Labsheet 4

1. From the segmented speech signal in the previous lab sheet, calculate the short time energy.  
   The segments should be 30 msec duration with 50% overlap

clc

clear

clear

[a,fs]=audioread('speech.wav');

n=0.03\*fs;

off=floor(0.015\*fs);

v=1;

ln=length(a);

t=floor(ln/(n-off));

%segmenting

for i=1:t

for j=1:n

if v<=ln

x(i,j)=a(v);

v=v+1;

else

x(i,j)=0;

end

end

v=v-off;

end

%generating hamming window

h=hamming(n);

%multipling with hamming window

for i=1:t

for j=1:n

z(i,j)=x(i,j)\*h(j);

end

end

%fnding energy

E=zeros(1,t);

for i=1:t

for j=1:n

E(i)=E(i)+(z(i,j))^2;

end

end

%ploting the waveform vs energy of the signal

subplot(2,1,1);

plot(a);

title('orginal waveform');

subplot(2,1,2);

num=1:t;

stem(num,E);

title('energy of wavefrorm');

1. Record the alphabet ‘a’ and alphabet‘s’. Compare the short time energy in each case. Comment  
   on your inference

Code:

clc

clear

clear

[a,fs1]=audioread('a.wav');

[s,fs2]=audioread('s.wav');

% procession of A

[A,t1]=energy(a,fs1);

figure(1);

%ploting the waveform vs energy of the signal

subplot(2,1,1);

plot(a);

title('orginal waveform of A');

subplot(2,1,2);

num=1:t1;

stem(num,A);

title('energy of wavefrorm A');

% procession of B

[S,t2]=energy(s,fs2);

figure(2);

%ploting the waveform vs energy of the signal

subplot(2,1,1);

plot(s);

title('orginal waveform of S');

subplot(2,1,2);

num=1:t2;

stem(num,S);

title('energy of wavefrorm S');

FUNCTON:

function[E,t]=energy(a,fs)

n=0.03\*fs;

off=floor(0.015\*fs);

v=1;

ln=length(a);

t=floor(ln/(n-off));

%segmenting

for i=1:t

for j=1:n

if v<=ln

x(i,j)=a(v);

v=v+1;

else

x(i,j)=0;

end

end

v=v-off;

end

%generating hamming window

h=hamming(n);

%multipling with hamming window

for i=1:t

for j=1:n

z(i,j)=x(i,j)\*h(j);

end

end

%fnding energy

E=zeros(1,t);

for i=1:t

for j=1:n

E(i)=E(i)+(z(i,j))^2;

end

end

1. Plot one cycle of the sine wave and verify the number of zero crossings using the above equation.

Code:

clc

clear

f=10;

fs=1000;

t=0:1/fs:1;

s=sin(2\*pi\*f\*t);

plot(t,s);%ploting the

n=length(s);

z=0;

for i=2:n

if i<n-1

z = z+(abs(sign(s(i+1))-sign(s(i))));

end

end

z=floor(z/2)% gettng the value of z right

OUTPUT:

z = 19

1. From the segmented speech signal in the previous lab sheet, calculate the short time ZCR. The  
   segments should be 30 msec duration with 50% overlap.

Code:

clc

clear

%importng the audio files

[a,fs]=audioread('speech.wav');

%segmenting wave

[A,n,t]=segment(a,fs);

%generating hamming window

h=hamming(n);

%finding zero count of each segment

z=zeros(t,1);

for i=1:t

for j=1:n

if j<n-1

z(i)=z(i)+(abs(sign(A(i,j+1))-sign(A(i,j))))\*h(j);

end

end

z(i)=floor(z(i)/2);

end

z

FUNCTION:

function[x,n,t]=segment(amp,fs)

n=0.06\*fs;

off=floor(0.03\*fs);

v=1;

ln=length(amp);

t=floor(ln/(n-off));

%segmenting

for i=1:t

for j=1:n

if v<=ln

x(i,j)=amp(v);

v=v+1;

else

x(i,j)=0;

end

end

v=v-off;

end

OUTPUT:

z = 24 32 30 27 31 31 34

1. Record the alphabet ‘a’ and alphabet‘s’. Compare the short time energy in each case. Comment  
   on your inference.

Code:

clc

clear

%importng the audio files

[a,fs1]=audioread('a.wav');

[s,fs2]=audioread('s.wav');

%segmenting a

[A,n,t]=segment(a,fs1);

%generating hamming window

h=hamming(n);

%finding zero count of each segment

za=zeros(t,1);

for i=1:t

for j=1:n

if j<n-1

za(i)=za(i)+(abs(sign(A(i,j+1))-sign(A(i,j))))\*h(j);

end

end

za(i)=floor(za(i)/2);

end

za

%segmenting b

[B,n,t]=segment(s,fs2);

%generating hamming window

h=hamming(n);

%finding zero count of each segment

zb=zeros(t,1);

for i=1:t

for j=1:n

if j<n-1

zb(i)=zb(i)+(abs(sign(B(i,j+1))-sign(B(i,j))))\*h(j);

end

end

zb(i)=floor(zb(i)/2);

end

zb

OUTPUT:

za = 90 35 33 30 31 29 28 31 30 30 25 25 25 24 26 28 23 25 64 54 91 102 83

zb = 164 127 82 35 32 29 31 29 30 50 122 180 162 183 214 218 184 141 95

1. From one segment of speech signal plot the

Code:

clc

clear

%importng the audio files

[a,fs]=audioread('speech.wav');



%segmenting wave

[A,n,t]=segment(a,fs);

for i=1:20

seg=A(i,1:n);

R=xcorr(seg);

%finding peaks

[pks,locs]=findpeaks(R);

[pk,mloc]=max(pks);

%locaton of first max

loc1=locs(mloc);

%findng location of second max

pks(mloc)=0;

[pk,mloc]=max(pks);

loc2=locs(mloc);

P(i)=loc1-loc2;

PF(i)=1/P(i);

figure(i);

plot(R);

end

P

mean\_P=mean(P)

OUTPUT:

mean\_P = 283.4500