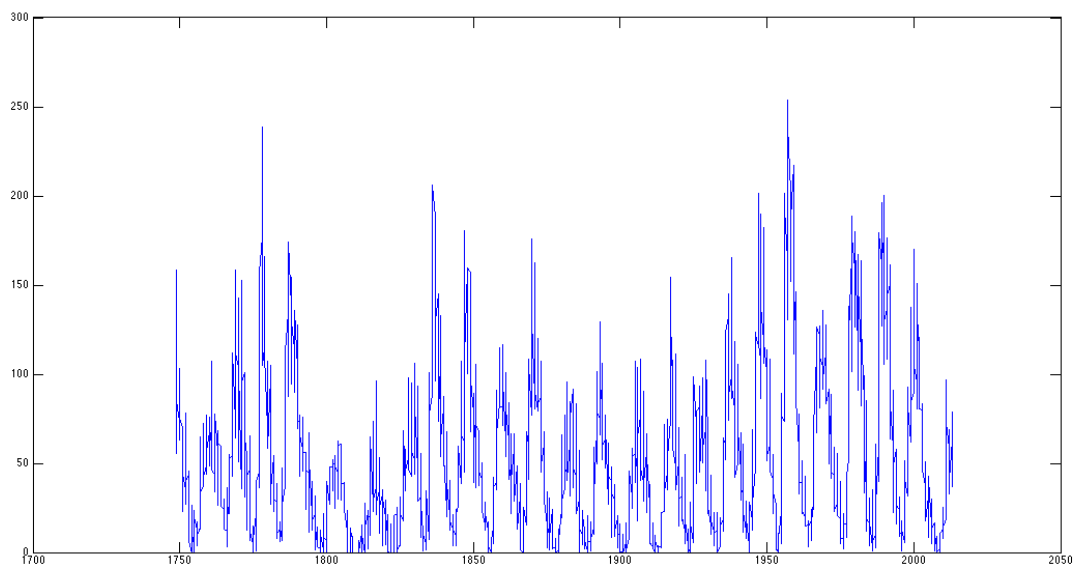

Hw3-5: Fourier Transformation

15826 – Multimedia Databases and Data Mining

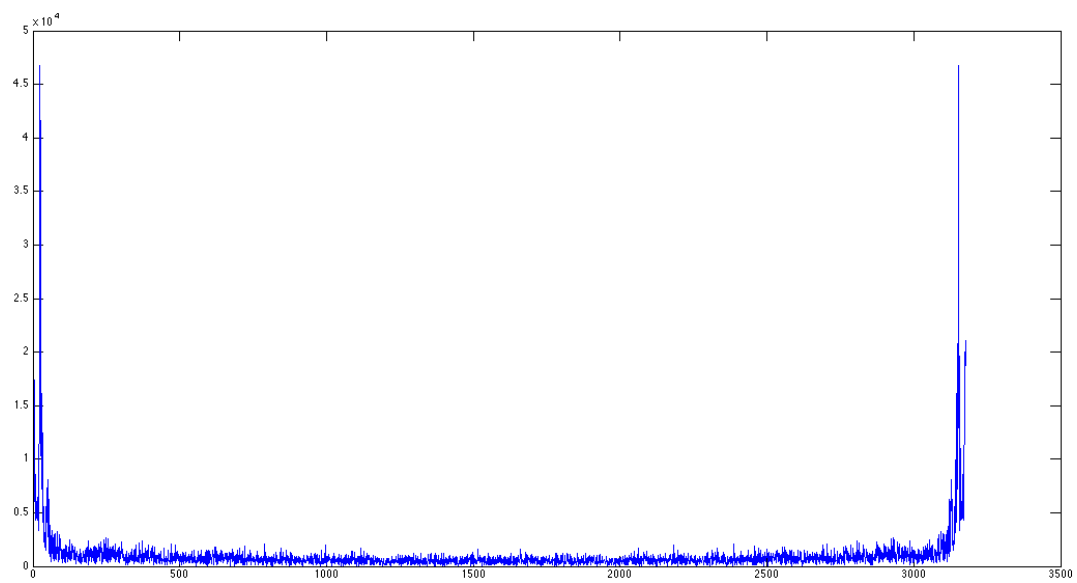
Fall 2013, C. Faloutsos

Emma R. Zhang{runyunz@andrew.cmu.edu} - November 18, 2013

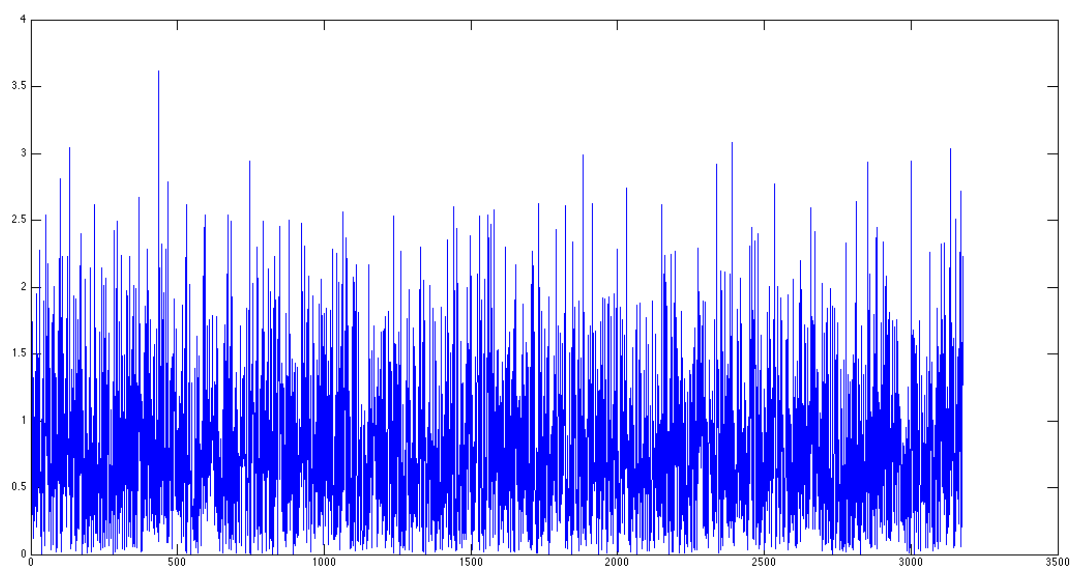
Plot



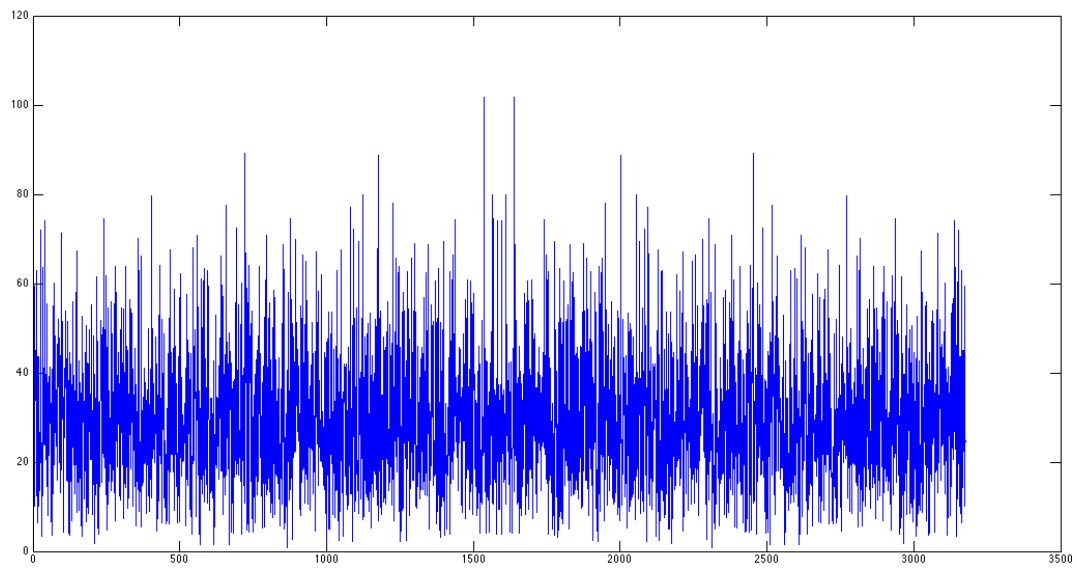
s1 - time series



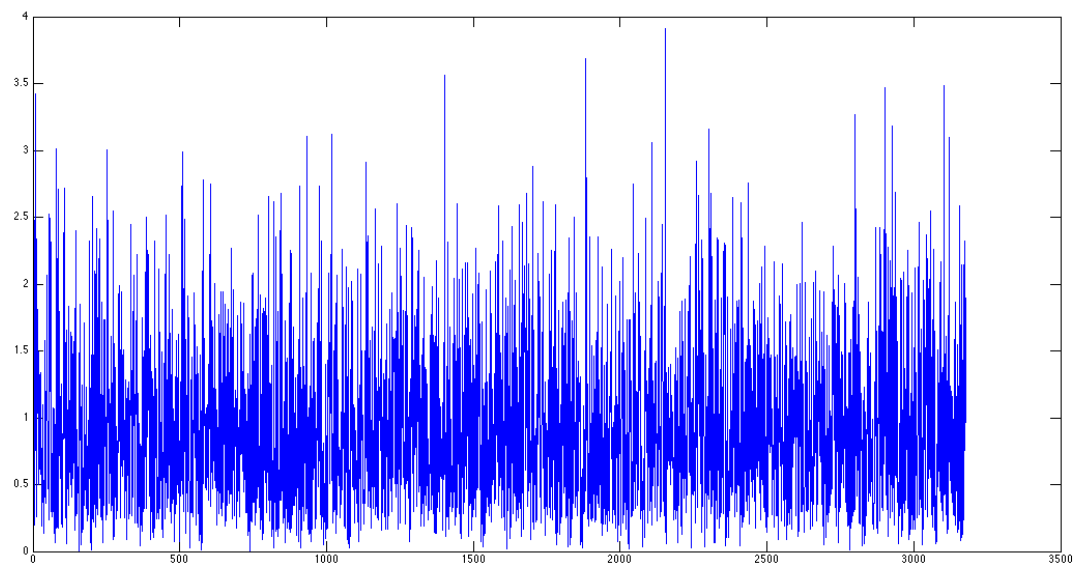
s2 - frequency/spectrum plot(without frequency 0)



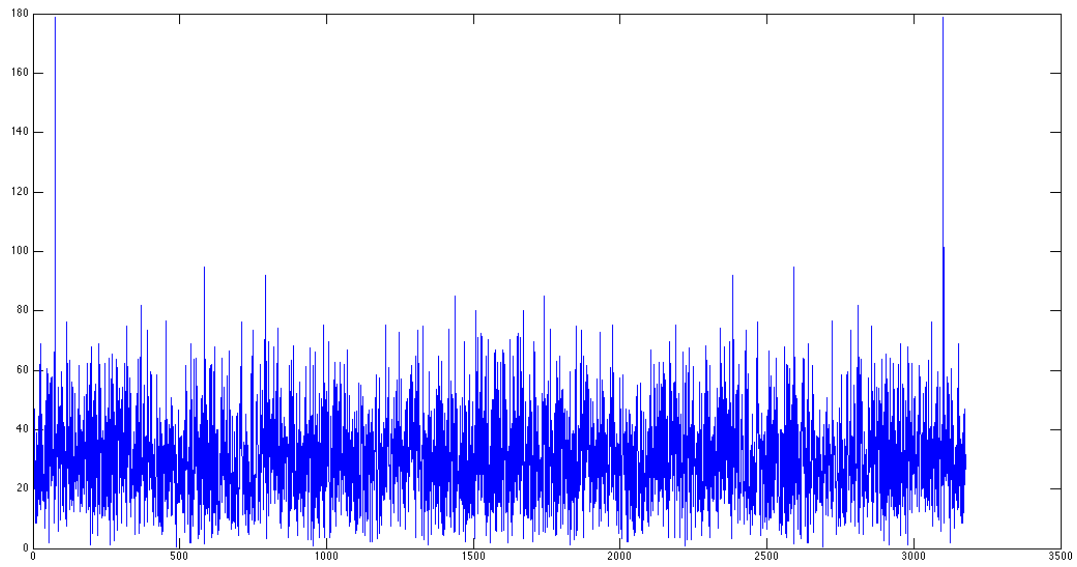
s4 - signal plot



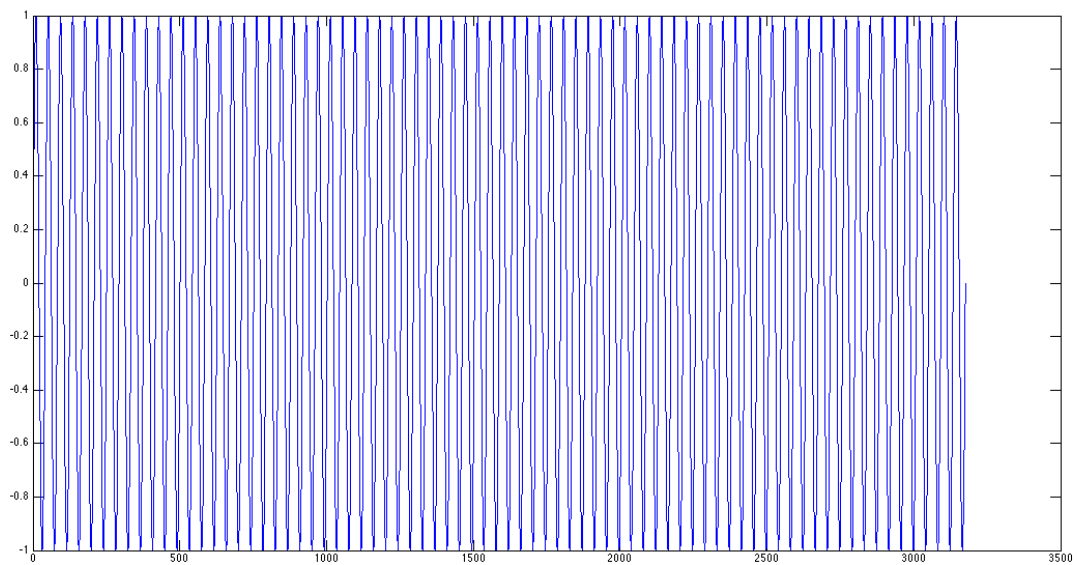
s4 - frequency/spectrum plot(without frequency 0)



s5 - signal plot



s5 - frequency/spectrum plot(without frequency 0)



s6 - secret sinusoid plot without amplitude recovery

Answers

S3 - Calculating Periodicity

Frequency = 24 (and 3153)

Period = (length(time series) - 1) / Frequency / 12
= 3176 / 24 / 12 = 11.0278

S4 - Finding Frequency

No frequency stands out in this case.

S5 - Finding Frequency II

Frequency 76 (and 3101) stands out.

S6 - Recovering Sinusoid

$t = \sin(2 * \pi * 76 / 3177)$

Code

q5.m

```
%s1
plot(YEAR, SSN);

%s2
X = SSN;
Xf=fft(X);
Xf(1)=[ ];
plot(abs(Xf));

%s3 freq 24(3153) period=11.0278
idx = find(abs(Xf) == max(abs(Xf)));
freq = min(idx);
period = length(Xf)/freq/12;

%s4 no frequency stands out
plot(Y);
Yf=fft(Y);
Yf(1)=[ ];
plot(abs(Yf));

%s5 freq 76(3101) stands out
plot(YM);
YMf=fft(YM);
YMf(1)=[ ];
plot(abs(YMf));
idx = find(abs(YMf) == max(abs(YMf)));

%s6
s = linspace(0,1,length(YM));
t = sin(2 * pi * min(idx) * s);
plot(0:length(YM)-1, t);
```