

Fast/Long Convolution with FFTW Madhur Murlu

Introduction

This is a quick guide on how to implement the FFTConvolver library in your Project. Here is the link to a demo project that uses this library. This library has been created by HiFi-LoFi and has been shared publically on GitHub:

<https://github.com/HiFi-LoFi/FFTConvolver>

The repository doesn't contain much documentation so you might want to look elsewhere to understand the theory. Key Terms- FFT Convolution, Two Stage Convolution

Practical Use: This library is especially useful if you are looking to convolve long (>3second) Impulse responses real-time. It reduces CPU consumption by almost 70% compared to regular convolution.

Dependencies

Get the library files from the link and add them to your RackAFX project folder:

- AudioFFT.h
- AudioFFT.cpp
- FFTConvolver.h
- FFTConvolver.cpp
- TwoStageFFTConvolver.h
- TwoStageFFTConvolver.cpp
- Utilities.h

The only file you need to add to your Visual Studio Project is TwoStageFFTConvolver.h

In the Demo project, I have used an IR that had been saved as an array in the file:

irarrays.h

so that users would not have to download IRs to test out the demo. I have also included the code to load IR from files in *OpenIRFile()*. The code to call this function when the user presses a button is also include in *userInterfaceChange()*. You will just need to set up a switch case for the appropriate button and uncomment the code.

Notes:

- Make sure you build in release mode
- There are 3 knobs in the project- HeadBlocSize, TailBlocSize and Wet/Dry
- HeadBlocMeter and TailBlocMeter are divisors for the convolution length. As the name suggests, this library uses a Two Stage convolution, hence it requires a Head and a Tail Size. Ideally, you should adjust the Head and Tail Size based on the length of the impulse response to get the optimal performance.

References:

<https://github.com/HiFi-LoFi/FFTConvolver>