

homework_spectral_analysis

June 1, 2019

```
In [1]: import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import csv
from scripts.functions import powernoise, logistic_map
# import pmodel
import seaborn as sns
import math
from scipy import stats
# from sklearn.preprocessing import MinMaxScaler
```

```
c:\users\samsung\appdata\local\programs\python\python37-32\lib\site-packages\matplotlib\__init__.py:149: DeprecationWarning: The 'examples' directory is deprecated; in the future, examples will be found relative to the 'datapath' directory.
"found relative to the 'datapath' directory.".format(key))
```

```
In [2]: white_noise_normalize = powernoise(beta=0, N=2**12, varargin='normalize')
white_noise_ranpower = powernoise(beta=0, N=2**12, varargin='ranpower')

pink_noise_normalize = powernoise(beta=1, N=2**12, varargin='normalize')
pink_noise_ranpower = powernoise(beta=1, N=2**12, varargin='ranpower')

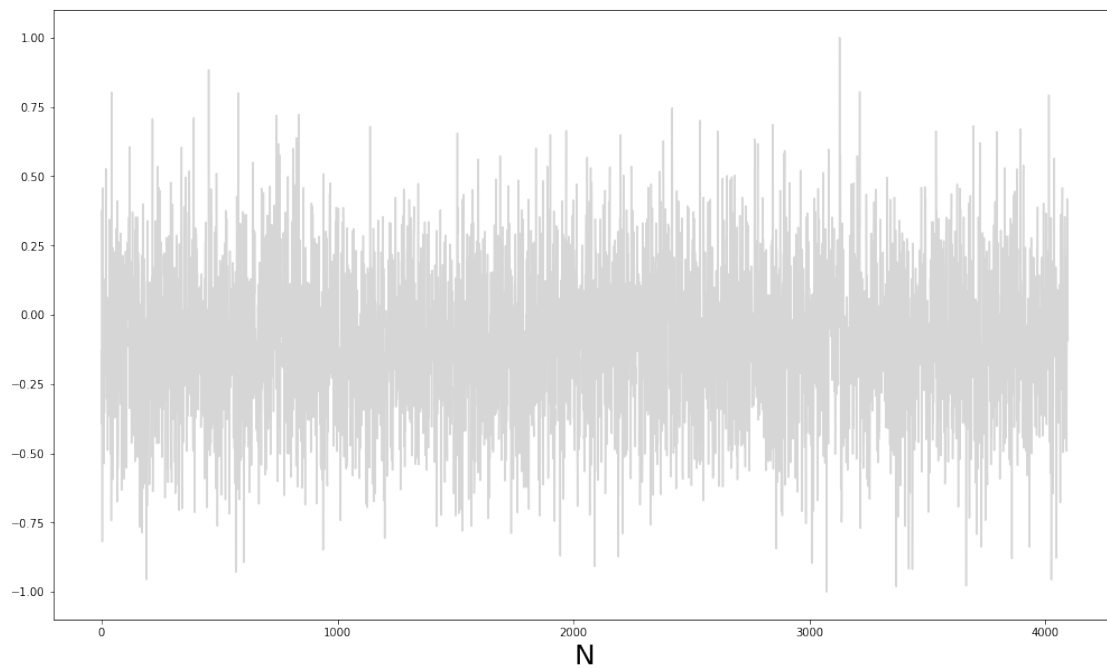
red_noise_normalize = powernoise(beta=2, N=2**12, varargin='normalize')
red_noise_ranpower = powernoise(beta=2, N=2**12, varargin='ranpower')

s1 = white_noise_normalize
s2 = pink_noise_normalize
s3 = red_noise_normalize
```

```
In [3]: plt.figure(figsize=(17, 10))
plt.title('White Noise =0', fontdict={'fontsize': '35'}, y=1.03)
plt.xlabel('N', fontdict={'fontsize': '25'})
plt.plot(white_noise_normalize, color='#d6d6d6')
```

```
Out[3]: [<matplotlib.lines.Line2D at 0x1bbe35b0>]
```

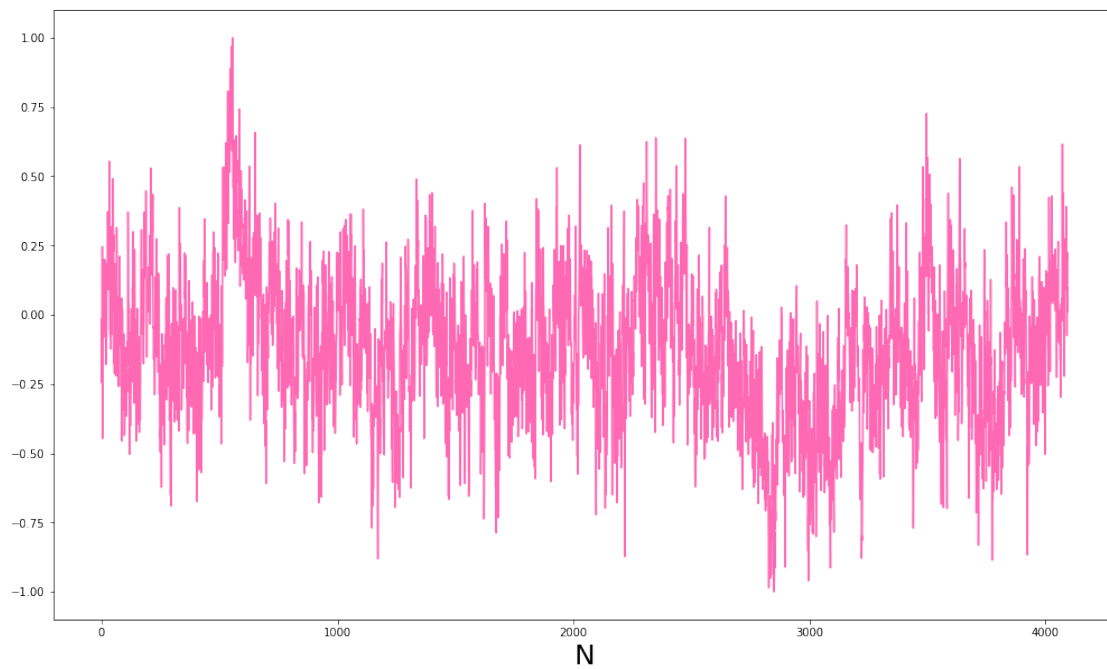
White Noise $\beta=0$



```
In [4]: plt.figure(figsize=(17, 10))  
        plt.title('Pink Noise =1', fontdict={'fontsize': '35'}, y=1.03)  
        plt.xlabel('N', fontdict={'fontsize': '25'})  
        plt.plot(pink_noise_normalize, color='hotpink')
```

```
Out[4]: [<matplotlib.lines.Line2D at 0x1c256d90>]
```

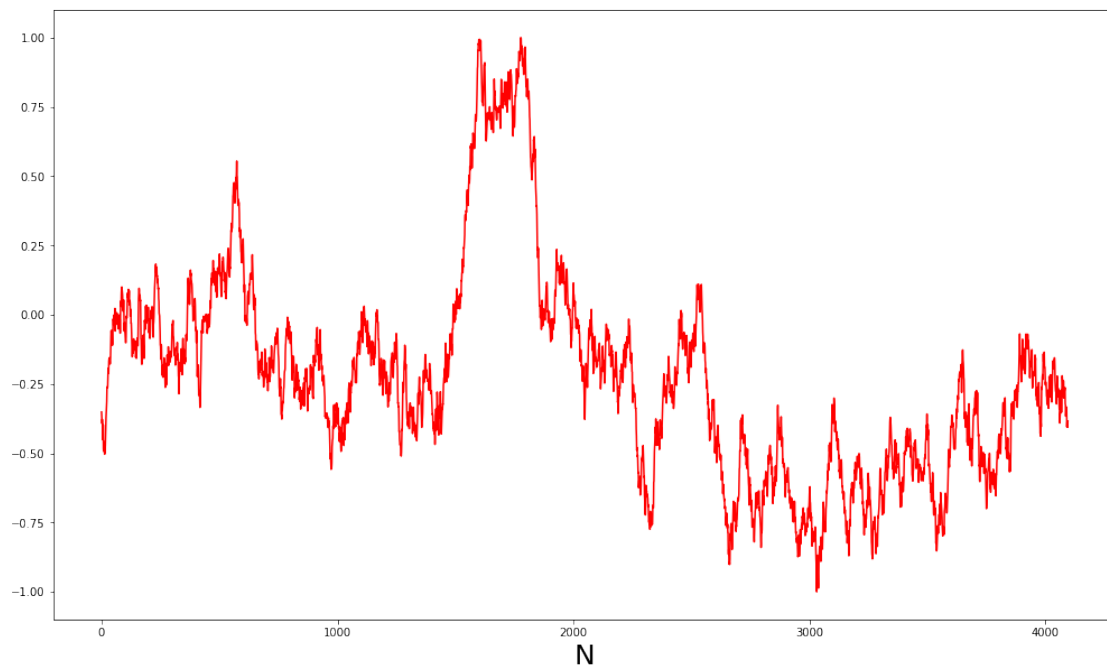
Pink Noise $\beta=1$



```
In [5]: plt.figure(figsize=(17, 10))
plt.title('Red Noise =2', fontdict={'fontsize': '35'}, y=1.03)
plt.xlabel('N', fontdict={'fontsize': '25'})
plt.plot(red_noise_normalize, color='red')
```

```
Out[5]: [<matplotlib.lines.Line2D at 0x1c114890>]
```

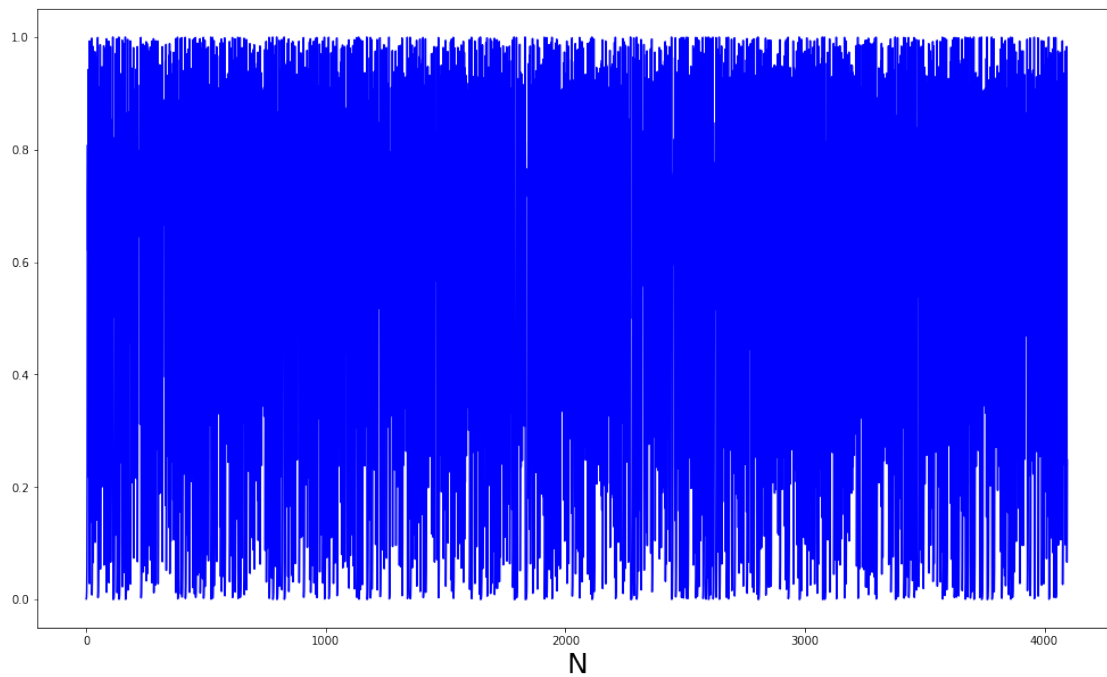
Red Noise $\beta=2$



```
In [6]: s4 = logistic_map(rho=4, a0=0.001, n=2**12)
plt.figure(figsize=(17, 10))
plt.title('Logistic Map =4', fontdict={'fontsize': '35'}, y=1.03)
plt.xlabel('N', fontdict={'fontsize': '25'})
plt.plot(s4, color='#0000FF')
```

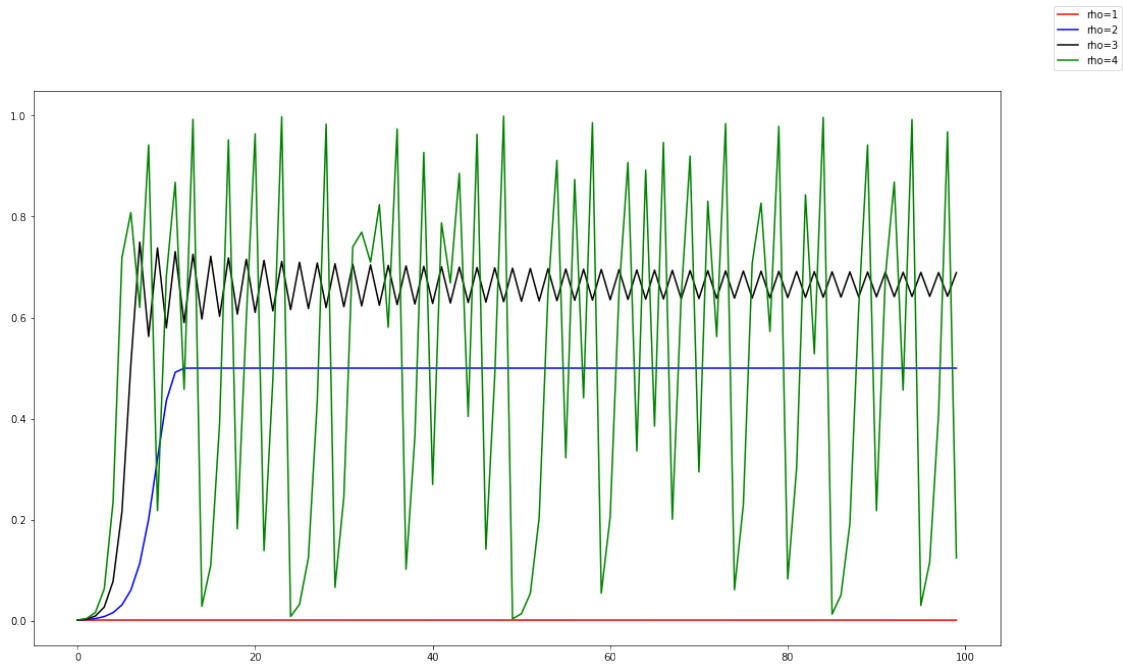
```
Out[6]: [<matplotlib.lines.Line2D at 0x1bed39b0>]
```

Logistic Map $\rho=4$



```
In [7]: fig, ax = plt.subplots(figsize=(17, 10))
        ax.plot(logistic_map(rho=1, a0=0.001, n=100), label='rho=1', color='red')
        ax.plot(logistic_map(rho=2, a0=0.001, n=100), label='rho=2', color='blue')
        ax.plot(logistic_map(rho=3, a0=0.001, n=100), label='rho=3', color='black')
        ax.plot(logistic_map(rho=4, a0=0.001, n=100), label='rho=4', color='green')
        fig.legend()
```

```
Out[7]: <matplotlib.legend.Legend at 0x1bf0ff50>
```



```
In [8]: def normalize(x):
        return ((x - min(x)) / (max(x) - min(x)) - 0.5) * 2

In [9]: s5 = normalize(s1+s4)
        s6 = normalize(s2+s4)
        s7 = normalize(s3+s4)
```