

A Generic Solution for Tile-Based Histological Image Analysis

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Abstract

With the rising availability of digital slide scanners, histology is experiencing a rapid trend toward digitization. This opens the door for the automatic quantification of tissue parameters, with the potential to greatly improve the speed, accuracy and reproducibility of biomedical observations. The huge size and variability of histological whole-slide images are still major challenges to their automated analysis. A common approach is to subdivide the image into a lattice of square tiles and to automatically classify each tile into different tissue categories. We will present an efficient tile-based image analysis solution for generic tissue classification problems. By considering tissue structures on multiple scales, the software can quickly process Gigabyte-sized images on standard computers. We will demonstrate how the software can be easily adapted to the huge complexity and variance of histological images. Instead of being forced to set any abstract parameters, all the user has to do is to point out examples of the relevant tissue structures in an intuitive microscope-like user interface. The software incorporates a relational data model for image analysis results, that can efficiently handle large volumes of data and be comprehensively queried on the basis of SQL. Since this data model is very generic and entirely founded on open-source technologies, it will be applicable in other scenarios of biomedical image analysis as well.

Keywords

Histological image analysis, whole-slide image analysis, classification

