

CAS 741: Problem Statement

Simple Digital Signal Processing Using FFT

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Table 1: Revision History

| Date | Developer(s) | Change |
|-----------|--------------|----------------|
| Sept 14th | Yuzhi Zhao | First Version |
| Sept 15th | Yuzhi Zhao | Second Version |

An FFT can rapidly computes DFT by factorizing the DFT matrix into a product of sparse factors. As a result, it manages to reduce the complexity of computing the DFT from $\mathcal{O}(\log n^2)$, which arises if one simply applies the definition of DFT, to $\mathcal{O}(n \log n)$, where n is the data size. Because of this algorithm decreasing the amount of calculation incredibly so that the FFT is widely used in the digital signal processing, fast discrete Hartley transform.

This project aims at providing a FFT library to other softwares which include some FFT implementations or calculations. This FFT library should include both some basic DFT calculation functions, such as DFT and IDFT, and more extension FFT related functions like retrieving the major peak of the result of FFT, calculating the times of addition or multiplication being executed during FFT process. Also, for the calculation which bases on FFT algorithm itself, this library should provide with solid supports to different types of input whatever they are in real datas or in complex datas.

In the meantime, this FFT library should have clear statements for each function and it should be successfully run under different operating systems.

By creating a FFT library as described above, softwares in various fields which have to implement FFT can easily approach the library and retrieve proper functions to achieve the goals.