EXP 6 ***FAST FOURIER TRANSFORM***

28/7/14

AIM:

To perform DFT of a sequence implementing FFT algorithms.

PROGRAM:

RADIX-2 DIT ALGORITHM:

clc;

clear all;

close all;

n1=input('\nENTER THE VALUE FOR n1 ');

n2=input('\nENTER THE VALUE FOR n2 ');

n=n1:1:n2;

m=numel(n);

e=n1;

disp(' ');

disp('ENTER THE SEQUENCE');

for i=1:1:m

fprintf('x[%d] ',e);

x(i)=input('');

e=e+1;

end

N=input('Enter the value of N ');

figure

n=0:N-1;

stem(n,x)

title('THE INPUT SEQUENCE');

axis([-1 N min(x)-1 max(x)+1]);

xlabel('TIME');

ylabel('AMPLITUDE');

x0=x(1:2:numel(x));

x1=x(2:2:numel(x));

f=1;

for n=0:N/2-1

h=1;

for k=0:N/2-1

W(f,h)=exp((-4\*1i\*pi\*n\*k)/N);

h=h+1;

end

f=f+1;

end

X0=W\*x0';

X1=W\*x1';

for k=1:N/2

y0(k)=X0(k)+(exp((-2\*1i\*pi\*(k-1))/N)\*X1(k));

y1(k)=X0(k)-(exp((-2\*1i\*pi\*(k-1))/N)\*X1(k));

end

fprintf('\nTHE RESULT IS');

Y=[y0,y1]

l=real(Y);

figure

k=0:N-1;

stem(k,l);

title('THE REAL PART OF DIT SEQUENCE');

axis([-1 N min(l)-1 max(l)+1]);

xlabel('TIME');

ylabel('AMPLITUDE');

IY=imag(Y);

figure

k=0:N-1;

stem(k,IY);

title('THE IMAGINARY PART OF DIT SEQUENCE');

axis([-1 N min(IY)-1 max(IY)+1]);

xlabel('TIME');

ylabel('AMPLITUDE');

OUTPUT:

ENTER THE VALUE FOR n1 0

ENTER THE VALUE FOR n2 7

ENTER THE SEQUENCE

x[0] 1

x[1] 1

x[2] 1

x[3] 1

x[4] 0

x[5] 1

x[6] 1

x[7] 1

Enter the value of N 8

THE RESULT IS

Y= 7.00 1.00 -1.00 1.00 -1.00 1.00 -1.00 1.00







*RADIX-2 DIF ALGORITHM*

clc;

clear all;

close all;

n1=input('\nENTER THE VALUE FOR n1 ');

n2=input('\nENTER THE VALUE FOR n2 ');

n=n1:1:n2;

m=numel(n);

e=n1;

disp(' ');

disp('ENTER THE SEQUENCE');

for i=1:1:m

fprintf('x[%d] ',e);

x(i)=input('');

e=e+1;

end

N=input('Enter the value of N ');

figure

n=0:N-1;

stem(n,x)

title('THE INPUT SEQUENCE');

axis([-1 N min(x)-1 max(x)+1]);

xlabel('TIME');

ylabel('AMPLITUDE');

%twiddle factor for N/2

f=1;

for k=0:N/2-1

h=1;

for n=0:N/2-1

W(f,h)=exp((-4\*1i\*pi\*n\*k)/N);

h=h+1;

end

f=f+1;

end

o=1;

for n=1:N/2

y0(o)=x(n)+x(n+N/2);

y1(o)=(x(n)-x(n+N/2))\*exp(-2\*j\*pi\*(n-1)/N);

o=o+1;

end

X1=W\*y0';

X2=W\*y1';

X=[X1',X2'];

fprintf('\nTHE RESULT IS');

Y=bitrevorder(X)

l=real(Y);

figure

k=0:N-1;

stem(k,l);

title('THE REAL PART OF DIT SEQUENCE');

axis([-1 N min(l)-1 max(l)+1]);

xlabel('TIME');

ylabel('AMPLITUDE');

IY=imag(Y);

figure

k=0:N-1;

stem(k,IY);

title('THE IMAGINARY PART OF DIT SEQUENCE');

axis([-1 N min(IY)-1 max(IY)+1]);

xlabel('TIME');

ylabel('AMPLITUDE');

OUTPUT:

ENTER THE VALUE FOR n1 0

ENTER THE VALUE FOR n2 3

ENTER THE SEQUENCE

x[0] 1

x[1] 0

x[2] -1

x[3] 0

Enter the value of N 4

THE RESULT IS

Y =0 2.00 0 2.00







RESULT:

Thus the DFT of the given sequence is obtained by using the radix-2 DIF and DIT algorithms of FFT.