```
[y1,Fs]=audioread('arctic_a0001.wav');
sp=y1(:,1);
s=resample(sp,8000,Fs);
plot(s);
Fs=8000;
t = 0:1/Fs:length(s)/Fs - 1/Fs;
%% Narrow band spectrogram
% Window length of 30 msec and step of 10 msec
figure; a1=subplot(211);
plot(t,s); xlabel('Tim/e (s)'); axis tight;
a2=subplot(212);
spectrogram(s, 30*10^(-3)*Fs, 10*10^(-3)*Fs, 1024, Fs, 'yaxis')
axis tight;
linkaxes([a1 a2],'x')
%view(-45,65)
%% Wideband spectrogram
figure; subplot(211);
plot(t, s); xlabel('Time (s)');
subplot(212);
spectrogram(s, 3*10^(-3)*Fs, 1*10^(-3)*Fs, 1024, Fs, 'yaxis')
```

Relation b/w STFT and STACF

```
[y1,Fs]=audioread('arctic_a0001.wav');
sp=y1(:,1);
speech=resample(sp,8000,Fs);
y=speech;Fs=8000;
y=speech(4001:4500);
plot(speech);
L=length(y);
NFFT = 2^nextpow2(L);
seg_fft = fft(y,NFFT);
z = seg_fft(1:1+NFFT/2);
z= abs(z(1:NFFT/2+1));
f_scale = (0:NFFT/2)* Fs/NFFT;
 %z=20*log10(z);
 figure;
 subplot(211);
 plot(f_scale,z);
 title('ST linear magnitude spectrum')
xlabel('Frequency (Hz)','FontSize',10,'FontWeight','bold');
ylabel('Magnitude','FontSize',10,'FontWeight','bold');
 r=xcorr(y);
subplot(212);plot(r(500:end));
title('STACF')
xlabel('Lag (in Samples)','FontSize',10,'FontWeight','bold');
```