close all;  
clear;  
  
[file, path] = uigetfile('\*.wav');  
fullFileName = fullfile(path, file);  
  
[data, original\_fs] = audioread(fullFileName);  
  
disp('File information:');  
disp(['Path: ' fullFileName]);  
disp(['Data dimensions: ' mat2str(size(data))]);  
disp(['Frequency: ' num2str(original\_fs)]);  
  
bands = get\_bands();  
  
fs = original\_fs;  
if bands(end, end) >= fs / 2  
 margin = 11;  
 fs = 2 \* (bands(end, end) + margin);  
 data = resample(data, fs, original\_fs);  
end  
  
gains = zeros(1, length(bands));  
for i = 1:length(bands)  
 gains(i) = get\_number(['Enter gain for ' mat2str(bands(i,:)) 'Hz (between -20 dB and 20 dB): '], @(x) x >= -20 && x <= 20);  
end  
  
filter\_type = get\_string('Enter filter type ("fir" or "iir"):', @(x) strcmp('fir', x) || strcmp('iir', x));  
  
output\_fs = get\_number('Enter a valid output sample rate: ', @(x) x > 340);  
  
if strcmp('fir', filter\_type)  
 fir\_order = 150;  
 filters = fir\_filters(fir\_order, fs, bands);  
else  
 iir\_order = 4;  
 filters = iir\_filters(iir\_order, fs, bands);  
end  
  
acc\_filtered = data .\* 0;  
  
freq\_range\_plt = [' 0-170 Hz'; '170-310 Hz'; '310-600 Hz'; '0.6-1 kHz'; '1-3 kHz'; '3-6 kHz'; '6-12 kHz'; '12-14 kHz'; '14-16 KHZ'];  
for i = 1:length(filters)  
 plot\_requirements(filters(i), fs, [mat2str(bands(i,:)) 'Hz']);  
 filtered = filter(filters(i).Numerator, filters(i).Denominator, data);  
 plot\_time\_frequency\_domain(filtered, fs, ['Output in time-domain for filter ' freq\_range\_plt(i,:)], ['Output in frequency-domain for filter ' freq\_range\_plt(i,:)]);  
 acc\_filtered = acc\_filtered + filtered \* db2mag(gains(i));  
 [z, p, k] = tf2zpk(filters(i).Numerator, filters(i).Denominator);  
 order = filtord(filters(i).Numerator, filters(i).Denominator);  
 fprintf('The gain of %s filter : %s is %f , Order is %d \n',filter\_type, freq\_range\_plt(i,:), k, order);  
end  
  
acc\_filtered = resample(acc\_filtered, output\_fs, fs); % resample to the output fs  
plot\_time\_frequency\_domain(data, original\_fs, 'Input in time ', 'Input in freq. ', acc\_filtered, output\_fs, 'Output in freq.', 'Output in time.');  
  
[file, path] = uiputfile('\*.wav');  
fullFileName = fullfile(path, file);  
  
audiowrite(fullFileName, acc\_filtered, output\_fs);

File information:  
Path: C:\Users\PC\Desktop\FinalProject\_DSP\voice.wav  
Data dimensions: [268237 2]  
Frequency: 8000  
The gain of fir filter : 0-170 Hz is 0.000277 , Order is 150   
The gain of fir filter : 170-310 Hz is -0.001567 , Order is 150   
The gain of fir filter : 310-600 Hz is 0.000804 , Order is 150   
The gain of fir filter : 0.6-1 kHz is 0.000115 , Order is 150   
The gain of fir filter : 1-3 kHz is -0.000228 , Order is 150   
The gain of fir filter : 3-6 kHz is 0.000054 , Order is 150   
The gain of fir filter : 6-12 kHz is 0.000099 , Order is 150   
The gain of fir filter : 12-14 kHz is -0.000537 , Order is 150   
The gain of fir filter : 14-16 KHZ is 0.000384 , Order is 1





































