Time domain convolution

~/501-a4$ time ./convolve guitar16.wav impulse.wav guitar16-convolved-out.wav

Convolution completed successfully.

real 40m40,776s

user 40m4,494s

sys 0m18,347s

gcc -g -o convolve\_fft convolve\_fft.c -lm

Without Compiler optimizations

~/501-a4$ time ./convolve-fft guitar16.wav impulse.wav guitar16-convolved-fft-out.wav

Convolution completed successfully.

real 0m0,995s

user 0m0,882s

sys 0m0,089s

removed scaling of the imaginary part at the end of fft.

~/501-a4$ time ./convolve-fft guitar16.wav impulse.wav guitar16-convolved-fft-out.wav

Convolution completed successfully.

real 0m0,951s

user 0m0,918s

sys 0m0,018s

moved a division operation from an inner loop

~/501-a4$ time ./convolve-fft guitar16.wav impulse.wav guitar16-convolved-fft-out.wav

Convolution completed successfully.

real 0m0,938s

user 0m0,532s

sys 0m0,381s

moved a conditional operator outside the loop

~/501-a4$ time ./convolve-fft guitar16.wav impulse.wav guitar16-convolved-fft-out.wav

Convolution completed successfully.

real 0m0,929s

user 0m0,865s

sys 0m0,042s

reusing a memory array instead of a new one to optimize cache access.

~/501-a4$ time ./convolve-fft guitar16.wav impulse.wav guitar16-convolved-fft-out.wav

Convolution completed successfully.

real 0m0,892s

user 0m0,642s

sys 0m0,237s

Reducing floating point precision from double to single

~/501-a4$ time ./convolve-fft guitar16.wav impulse.wav guitar16-convolved-fft-out.wav

Convolution completed successfully.

real 0m0,826s

user 0m0,100s

sys 0m0,698s

Compiler Optimization with -O3

~/501-a4$ time ./convolve-fft guitar16.wav impulse.wav guitar16-convolved-fft-out.wav

Convolution completed successfully.

real 0m0,304s

user 0m0,000s

sys 0m0,279s