In [ ]:

```
%matplotlib inline
from IPython.display import display, Math, Latex

import numpy as np
import matplotlib.pyplot as plt
import requests
from PIL import Image
from io import BytesIO

url = 'https://miro.medium.com/max/1074/1*2I9jCD3ZuQd-SUhC21ra8Q.jpeg'
response = requests.get(url)
img = Image.open(BytesIO(response.content)).convert('L')
```

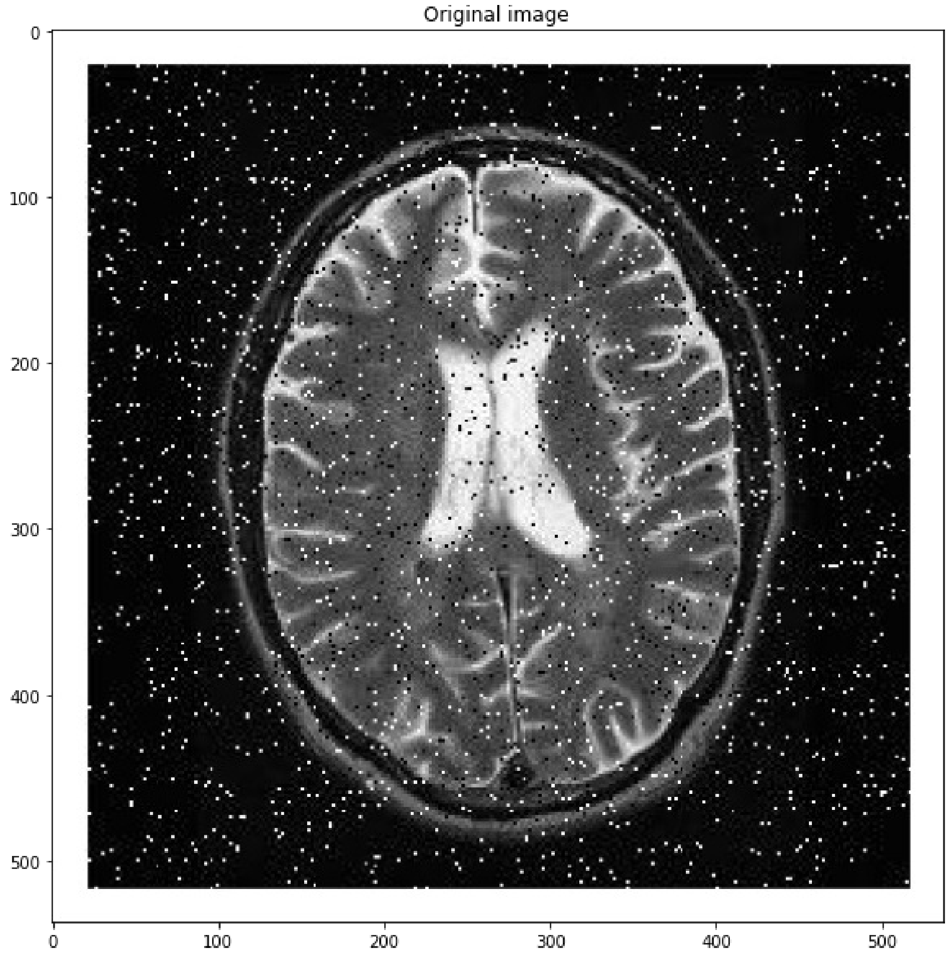
In [ ]:

```
# display the image
figsize = (10,10)
plt.figure(figsize=figsize)

plt.imshow(img, cmap='gray', vmin=0, vmax=255)
plt.title("Original image")
```

Out[ ]:

```
Text(0.5, 1.0, 'Original image')
```



In [ ]:

```
def median_filter(data, filter_size):
    temp = []
    indexer = filter_size // 2
    data_final = []
    data_final = np.zeros((len(data),len(data[0])))
    for i in range(len(data)):

        for j in range(len(data[0])):
            for z in range(filter_size):
                if i + z - indexer < 0 or i + z - indexer > len(data) - 1:
                    for c in range(filter_size):
                        temp.append(0)
                else:
                    if j + z - indexer < 0 or j + indexer > len(data[0]) - 1:
                        temp.append(0)
                    else:
                        for k in range(filter_size):
                            temp.append(data[i + z - indexer][j + k - indexer])

            temp.sort()
            data_final[i][j] = temp[len(temp) // 2]
            temp = []
    return data_final
```

In [ ]:

```
arr = np.asarray(img)
removed_noise = median_filter(arr, 5)
img = Image.fromarray(removed_noise)

# display the image
figsize = (10,10)
plt.figure(figsize=figsize)

plt.imshow(img, cmap='gray', vmin=0, vmax=255)
plt.title("After Median Filtering image")
```

Out[ ]:

```
Text(0.5, 1.0, 'After Median Filtering image')
```