

Solución Lab 4

FISI 6510

Guillermo Fidalgo

February 11, 2021

Exercise 3.1: Plotting experimental data

In the on-line resources you will find a file called `sunspots.txt`, which contains the observed number of sunspots on the Sun for each month since January 1749. The file contains two columns of numbers, the first being the month and the second being the sunspot number.

- Write a program that reads in the data and makes a graph of sunspots as a function of time.
- Modify your program to display only the first 1000 data points on the graph.
- Modify your program further to calculate and plot the running average of the data, defined by

$$Y_k = \frac{1}{2r} \sum_{m=-r}^r y_{k+m},$$

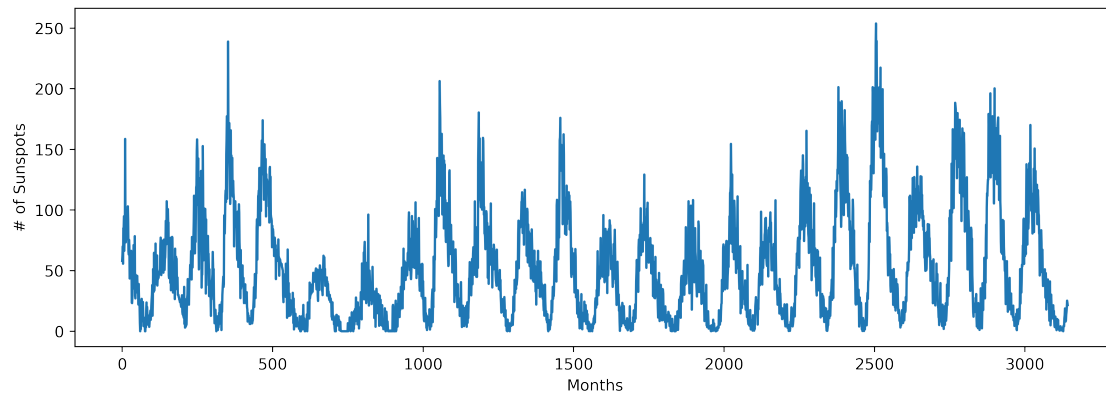
where $r = 5$ in this case (and the y_k are the sunspot numbers). Have the program plot both the original data and the running average on the same graph, again over the range covered by the first 1000 data points.

Parte a)

```
[1]: import matplotlib.pyplot as plt
import numpy as np
```

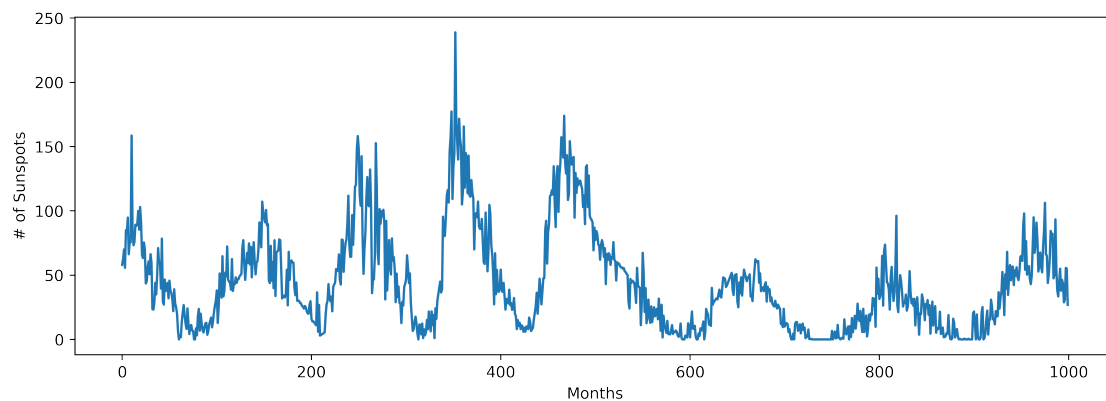
```
[2]: data=np.loadtxt('sunspots.txt')
time=data[:,0]
numspots=data[:,1]
```

```
[3]: plt.figure(dpi=500,figsize=(12,4))
plt.plot(time,numspots)
plt.xlabel('Months')
plt.ylabel('# of Sunspots')
plt.show()
```



Parte b)

```
[4]: plt.figure(dpi=500,figsize=(12,4))
plt.plot(time[:1000],numspots[:1000])
plt.xlabel('Months')
plt.ylabel('# of Sunspots')
plt.show()
```



Parte c)

```
[5]: # Calculando el running average
def runingAvg(y,r=5):
    Y=[]
    for k in range(len(y)):
        avg=0
        if k>=r and k < len(y)-r:
```

```

    for m in range(-r,r+1,1):
        avg=(.5/r)*(y[k+m])+avg
    Y.append(avg)
return Y

```

```
[6]: RunAvg=runingAvg(numspots,r=5)
```

```

[7]: plt.figure(dpi=500,figsize=(12,4))
plt.plot(time[:1000],numspots[:1000])
plt.plot(time[:1000],RunAvg[:1000])
plt.xlabel('Months')
plt.ylabel('# of Sunspots')
plt.show()

```

