web page draft for ctFIRE(curvelet transform and FIbeR Extracition)

Main Developers: [Yuming Liu](http://loci.wisc.edu/people/yuming-liu) [Jeremy Bredfeldt](http://loci.wisc.edu/people/jeremy-bredfeldt)

Contents

[Overview 1](#_Toc348962241)

[Download 1](#_Toc348962242)

[Installation 2](#_Toc348962243)

[Usage: 2](#_Toc348962244)

[References: 2](#_Toc348962245)

# Overview

The purpose of this standalone MATLAB package is to allow users to automatically extract and quantify the alignment of collagen fibers in an image. The program reads in image files, extracts the individual collagen fibers via ctFIRE ( curvelet transform plus FIRE algorithm) , which is an approach combining the advantage of the fast discrete curvelet transform(curvelet.org)1 for denoising the image and enhancing the fiber edge features and the advantage of FIRE algorithm (A. M. Stein etc. J.Microsc. 2008)2 for extracting individual fibers, and returns the segmented fibers along with descriptive statistics, such as fiber angle and length histograms as well as other optional outputs. The output may be displayed on the screen and/or written to .xlsx , .tif or .mat files.

In the ctFIRE program, the user can choose to run FIRE, ctFIRE or both of them. Parameters to run FIRE and ctFIRE have default values and are also adjustable via GUI . Optional outputs include: overlaid image of the segmented fibers on the original image and the CT reconstructed image, figure of the fiber angle histogram, figure of the fiber length histogram, or fiber angle value and fiber length value spreadsheets. The detailed information about the parameters and output of ctFIRE is automatically saved in .mat binary format for a later post-processing.

# Download

Language: MATLAB

Latest Version: V 1.0

Download:

[Standalone application for Windows](https://github.com/uw-loci/curvelets/tree/master/deploy)

[MATLAB m-files](https://github.com/uw-loci/curvelets/tree/master/ctFIRE)

# Installation

**Standalone for Windows:**

1. Install the 64-bit MATLAB Compiler Runtime (MCR) version 7.15 using MCRinstaller.exe

2. Add the MCR directory to the system path. This step may be unnecessary for some systems

3. Download and run ctFIRE\_PC.exe

**MATLAB version:**

Download ctFIRE \_MATLAB.zip and unzip it to the default folder 'ctFIRE' . Then (1) go to [curvelet.org](http://curvelet.org/register.html) and register to sign a licensing agreement and download the CurveLab 2.1.2 MATLAB package and unzip it; (2) go to <http://www.ima.umn.edu/~astein/Andrew%20Stein/Software.html> to download FIRE(FIbeR Extraction) software. Place the three unzipped default folders i.e. ctFIRE, CurveLab-2.1.2 and FIRE into the same folder. With MATLAB's Current Folder set to the ctFIRE folder, enter "ctFIRE" at the command prompt to launch the GUI.

# Usage:

[**Download the Users Manual for full operating instructions**](https://github.com/uw-loci/curvelets/tree/master/ctFIRE)

More Information

Source Code:

[ctFIRE](https://github.com/uw-loci/curvelets/tree/master/ctFIRE)

Website:

[Curvelet Transform](http://curvelet.org/)

[FIbeR Extraction](http://www.ima.umn.edu/~astein/Andrew%20Stein/Software.html)

# References:

[1] “curvelet toolbox,” <http://www.curvelet.org/software.html> (19 July 2012).

[2] A. M. Stein, D. A. Vader, L. M. Jawerth, D. A. Weitz, and L. M. Sander, “An algorithm for extracting the network geometry of three-dimensional collagen gels,” *Journal of Microscopy* **232**(3), 463–475 (2008) [doi:10.1111/j.1365-2818.2008.02141.x].