Lab 5

BIEN 4320

11/ 17 /21

Zach Thompson, Emmalee Volk





Original R-wave magnitude of 60bpm ECG: 0.0029 V (2.9 mV)





%% Lab 5a – Part 1

bpm30 = readmatrix('30bpm.txt'); % read both data files in a matrix

bpm60 = readmatrix('60bpm.txt');

fs = 1/.0001; % calculate sampling frequency

t\_bpm30 = (1:length(bpm30))/fs; % create time vector

plot(t\_bpm30, bpm30(:,2)); % plot data

xlabel('Time (sec)');

ylabel('Amplitude (volts)');

title('Simulated ECG @ 30bpm');

t\_bpm60 = (1:length(bpm60))/fs; % create time vector

figure(2) % new figure

plot(t\_bpm60, bpm60); % plot data

xlabel('Time (sec)');

ylabel('Amplitude (volts)');

title('Simulated ECG @ 60bpm');

%% Lab 5a - Part 2

gain = 49400/(200 + 1);

max\_val = max(bpm60(:,2));

min\_val = min(bpm60(:,2));

r\_mag = (max\_val - min\_val)/gain;

%% Lab 5a - Part 3

f\_bpm30 = (0:length(bpm30)/2)\*fs/length(bpm30); % create frequency vector

fft\_bpm30 = fft(bpm30(:,2)); % calculate fft of signal

mag\_bpm30 = abs(fft\_bpm30/length(bpm30)); % calculate magnitude

scaled\_bpm30 = mag\_bpm30(1:length(bpm30)/2+1); % scale

figure(3)

plot(f\_bpm30, scaled\_bpm30); % plot fft

xlabel('Frequency (Hz)');

ylabel('Magnitude (mV)');

title('Simulated ECG FFT @ 30bpm');

xlim([0 125]); % limit plot to relevant frequencies

f\_bpm60 = (0:length(bpm60)/2)\*fs/length(bpm60); % create frequency vector

fft\_bpm60 = fft(bpm60(:,2)); % calculate fft of signal

mag\_bpm60 = abs(fft\_bpm60/length(bpm60)); % calculate magnitude

scaled\_bpm60 = mag\_bpm60(1:length(bpm60)/2+1); % scale

figure(4)

plot(f\_bpm60, scaled\_bpm60); % plot fft

xlabel('Frequency (Hz)');

ylabel('Magnitude (mV)');

title('Simulated ECG FFT @ 60bpm');

xlim([0 125]) % limit plot to relevant frequencies