

Design document ‘Pathology Image Processing Libraries and Workstation’

This document describes the general design of the pathology libraries components, the design of the workstation and the detailed description of the classes and components.

本文档描述了病理学库组件的总体设计、工作站的设计以及类和组件的详细描述。

Library Components 库组件

Core

The core library contains all the utility functionality (conversion of strings, handling of file paths, etc.) that is generally used by other libraries. The second part of this library is the presence of the base class for image sources (both readers and filters).

核心库包含其他库通常使用的所有实用程序功能(字符串转换、文件路径处理等)。这个库的第二部分是图像源(包括阅读器和过滤器)的基类。

Content 内容

- Stringconversion
 - Methods to parse/convert `std::strings` 方法来解析/转换 `std::`字符串
- Filetools
 - Methods to (cross-platform) handle file system interactions (copy, delete, create directories, etc.) (跨平台)处理文件系统交互(复制、删除、创建目录等)的方法。
- PathologyEnums
 - Header files which declares all the enumerations used in the pathology project 头文件，声明病理学项目中使用的所有枚举
- ImageSource
 - Base class for modules that provides images. This class implements all the functionality to obtain information on the ImageSource related to its output (colortype, datatype, dimensions, samples per pixel) 提供图像的模块的基类。这个类实现了获取与其输出相关的 ImageSource 信息的所有功能(颜色类型、数据类型、尺寸、每像素样本)。

Dependencies 依赖关系

The core library has dependencies on the boost libraries. 核心库依赖于 boost 库。

IO

The IO library contains the functionality for reading and writing multi-resolution pathology images. Some functionality is implemented ourselves (LIF, VSI), but most of it comes through wrapping of third-party libraries like OpenSlide IO 库包含读取和写入多分辨率病理图像的功能。有些功能是我们自己实现的(LIF, VSI)，但大多数是通过包装第三方库(如 OpenSlide)实现的

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- **MultiResolutionImage**
 - Base class for MultiResolutionImage's, all vendor specific images are derived from this class. It implements a template function to obtain image data, regardless of the data type of the slide file itself. Finally, it contains a cache for loaded tiles.
MultiResolutionImage 的基类，所有特定于供应商的图像都从这个类派生。它实现了一个模板函数来获取图像数据，而不管幻灯片文件本身的数据类型是什么。最后，它还包含一个用于加载磁片的缓存。
- **MultiResolutionImageReader/Writer**
 - Classes to either read a MultiResolutionImage (instantiates the correct derived class for loading of the image), or write it to disk (as a multi-resolution, tiled TIFF)
类来读取 **MultiResolutionImage**(为装载图像实例化正确的派生类)，或将其写入磁盘(作为一个多分辨率的平铺 TIFF)
- **TileCache**
 - A caching class which implements a tile cache to enable faster image loading when the same tiles are loaded repeatedly. 一个缓存类，它实现了一个 tile 缓存，以在重复加载相同的 tile 时实现更快的图像加载。
- **JPEG2000Codec**
 - Wrapper around libjasper to encode or decode individual tiles with the JPEG2000 compression algorithm 包装 libjasper，用 JPEG2000 压缩算法编码或解码单个块
- **VSIImage/TIFFImage/OpenSlideImage/LIFImage**
 - Specific implementations of MultiResolutionImage for different file types, implements the initialize and readRegion member functions of MultiResolutionImage.
针对不同文件类型的 **MultiResolutionImage** 的具体实现，实现了 **MultiResolutionImage** 的 initialize 和 readRegion 成员函数。

Dependencies

IO has a large number of third-party dependencies due to the fact that it needs to support several compression methods (ZIP through libz, JPEG2000 through libjasper, JPEG through libjpeg, DCMTK for lossless JPEG, LZW through libtiff). Furthermore, libtiff is used for both reading and writing of multi-resolution TIFF. Last, OpenSlide is used to add support for several proprietary fileformats (e.g. MRXS, SVS, SCN). IO 有大量的第三方依赖关系，因为它需要支持几种压缩方法(ZIP 通过 libz, JPEG2000 通过 libjasper, JPEG 通过 libjpeg, DCMTK 用于无损 JPEG, LZW 通过 libtiff)。此外，libtiff 可用于读取和写入多分辨率 TIFF。最后，OpenSlide 用于添加对几种专有文件格式的支持(例如 MRXS、SVS、SCN)。

Image processing

MeVisLab

Contains MeVisLab-module version of code implemented in the other libraries. For example, it implements the color deconvolution methods and image IO in MeVisLab modules. 包含在其他库中

实现的代码的 **mevislab** 模块版本。例如，在 **MeVisLab** 模块中实现了颜色反褶积方法和图像 IO。

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- **DIAGColorDeconvolution**
 - Modules which functions as a wrapper around the color deconvolution filter implemented in imageprocessing
模块，它作为包装在图像处理中实现的颜色反褶积滤波器
- **DIAGMultiResolutionImageReader/Writer**
 - Wrappers around the IO library to provide multi-resolution image access in MeVisLab
IO 库周围的包装器在 **MeVisLab** 中提供多分辨率图像访问

Dependencies

One extra dependency is introduced, the dependency on MeVisLab. 引入了一个额外的依赖，对 **MeVisLab** 的依赖。

Executables

Contains commandline executables which use code from the pathology library components to perform specific tasks. 包含命令行可执行程序，这些命令行可执行程序使用来自病理库组件的代码执行特定任务。

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- **MultiResImageConverter**
 - Implements conversion from proprietary formats to multi-resolution tiled TIFF
实现从专有格式到多分辨率平铺 TIFF 的转换
- **PatholTestTunner**
 - Runs the unittests for the pathology libraries 运行病理学库的单元测试

Dependencies

No extra dependencies imposed, dependencies of individual executables are fully determined by the pathology libraries they use.

没有额外的依赖，单个可执行程序的依赖完全由它们使用的病理库决定。