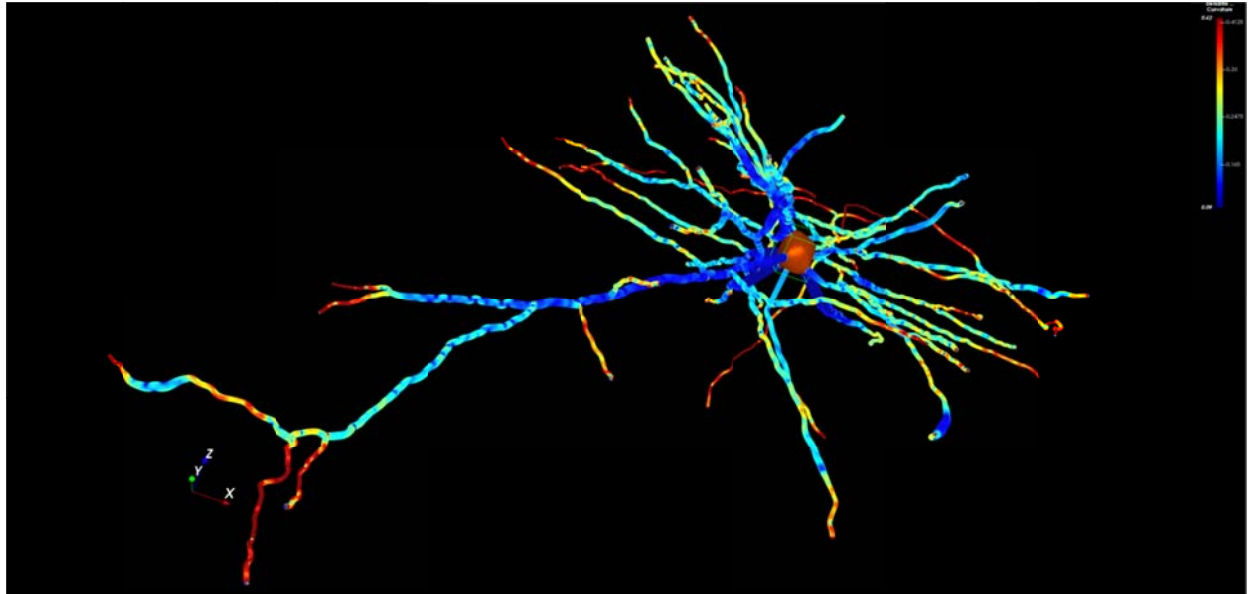


# DRVISION TECHNOLOGIES

## AIVIA 5

April 19<sup>th</sup> 2017, Bellevue, WA, USA



## OVERVIEW

We are introducing a novel approach to detecting, analyzing, visualizing and classifying neurons from fluorescent 3D data sets. We have made significant performance and speed improvements to the 3D Neuron Analysis recipe to enable fast, automated neuron detections. In addition, we are introducing support for image and data interaction in Virtual Reality (VR)\* - enabling the next level in data immersion. Furthermore, we have added 25 new features that maximize on-screen space for image exploration and improve the overall user experience with Aivia.

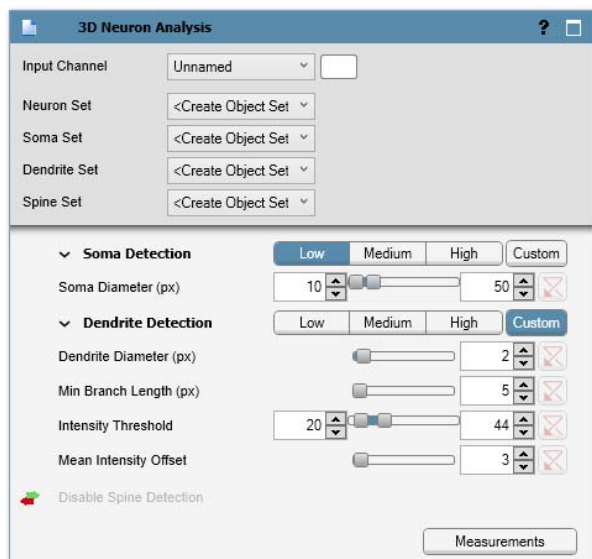
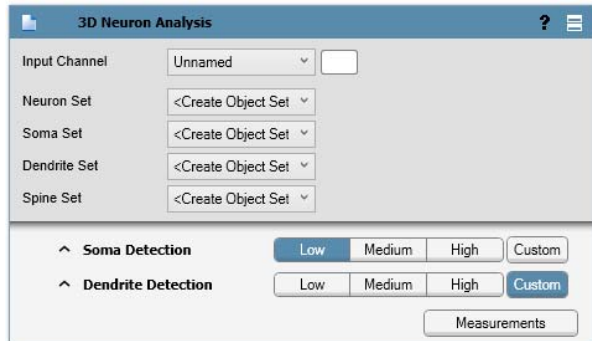
\*Compatible VR headset (HTC Vive) is required for VR features.

Summary of Aivia 5 developments:

- *Automated 3D neuron tracing and morphometric description – 12 new features*
- *VR visualization – 15 new features*
- *3D classifier – 50 new features*
- *Neuron editor – 25 new features*
- *Keyframe animations – 12 new features*
- *Display settings – 19 new features*
- Usability improvements – 6 new features
- 106 bugs fixed

## 3D neuron and spine analysis

- Brand new analysis recipe which enables fast, automated detection of neurons in 3D image stacks with improved accuracy using voxel scooping algorithm
- Significant automatic tracing speedup – full tracing results on a 1GB dataset (2000 x 2000 x 500) takes less than 25 seconds



- 2 Presets composed of 5 detection parameters plus one switchable options for enabling spine detection
  - Soma Detection
    - Soma diameter: defines the diameter range for detecting the soma of a neuron
  - Dendrite Detection
    - Dendrite Diameter: defines the approximate diameter of dendrites on the dataset
    - Min Branch Length: removes short segments
    - Intensity Threshold: specifies the range of voxel intensity to segment in a local area for tracing
    - Mean Intensity Offset: specifies the intensity offset value for measuring local mean intensity in a scooped voxel cluster
    - Disable/Enable spine detection: this option allows users to enable (or disable) detection of dendritic spines
- Over 70 statistical measurements on the dendritic arbors, including
  - Number of somas, dendrite segments, branches and spines
  - Voxel intensity of somas, dendrite segments and spines (for all channels)
  - Statistics of branch volume, surface area, tortuosity, node count, etc. for all dendritic segments per neuron

## VR Visualization

- Support for 3D volume visualization in Virtual Reality (VR) with compatible VR headsets\*
- Interact with whole scene in volumetric rendering
- Interact with individual mesh surfaces in surface rendering

## 3D Classifier

- Machine learning-enabled classification of 3D mesh objects (e.g. neurons) by morphology using random forest
- Three neuron type classifiers come standard with Aivia for classifying neurons in human, rat, and mouse samples
- Augment an existing classifier or create your own classifier with 3D Neuron Analysis recipe output or imported neuron traces in SWC format using the Classifier Gallery

## Neuron Editor

- Edit neuron tracing results from the 3D Neuron Analysis recipe
- Dendrite Pencil – trace dendrites in 3D view, software automatically determines point placements based on regions of visible signals
- Connect segments to dendritic arbor and soma – all neuron measurements update automatically

## Keyframe Animation

- Export 3D volume flythrough as AVI
- Set camera angle to create individual keyframes and software automatically generates the transition frames between them

## Display Settings

- New graphical user interface for control channel and object displays in the image viewer
- Adjust rendering mode (in 3D) and lookup table (LUT) on the fly
- Display options are streamlined to improve user experience

## Usability Improvements and Bugfixes

- Functions and tool layout have been reorganized to improve user efficiency and to maximize on-screen space for image exploration
- We have fixed 106 bugs to make Aivia more stable and user-friendly (less workarounds needed).

## Demo license and testing

Download Aivia from <https://www.drivetechnologies.com/download> – it includes the new 3D neuron analysis tools as well as 12 other applications – see more here <https://www.drivetechnologies.com/aivia>.

## Resources

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

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

**Sample data sets** – under the heading of each recipe in the “Recipe Tutorials” sections located on the right side of the tutorials page: <https://www.drivetechnologies.com/tutorials>

## Get Aivia for your lab

Please contact us ([quyent@drivetechnologies.com](mailto:quyent@drivetechnologies.com)) for pricing and licensing options.