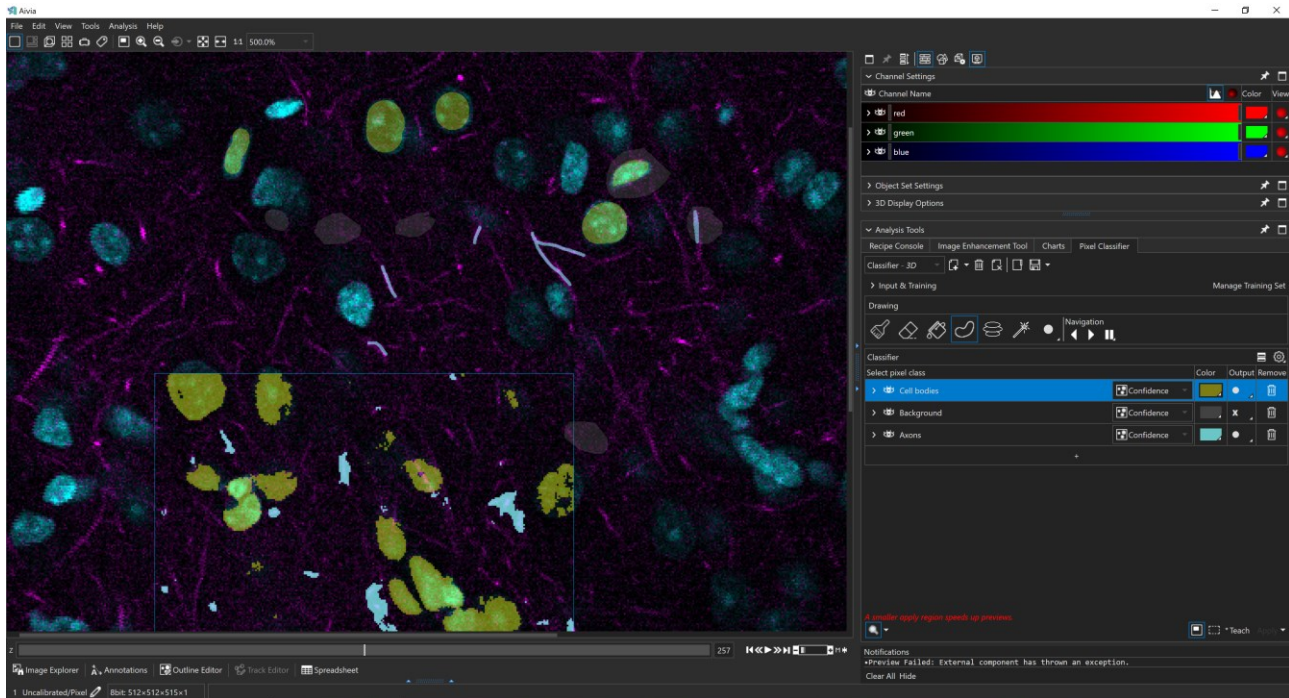


# DRVISION TECHNOLOGIES

## AIVIA 8.8.1

December 23rd, 2019, Bellevue, WA, USA

### OVERVIEW



Aivia, the leader in artificial intelligence (AI)-guided image analysis software, is making AI available to even more users with the launch of Aivia 8.8. We have made significant improvements in the way you teach, train and apply AI-enabled tools such as the Pixel Classifier and deep learning. With new smart annotation tools and GPU processing, it is possible to train a Pixel Classifier and get results faster than ever before. At the same time, we are bringing the expanded functionalities into Aivia 8.8 that enable you to train and apply deep learning models more easily. You can preprocess the data and tune deep learning input using your own custom Python code. Furthermore, we are bringing the functionality of Aivia Cloud into Aivia and introducing local mode that allows you to use your own local resources for deep learning. Do more with AI-assisted image analysis – only in Aivia 8.8.

Summary of Aivia 8.8 developments:

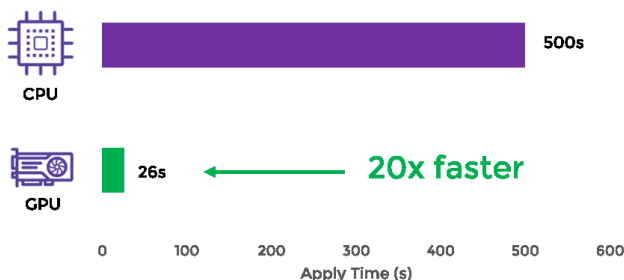
- Pixel Classifier improvements – 31 new features
- *Aivia Cloud 2.0* – 9 new features
- *Python integration* – 7 new features
- General improvements – 11 new features
- 186 bugs fixed

## Pixel Classifier improvements

In Aivia 8.8, we have made massive improvements to the way you teach, train and apply Pixel Classifiers. The improvements enable you to get more robust and accurate results using the Pixel Classifier more quickly. We made significant improvements to four major areas of the Pixel Classifier: 1) GPU-accelerated performance enhancement; 2) new 2D and 3D region annotation tools; 3) multi-session training; and 4) ROI preview and processing.

### GPU-accelerated performance improvements

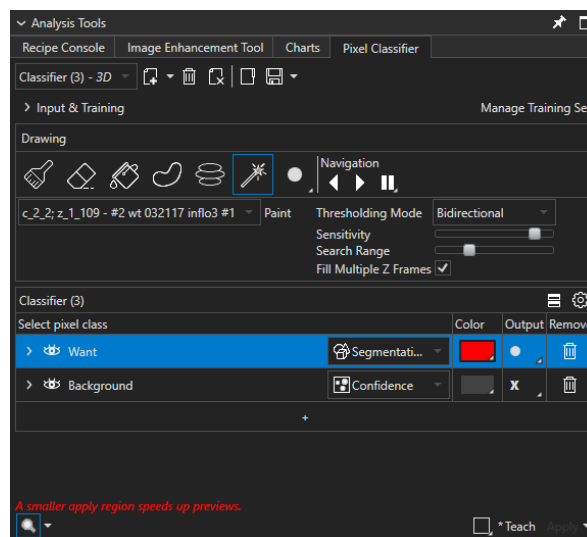
- GPU processing for generation of select 2D and 3D features for training and apply
  - Up to 10x speed improvement during teaching of the Pixel Classifier
  - Up to 20x speed improvement during apply
- Features that uses GPU acceleration are identified with a GPU symbol



Speed comparison between applying a Pixel Classifier on a 230 MB (1024 x 1024 x 113) dataset in Aivia 8.5 (CPU) and Aivia 8.8 (GPU)

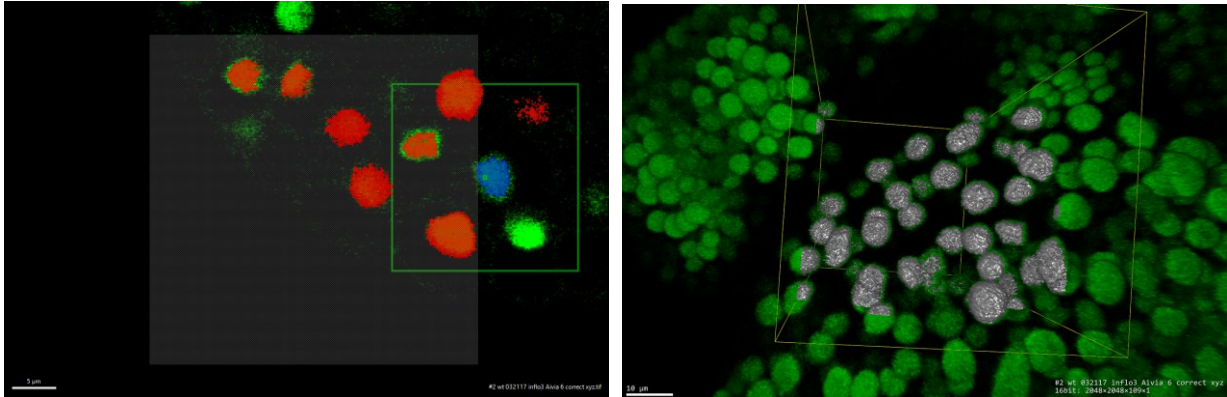
### New region annotation tools

- Two new annotation tools added to the Pixel Classifier drawing tools toolbar with three different modes of operation
  - Annotate next Z-slice automatically using “Predict Next Slice” tool
  - Determine regions to annotate in 2D or 3D by clicking on the image with the “Magic Wand” tool
- Predict Next Slice generates predictions for annotations based on the defined regions on the current Z-plane
  - Navigate to previous or next Z-slice in 2D view with on-screen navigation controls
  - Pre-drawn regions generated from predictions let you quickly editing the teaching regions



Updated graphical user interface for the Pixel Classifier tool with option to manage multiple images in the upper left

- Magic Wand tool annotates the image based on the intensity on the image where you click and its environs
  - In 2D view, Magic Wand previews area to annotate with option to adjust the thresholding mode, sensitivity and search distance for similar pixels to annotate; additional option to extend drawing to other Z-plane is provided
  - In 3D view, Magic Wand previews whole objects to be annotated plus background
  - Click “Paint” to validate annotation regions



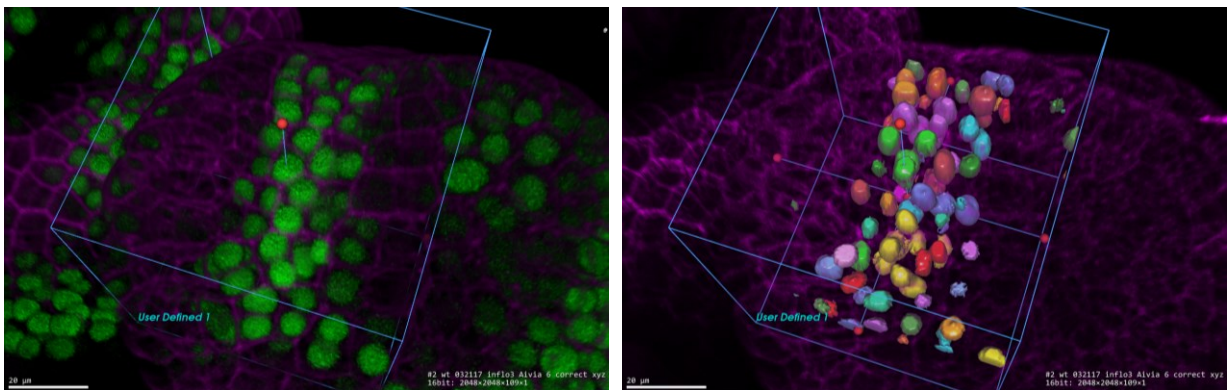
Left: Magic wand annotation in 2D view – the blue region in the green box highlights the detected region to annotate; the validated regions are shown in red (want) and gray (background) respectively. Right: Magic wand annotation in 3D view (Image Courtesy: Nat Prunet, UCLA)

### Multi-session training

- Save and resume Pixel Classifier training session at any time
- Training dataset and annotation regions are saved with new Pixel Classifier file format
- Train Pixel Classifier on more than one image
  - Add or remove training images as you like – changes made to the datasets are saved with the Pixel Classifier

### ROI preview and processing

- New ROI preview allows you to preview Pixel Classifier segmentation results in 2D and 3D
- Apply Pixel Classifier to ROI (Segmentation / Smart Segmentation only)

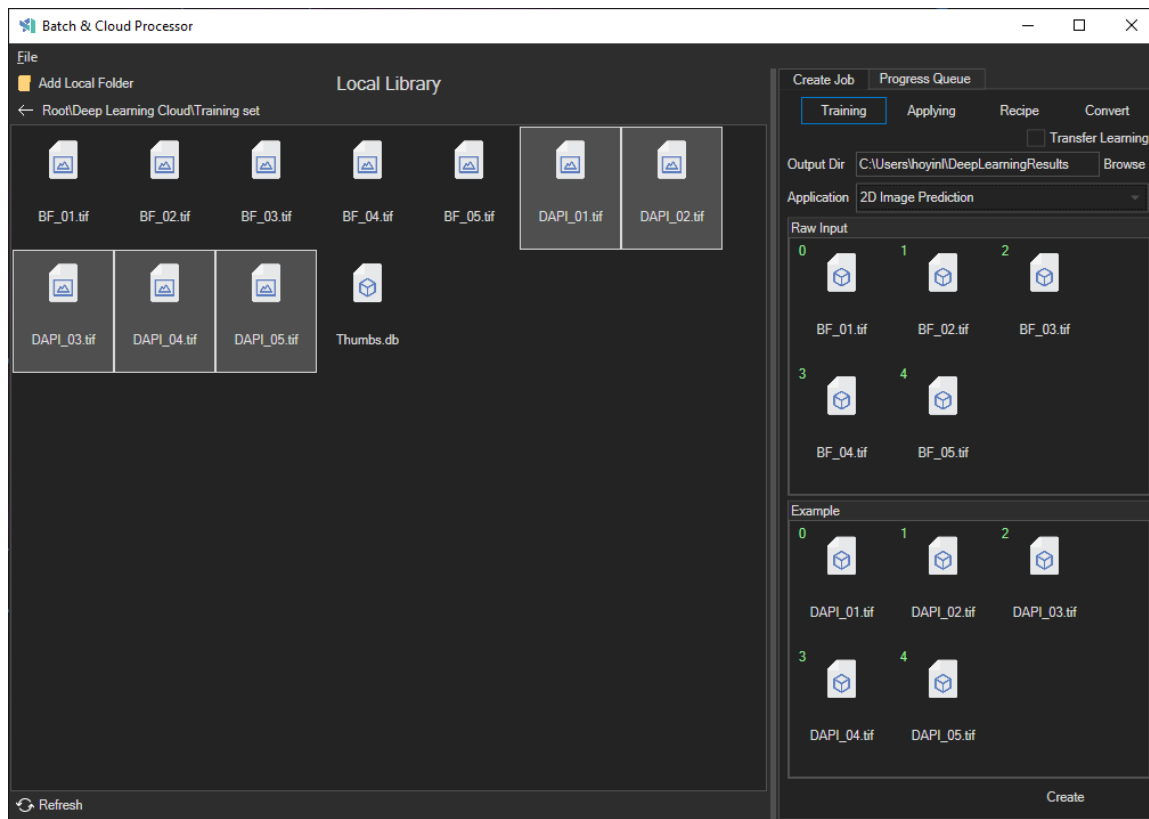


Left: ROI (blue box) in 3D view incorporating only a subset of nuclei. Right: Preview of object segmentation in ROI for Pixel Classifier taught on the green channel, which is hidden to show the extent of the preview output (Image courtesy: Nat Prunet, UCLA)

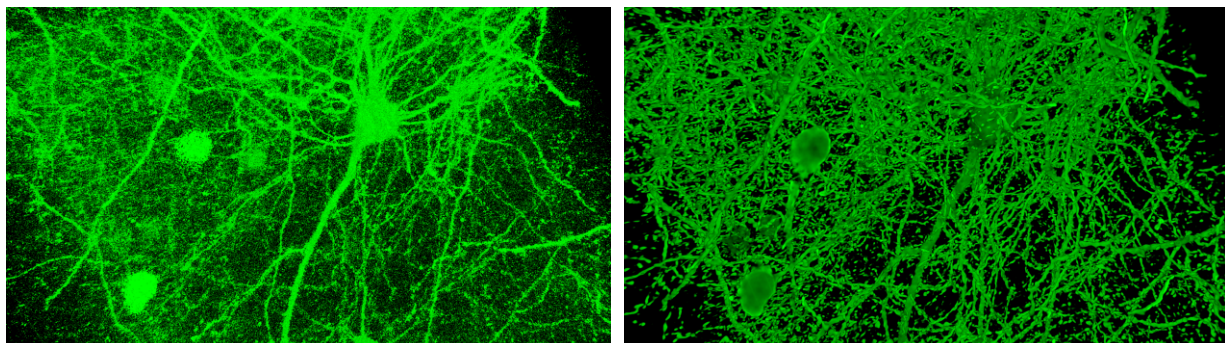
## Aivia Cloud 2.0

- Aivia Cloud interface is integrated into Aivia's desktop application – no need to install or launch separate program to use

- Train data using local resources or cloud-based resources
  - Local mode allows user to use their own GPU for training and applying deep learning models
  - Cloud mode allows user to connect to computing resources from Google Cloud Platform for training and applying deep learning models
- Stop model training any time you are satisfied with the error rate and get the best model generated in training
- Two new AI deconvolution models for denoising images acquired on a confocal microscope equipped with a resonant scanner



Batch and Cloud processor window in Aivia 8.8

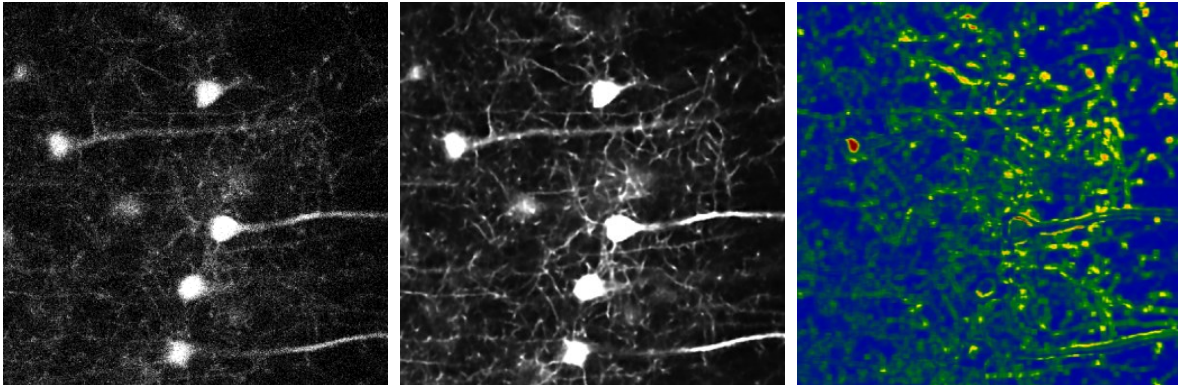


Left: 3D volume of neurons in cleared brain tissue imaged on a confocal microscope equipped with a resonant scanner at 20x with a 1.3NA objective lens using single-line scanning mode. Right: Volume restored using the 20x AI Deconvolution model



## Python integration

- API for importing and running your own Python script in Aivia
  - Image in-image out workflow
- Pre-process data for various applications including customizing deep learning input prior to training
- Option to install the latest supported Python version with the Aivia installer



Left: Original image. Middle: Image restored using 20x AI Deconvolution model. Right: Per-pixel structural similarity index (SSIM) measurement comparing the deep learning-restored output against the ground truth (deconvolved, 64 lines average) – with higher values corresponding to the yellow and red pixels.

## General improvements

- Site license management allowing you to share a single license amongst multiple workstations
- Expanded native support for additional file formats
  - Images: CZI and H5 formats
  - Deep learning annotations: DXF format (from Reconstruct)
  - Tracks and spots: CSV and TXT formats
  - Neurons: NeuronML format
- File importer reads image metadata to map image internal dimensions to imported sequence
- We have fixed 186 bugs to make Aivia more stable and user-friendly (less workarounds needed).

## Demo license and testing

Download Aivia from <https://www.drvttechnologies.com/demo> – it includes all the features listed above plus all the functionality previously introduced. See more details here <https://www.drvttechnologies.com/aivia>.

## Resources

**Video tutorials** - <https://www.drvttechnologies.com/tutorials> and via our YouTube channel, <https://www.youtube.com/channel/UCSZnnDkQltndrBfCmfkxyfw>

**How to tutorials (text)** – scroll to the “How To Guides” section on the tutorials page:  
<https://www.drvttechnologies.com/tutorials>

**Sample data sets** – under the heading of each recipe in the “Recipes” sections in the Aivia Wiki homepage:  
<https://drvision.atlassian.net/wiki/spaces/AW/overview>

Aivia Wiki (reference manual) - <https://drvision.atlassian.net/wiki/spaces/AW/overview>

## **Get Aivia for your lab**

Please contact Jim Paladino ([jimp@drvtechnologies.com](mailto:jimp@drvtechnologies.com)) for pricing and licensing options.