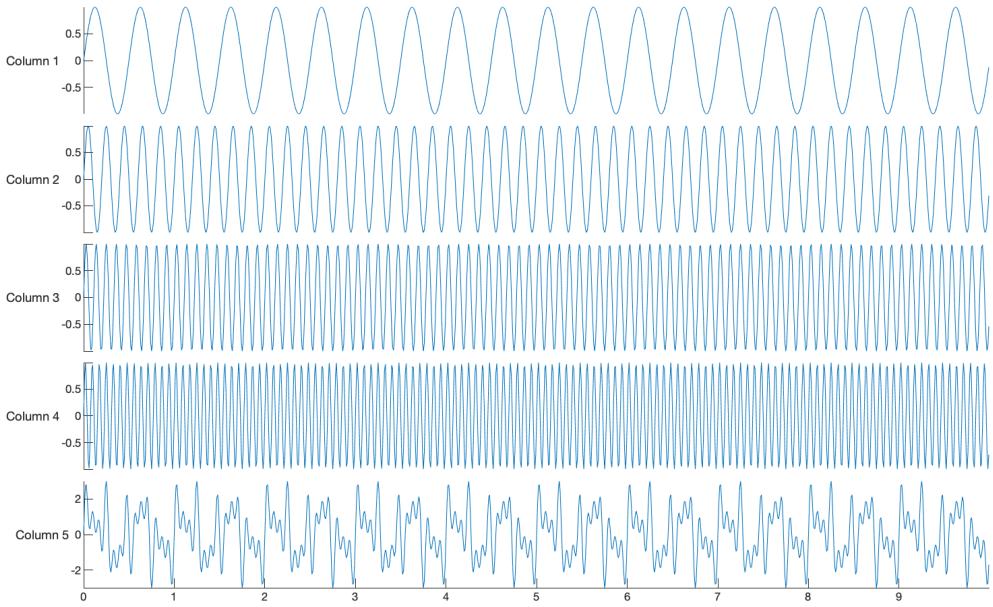
Neural Time-Series Analysis Lab

--Shaojun Yu

Code repo:

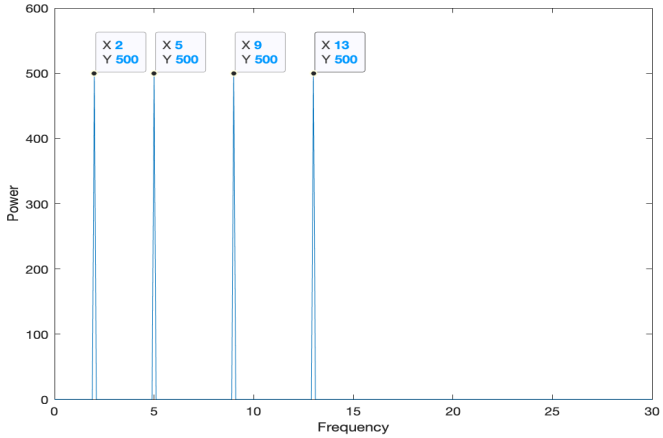
https://github.com/shaojunyu/BMI500/tree/master/Time-Series%20Lab

a) sine waves (Frequency: 2, 5, 9, 13 Hz), the Column 5 is sum of four waves



Fourier analysis:

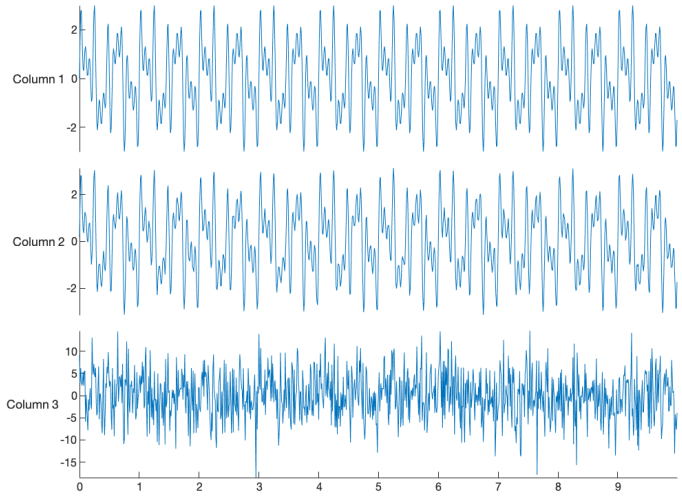
We could observe 4 peeks at frequency of 2, 5, 9, 13



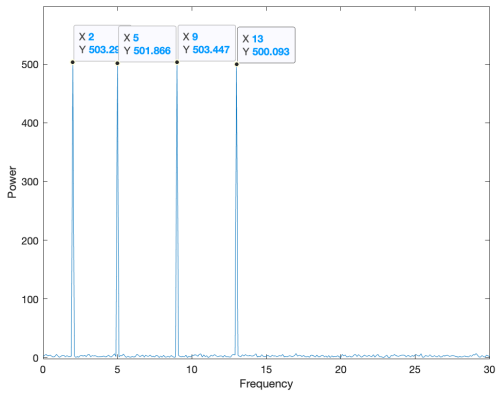
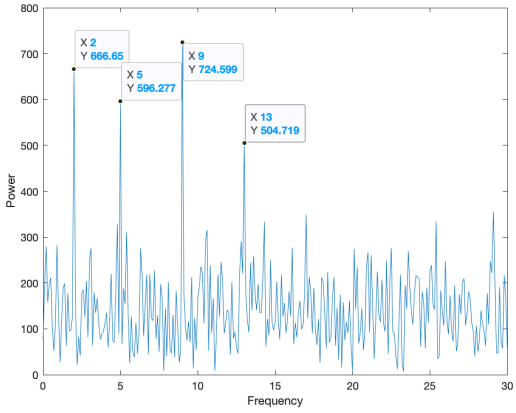
b) Column 1: original sine wave

Column 2: add small nosie

Column 3: add large nosie

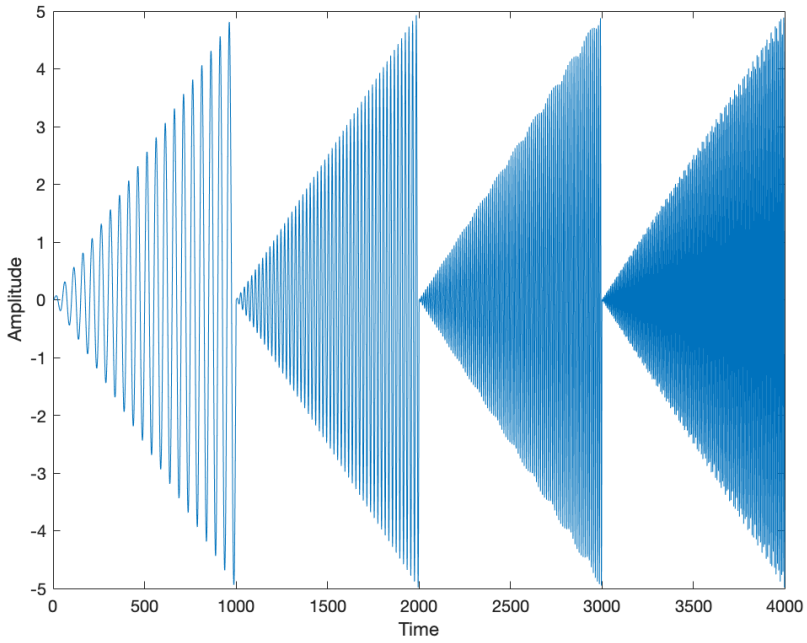


Fourier analysis:

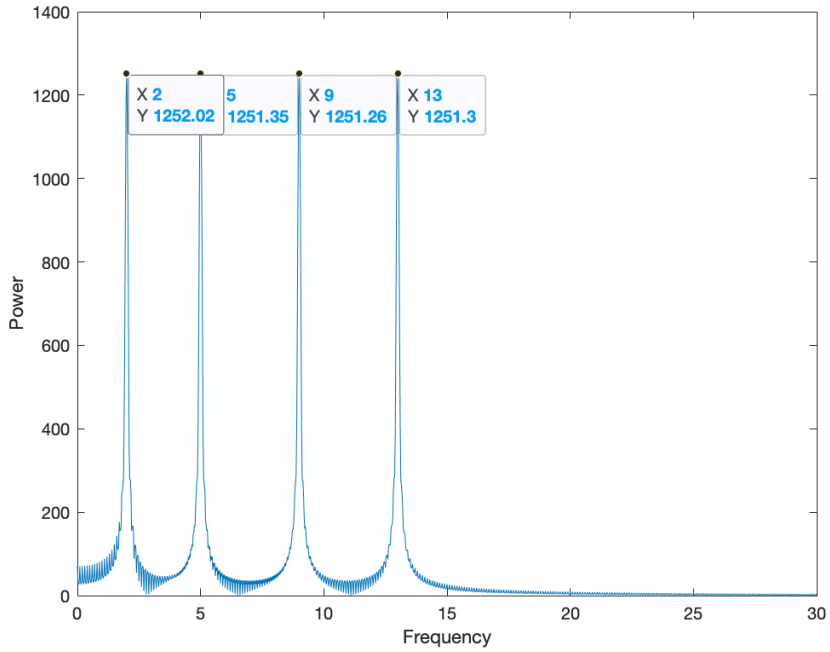
FFT of small noise	FFT of large noise
	

Noise singals in sine wave will produce some other peeks (noise) in the power spectrum, the larger noise in singal will also bring more noise in power. After adding noise, the sine waves are easier to detect in in the frequency domain.

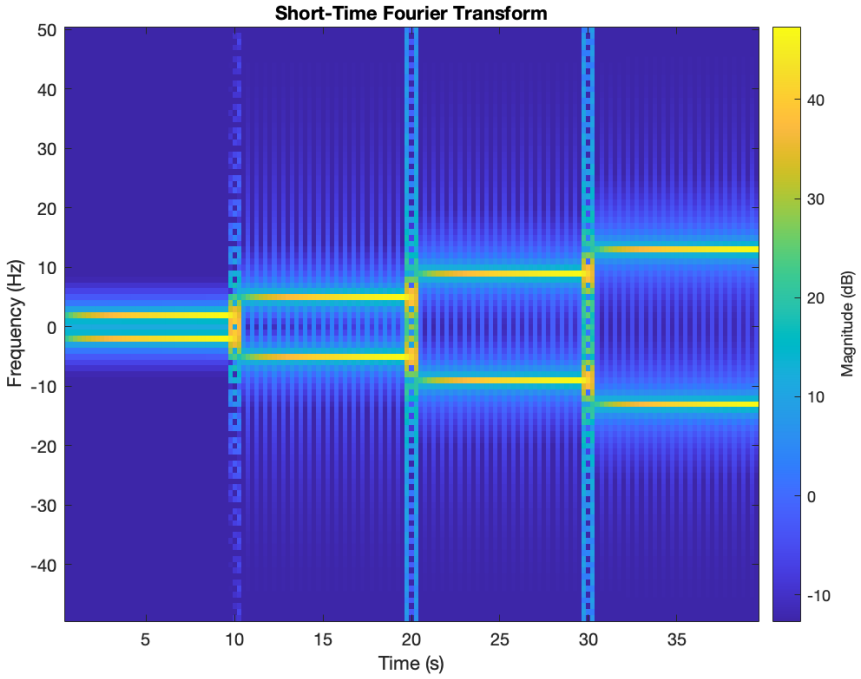
c) nonstationary time series

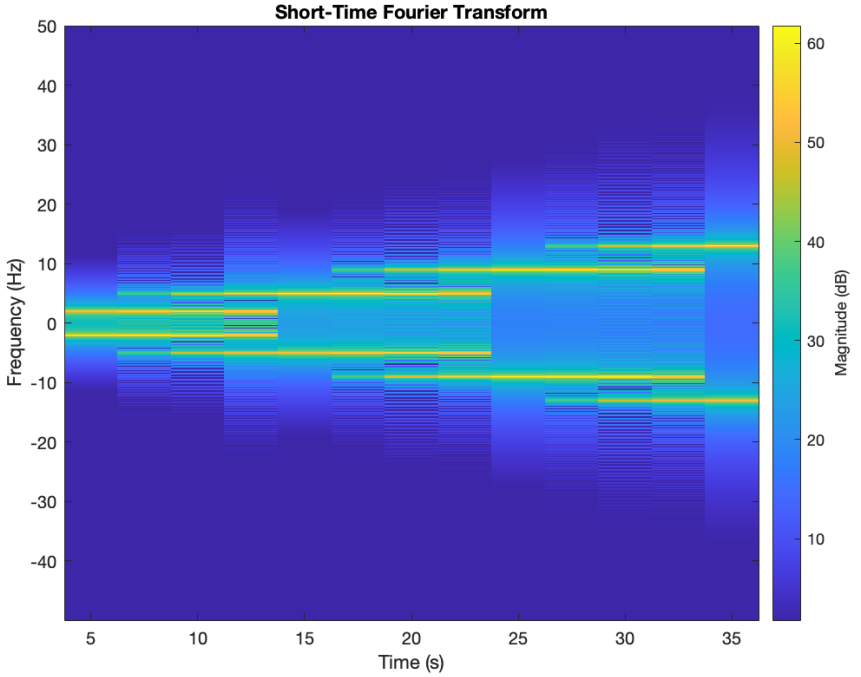


FFT of nonstationary time series:



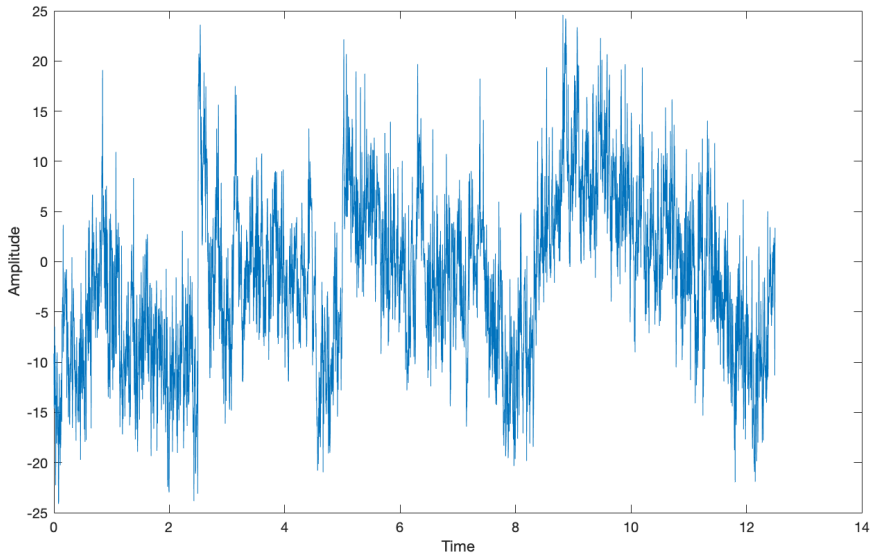
d) Short-Term Fourier Transform



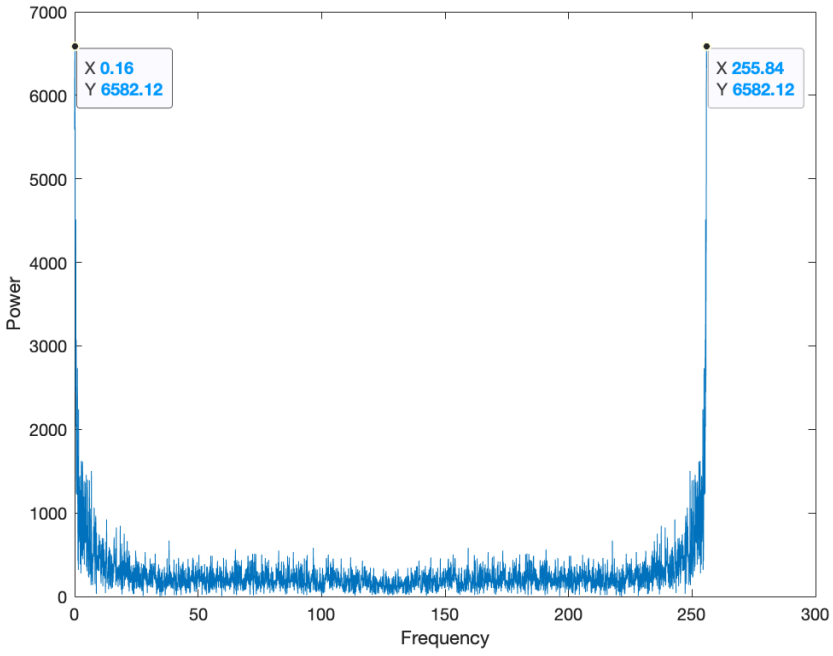


e)

4 trails can be identified from the eeg data.

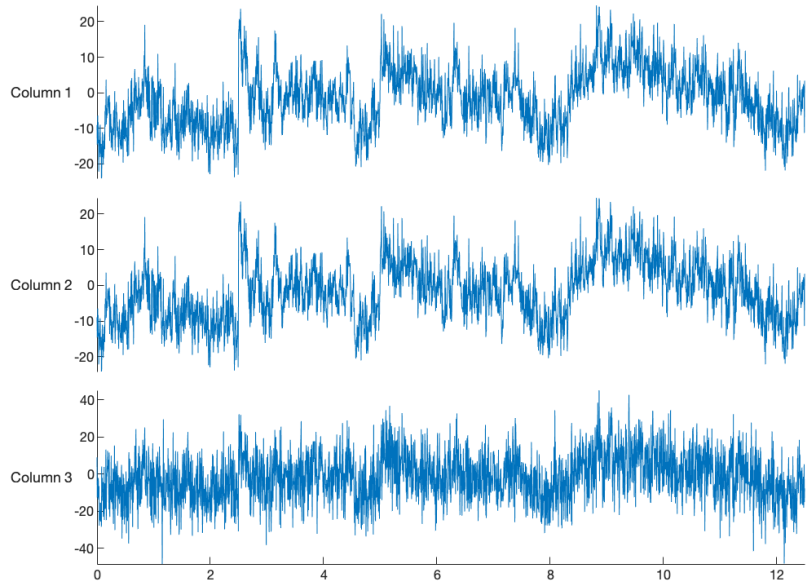


Fourier analysis:



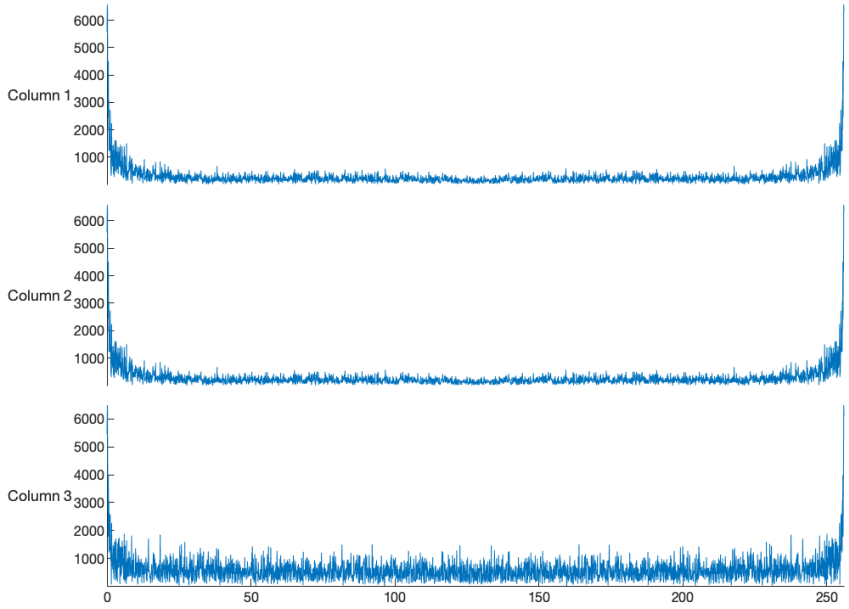
Add noise:

Column 1: original
Column 2: add small noise
Column 3: add large noise



Fourier analysis:

Column 1: FFT of original
Column 2: FFT of small noise
Column 3: FFT of large noise



Short-Term Fourier Transform