PHYSION
CONSULTING
One Broadway, 14th floor Cambridge, MA 02142
Tel (617) 299-9520 **Fax** (617) 401-3733
info@physionconsutling.com

Collaborative Image Annotation in Ovation®

The Ovation Scientific Data Management System® provides powerful image annotation and collaboration features. This document describes how biologists can take advantage of Ovation's image storage, annotation and querying capabilities.

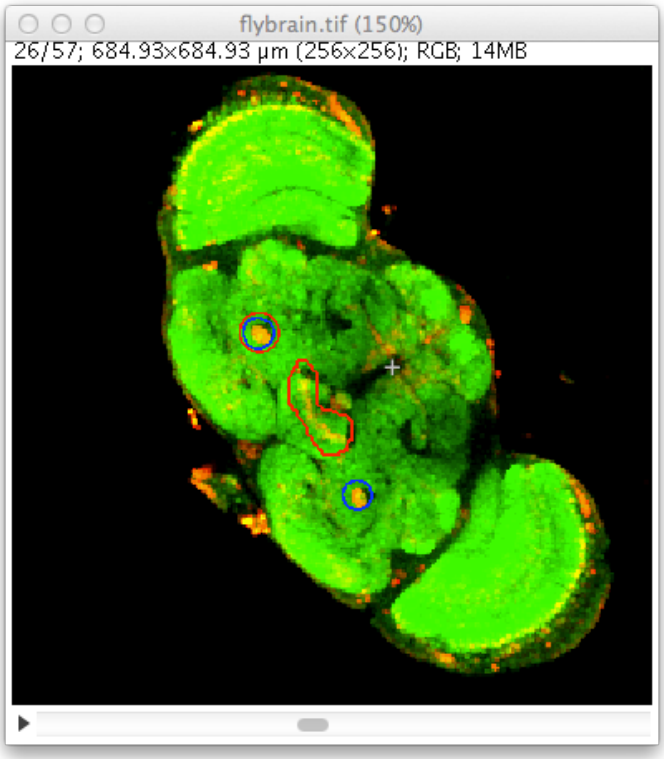

Figure 1 Confocal scan of a Drosophila brain. Two users' annotations are shown (blue and red). Annotation coordinates are accessible in physical coordinates (e.g. µm) from origin (white cross). Image courtesy of Benjamin Schmid.

Images are stored in their experimental context

Ovation's rich data model describes the entire experimental context of acquired data, including experimental conditions, subject, and protocol parameters. Ovation maintains the relationship between data acquired from multiple modalities including imaging, physiology, and sequencing. This entire context is query-able using Ovation's powerful query engine[1].

Ovation natively supports all image and media formats, including TIFF, DICOM, MPEG, AVI and many others. Image data may be stored directly in the database or accessed from a central resource such as a shared file system or a web service (e.g. XNAT).

Easily annotate images within Ovation

Ovation uses the popular ImageJ[2] engine and is compatible with all ImageJ plugins. Ovation includes an ImageJ plugin for opening images directly from the Ovation database. Matlab®[3] users may also open stored images directly in an embedded ImageJ window without leaving Matlab. Processed or derived images may be saved in the Ovation database, while maintaining their relationship to the original image.

[1] For more information about the structural data model of Ovation, please see http://bit.ly/ovation-for-biologists.
[2] http://rsbweb.nih.gov/ij/
[3] Matlab is a registered trademark of The Mathworks, Inc.

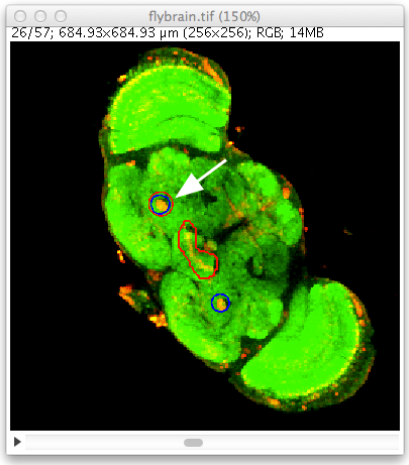

Figure 2 Ovation's powerful query engine can find images with overlap between two users' annotations anywhere in the image or at a particular coordinate (white arrow).

Within ImageJ, Ovation users may add shape annotations to images stored in the Ovation database (Figure 1). Annotations may be any shape supported by the ImageJ drawing tools. Annotation coordinates have a descriptive label and may, optionally, include an additional text description/notes. Annotations may be grouped into "annotation groups" denoting a single annotation spanning multiple discontinuous regions.

Image annotation coordinates may be accessed in calibrated physical units (e.g. µm) when image calibration information is present. Your analysis code is free to work in natural units rather than worrying about details of image resolution, calibration, etc. Coordinates are always stored relative to an image-relative origin (white cross in Figure 1) so comparison between images is also simple.

Easily collaborate between users

Many users may simultaneously annotate images in a shared Ovation database. Because all user interpretational data (including image annotations, keywords, and metadata properties) are stored per-user, one user's annotations do not interfere with annotations made by another user. Of course, all annotations may be made visible to all users so that everyone benefits from the combined efforts of the lab group. Figure 1 shows annotations from two users (red and blue regions). In the view shown in Figure 1, annotations from all users are shown, but you may choose to see only your annotations (or just an other user's annotations) at any time. Meta analyses such as calculating a consensus annotation is simple using Ovation's per-user annotation storage.

Easily query the entire Ovation database for annotated images

Ovation's powerful query engine includes support for image annotations as query criteria. Queries may specify:

- Presence or absence of a labeled annotation (e.g. all images with an annotation labeled "cerebellum")
- Presence of spatial overlap between two user's labeled annotations (e.g. all images in which two users have added overlapping annotations with the a given label such as "nucleus") (Figure 2)
- Presence of an annotation relative to another annotation (e.g. all images with an annotation within 10µm of an other annotation labeled "a new structure") (Figure 3)

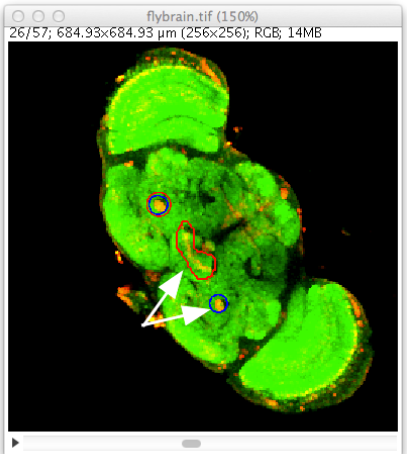

Figure 3 Ovation's query engine can find images with an annotation a fixed distance from another labeled annotation.

Interested?

For more information about The Ovation Scientific Data Management System®, please email info@physionconsulting.com.

About Physion Consulting

Physion builds software that breaks down barriers to exploration and collaboration in scientific data sets. We combine deep scientific expertise and engineering experience to produce software solutions tailored to the needs of modern researchers. Our extensive domain knowledge allows us to build software that integrates naturally into the scientific workflow, significantly reducing scientists' energy investment in data management. Physion makes software that helps scientists do what they do best.