NSF MRI: High Performance Digital Pathology Using Big Data and Machine Learning

Developing Big Data Resources for Digital Pathology

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What's New
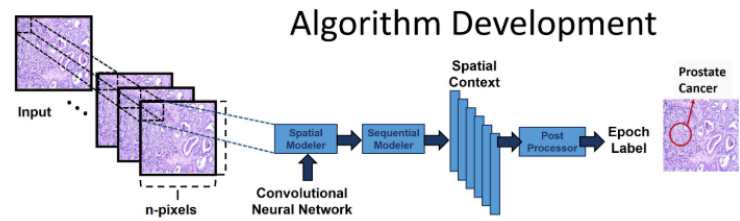
(20181228) Annotation Tutorial: A short video that demonstrates how we annotate images using Aperio's ImageScope software.

(20180727) The digital pathology team had a training session with the Aperio personnel on-site. The eSlideManager has been configured to handle our workflow, and now our system is fully functional.

(20180523) A sample of our digital pathology database, v0.0.0 is now available. This sample contains 6 patients and 3 tumor types (breast, gastrointestinal, urology).

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Project Summary

In this NSF-funded project, we are developing a digital imaging system using big data and machine learning algorithms to automatically characterize pathology slides. We have developed a sustainable facility to rapidly collect automatically annotated whole slide images. This project is producing the necessary data resources to support the development of high performance deep learning models.

Algorithm Development

Input   n-pixels   Convolutional Neural Network   Spatial Modeler   Sequential Modeler   Spatial Context   Post Processor   Epoch Label   Prostate Cancer

Over 10M slides read each year in the U.S. alone. Tapping into a fraction of this data will allow significant advancement of the science. Healthcare providers and machine learning researchers will be able to access an open source high-quality searchable archive of clincial data. More information on this project can be found here.

A Cost-Effective Image Management Platform

This NSF Major Research Instrumentation (MRI) grant supported the purchase of a Leica Aperio AT2 scanner as the platform used to convert pathology slides to digital images. This scanner can scan 50 high quality TIFF images with lossless compression per hour.

We have also developed a very cost-effective Petabyte file store based on off-the-shelf components to store our database of 1M pathology images. To learn more about our clustered computing environment being developed to support this research program, read this overview.

Leica Aperio AT2 – Digital Scanner at Temple University Hospital

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