

ZebraFish – Advanced Spectral Imaging

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Over the past decade the advancement of biomedical spectroscopic imaging to characterize mammalian cells and tissue has been profound. However, the progression of new imaging instrumentation that utilize large focal plane array detectors, coupled with the inherent complexity of the vibrational spectra that are produced, provides an ever more demanding need for advanced computational methods that allow rapid data processing, chemometric imaging, phenotypic archiving and supervised classification.

This contribution shall highlight newly developed software for the advancement of vibrational spectroscopic imaging. Within the ZebraFish Explorer module, a comprehensive library of algorithms is available for multivariate image construction and sample characterization. In addition to the optimization of traditional statistical methods used by the spectroscopic community, a number of new additions have been developed that allow enhanced performance. Of particular note is the implementation of GPU accelerated computing for large data sets, algorithms for scatter correction, and batch processing of multiple data sets.

Future releases of two additional modules are presently in development and shall provide further tools for robust data segmentation and classification. The Data Mining module shall compose tools allowing the construction of comprehensive spectroscopic libraries that can be mined and segmented using tissue/cell class tags and patient metadata. The Classification module will alternatively focus on the application of machine learning algorithms for optimized pattern recognition and classification. It is envisaged that these modules combined shall provide a comprehensive aid for biomedical spectroscopists.