FFT Complex to Complex Transforms

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Abstract

This document describes new code implemented using the Insight Toolkit ITK www.itk.org.
The code of the algorithm is written following the ITK CodingStyle as described in the directory
Insight/Documentation/Style.pdf

This software provides new functionality to compute complex to Ccmplex Fourier transforms using ITK.

1 Complex to Complex Fourier Transformation

ITK currently supports real to complex conjugate forward and inverse Fourier transformation's through dedicated filters. In turn, these utilize one of a number of Fourier transform implementations, such as that available through VNL, through FFTW or through Intel's implementation of the FFTW API.

When dealing directly with complex data, such as may be acquired by an MRI scanner, it is convenient to have dedicated filters supporting Complex to Complex transformations. It is also convenient to have filter classes that can convert between complex data and real and imaginary component and magnitude and phase component representations.

The code includes contributions in 1) Code/Algorithms providing complex to complex FFT support, 2) Code/BasicFilters providing converters from magnitude and phase, and real and imaginary representations, to complex format, 3) Examples/Filtering illustrating 2D and 3D complex to complex FFT, and 4) Examples/IO illustrating conversion of data types.

2 Software Requirements

You need to have the following software installed:

• Insight Toolkit 2.8.1