
Problem 10

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Initialization and comments

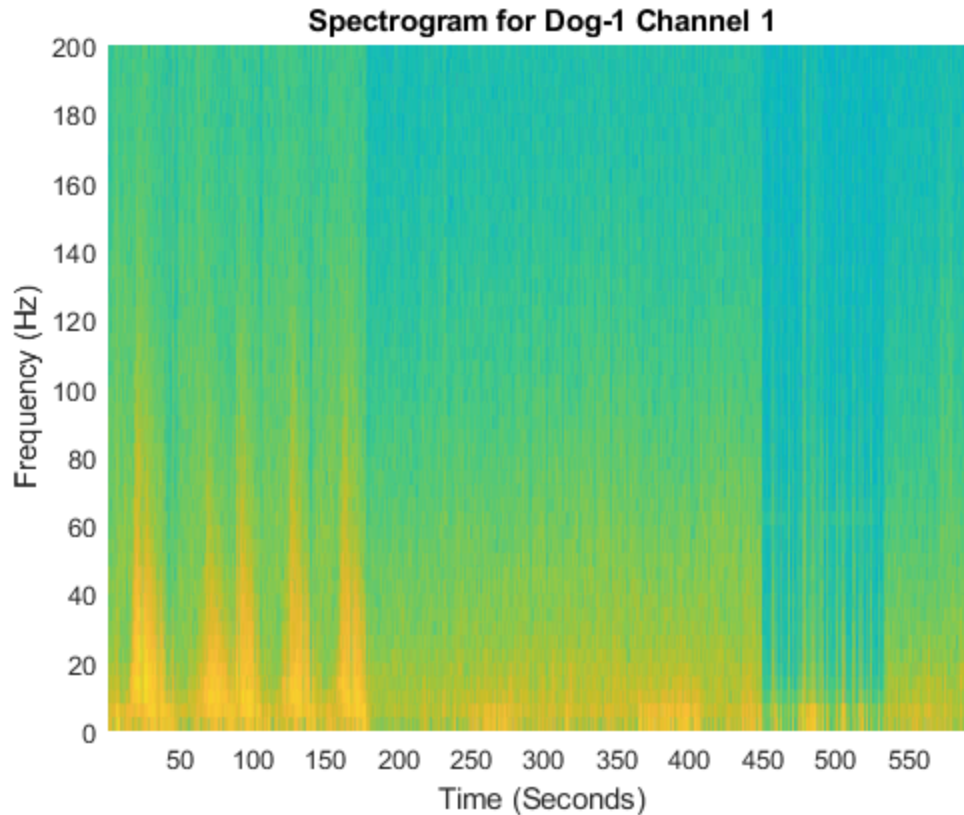
The logic is coded separately for each sub-question for better understanding. Note that this way is inefficient as it uses a loop to iterate over all the samples for each sub-question. It is actually better and saves time to use a single for loop and build all the logic within.

```
clearvars
close all
mat = dir('*.mat');
ch=1;
```

Part-a: Spectrogram

```
x=[];
for index=1:length(mat)
    load(mat(index).name);
    x=[x data];
end
Fs=ceil(freq); % Made as integer as spectrogram command requires an
integer as sampling frequency.

[S,F,T,P]=spectrogram(x(ch,:),100,80,100,Fs);
figure(1)
surf(T,F,20*log10(abs(S)), 'edgecolor','none'); axis tight;
view(2)% for top-view
xlabel('Time (Seconds)')
ylabel('Frequency (Hz)')
title("Spectrogram for Dog-1 Channel 1")
```



Part-b: Welch's PSD estimation

```

ictal=[];
for index=1:178
    load(mat(index).name);
    ictal=[ictal data(ch,:)];
end

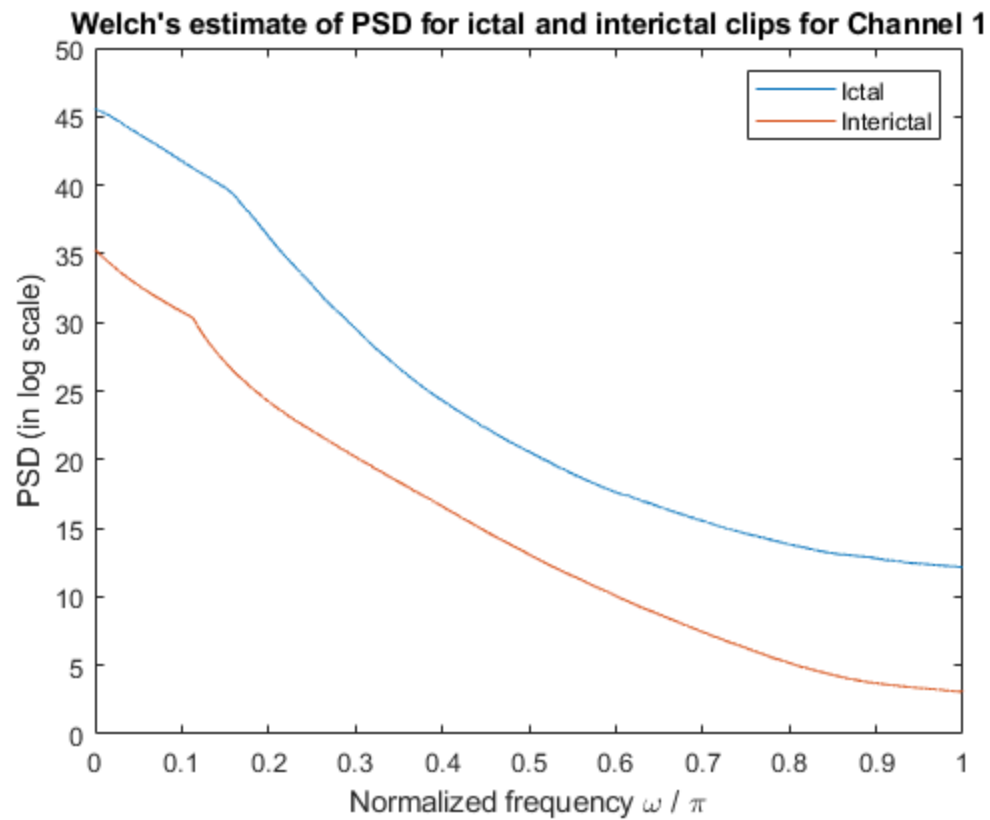
interictal=[];
for index=179:length(mat)
    load(mat(index).name);
    interictal=[interictal data(ch,:)];
end

[p_ictal,w1]=pwelch(ictal);
[p_interictal,w]=pwelch(interictal);

figure(2)
plot(w1/pi,smoothdata(10*log10(p_ictal)))
hold on
plot(w/pi,smoothdata(10*log10(p_interictal)))
hold off
xlabel('Normalized frequency \omega / \pi')
ylabel('PSD (in log scale)')
title('Welch's estimate of PSD for ictal and interictal clips for Channel 1')

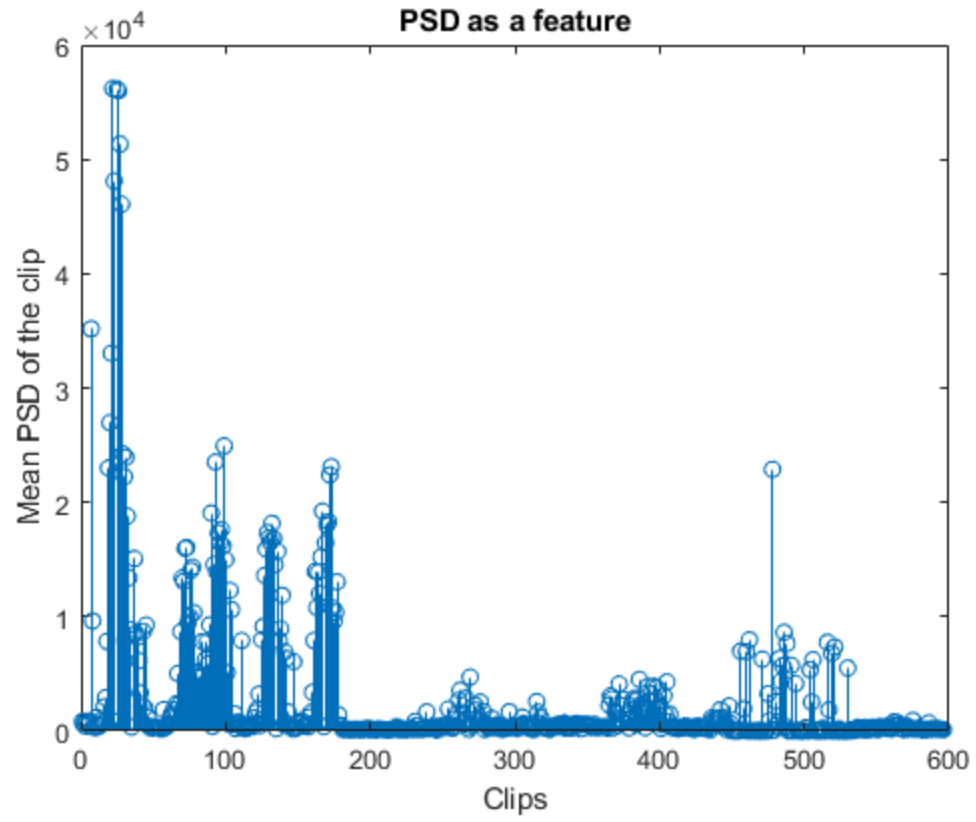
```

```
legend('Ictal','Interictal')
```



Part-c: Average PSD as a feature

```
for index=1:length(mat)
    load(mat(index).name);
    pxx=pwelch(data(ch,:));
    Power(index)=mean(pxx);
end
figure(3)
stem(Power)
xlabel('Clips')
ylabel('Mean PSD of the clip')
title('PSD as a feature')
```



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