FFT Library in Java

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I. Introduction

This library provides the fast Fourier transform (FFT) algorithm in Java for the numerical computation of the discrete Fourier transform (DFT) in 1-D, 2-D, and 3-D. This library can be useful for those programming in Java and need a FFT library for image processing applications. You are free to modify the source code of this library for your own. Note that you are not allowed to remove our names in this collection and release the modified code to a public domain. Please feel free to let us know any comments on this issue. Enjoy!

II. Usage

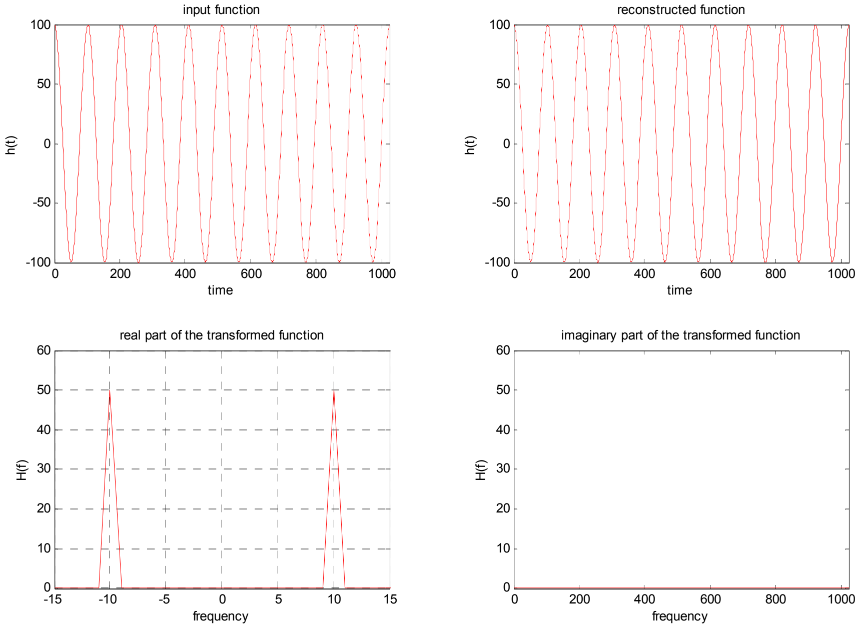
1. The FFT library is distributed in a jar file: fftlib.jar.
2. FastFourierTransform.html provides the documentation of the FFT functions.
3. demoFFT.java gives an example of using the FFT library to perform computation.
4. Please include the fftlib.jar when compiling and running as given by the following example:

   ```
   javac -classpath .;fftlib.jar demoFFT.java
   java -classpath .;fftlib.jar demoFFT
   ```
5. The source codes of the library are also provided in the src directory.

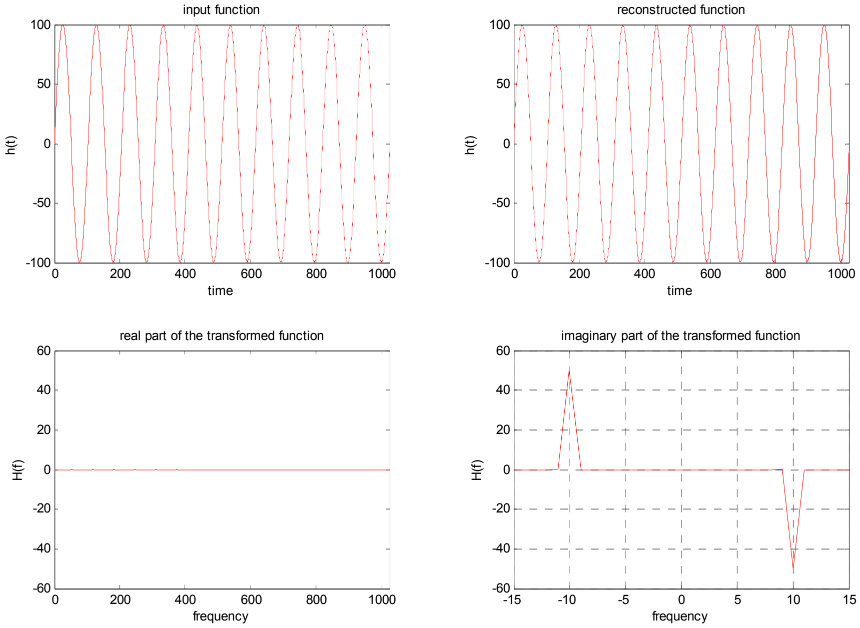
III. Experiments and Results

Some simple analytic functions were used to test the FFT library as provided in demoFFT.java.

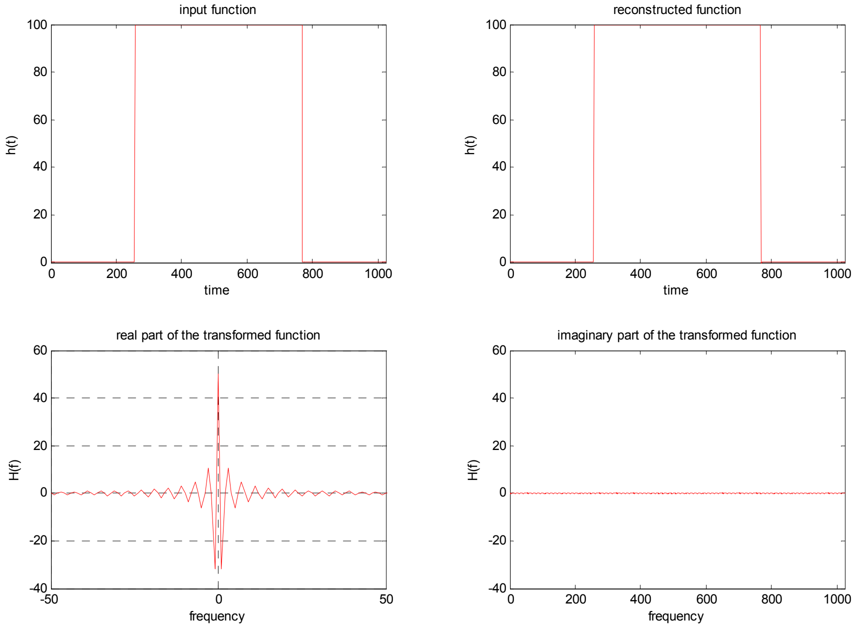
<u>Experiment 1</u>: Cosine function $h(t) = 100\cos(2\pi \cdot 10 \cdot t)$



<u>Experiment 2</u>: Sine function $h(t) = 100\sin(2\pi \cdot 10 \cdot t)$



Experiment 3: Box function $h(t) = \begin{array}{c} 100, |t| < 256 \\ 50, |t| = 256 \\ 0, |t| > 256 \end{array}$



IV. Computation Time

The computation time of using the FFT library has been tested on a Pentium M 1.6 GHz machine with a Windows XP operating system. The approximate processing time of using a 2-D FFT is given in the following table.

Dimension	**Processing time** (*ms*)
64 x 64	2
128 x 128	6
256 x 256	24
512 x 512	111
1024 x 1024	476
2048 x 2048	2091
4096 x 4096	12708