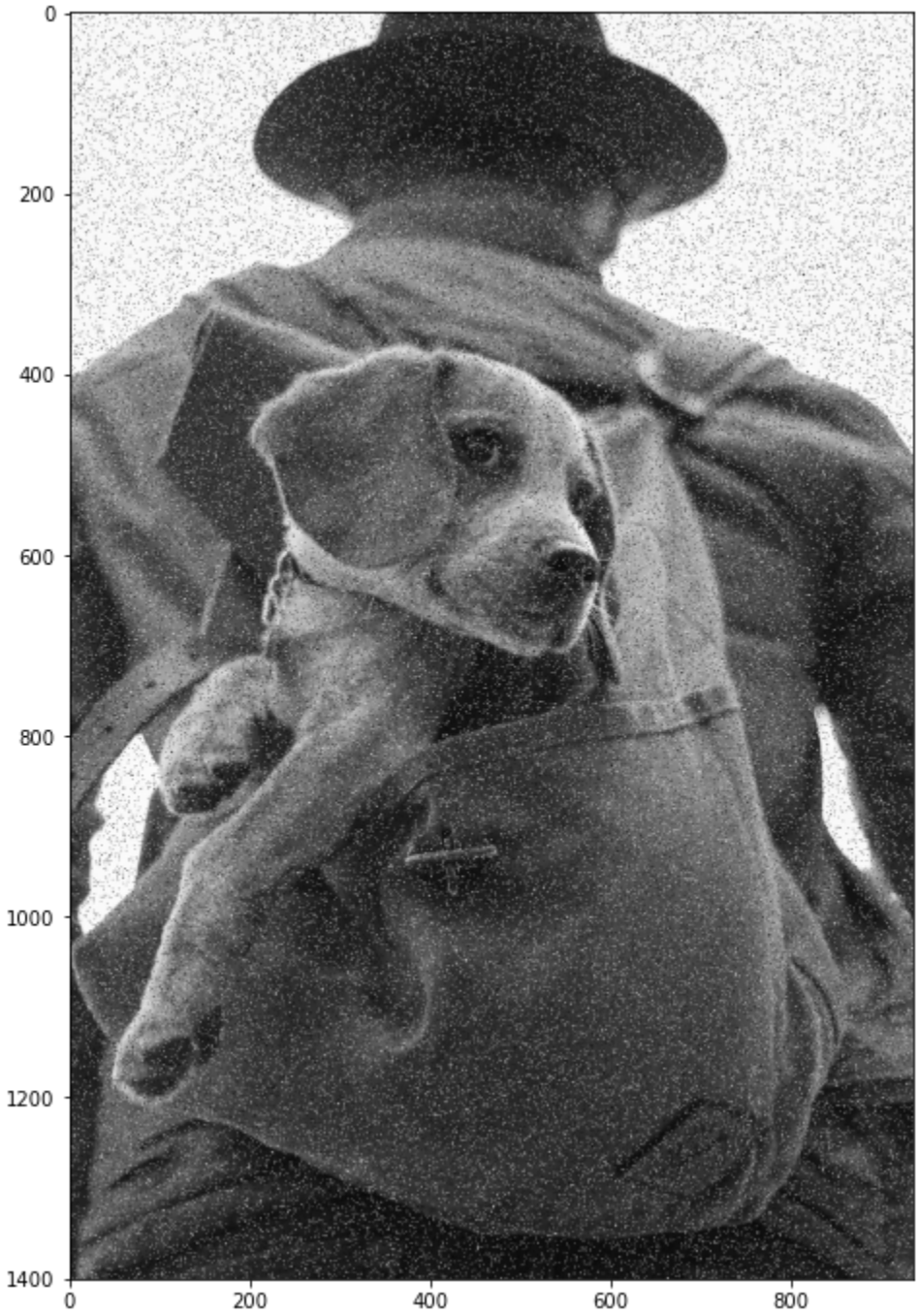
In [14]:
```
n_pepper=np.random.randint(50000,100000)
```

In [15]:
```
for i in range(0,n_pepper):
    x=np.random.randint(0,img.shape[0])
    y=np.random.randint(0,img.shape[1])
    noisy_img[x,y]=0
```

In [16]:
```
plt.figure(figsize=(18,12))
plt.imshow(noisy_img,cmap='gray')
```

```
<matplotlib.image.AxesImage at 0x7f7d202ed8b0>
```

Out[16]:



Removing Salt and Pepper Noise using 3X3 Median Filter

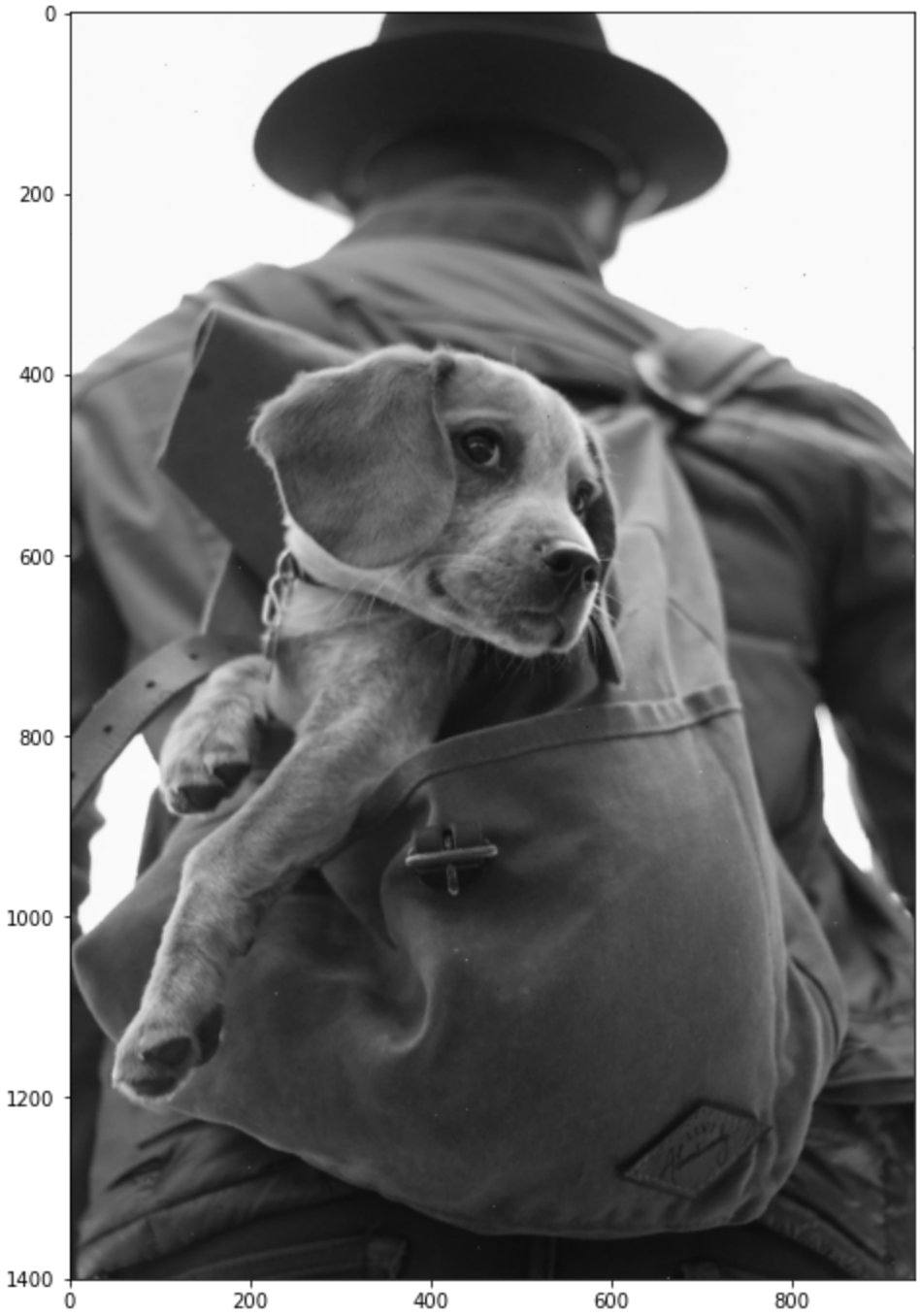
In [17]:
```
medFil_img=noisy_img.copy()
```

In [18]:
```
medFil_img=medFil_img.astype(np.uint8)
```

In [19]:
```
medFil_img=cv2.medianBlur(medFil_img,3)
```

In [20]:
```
plt.figure(figsize=(18,12))
plt.imshow(medFil_img,cmap='gray')
```

Out[20]:
```
<matplotlib.image.AxesImage at 0x7f7d2025a640>
```



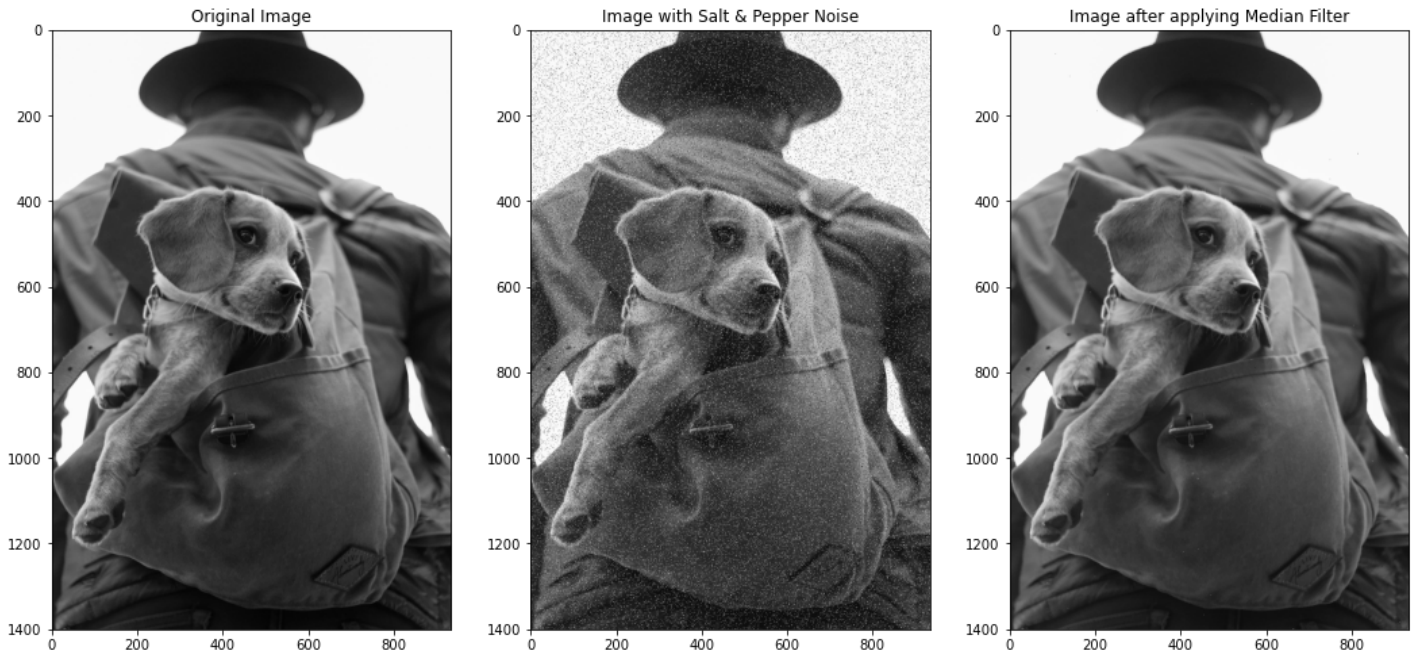
Displaying Final Results

In [21]:

```
fig = plt.figure(figsize=(18,12))
ax1 = fig.add_subplot(131)
ax1.set_title('Original Image')
ax1.imshow(img,cmap='gray')
ax2 = fig.add_subplot(132)
ax2.set_title('Image with Salt & Pepper Noise')
ax2.imshow(noisy_img,cmap='gray')
ax3 = fig.add_subplot(133)
ax3.set_title('Image after applying Median Filter')
ax3.imshow(medFil_img,cmap='gray')
```

Out[21]:

```
<matplotlib.image.AxesImage at 0x7f7d201378e0>
```



Credits:

Suddhasil Chatterjee, BTech CSE, NIT Durgapur.

In [ ]: