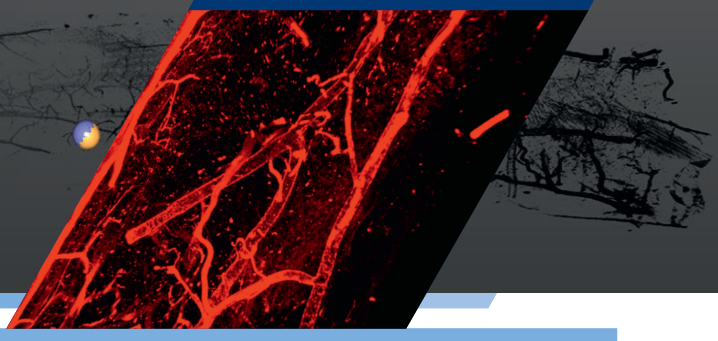
arivis

Imaging Science

Exploring whole organisms at single cell resolution



Institute for Stroke and Dementia Research (ISD)

Dr. Ali Ertürk, Institute for Stroke and Dementia Research (ISD), Klinikum der Universität München, Acute Brain Injury Research Group

Extend digital what is too large to be imaged

Integrating subcellular information into the context of whole tissues is important for understanding cellular networks and their contribution to normal and diseased conditions. Challenged by the size and opacity of tissues, only recent advancement in imaging techniques paved the way to study intact organs at a subcellular resolution. However, using techniques like Light-Sheet Microscopy is accompanied by the generation of large image data files, which complicates post-imaging data handling and processing drastically.

The acute brain injury research group of Dr. Ali Ertürk at the **Institute of Stroke and Dementia Research (ISD) in Munich**, is leading in breaking the limitations of volumetric imaging by using Light-Sheet Microscopy combined with innovative tissue clearing methods. Tackling the challenges of large imaging data sets, the lab benefitted from the unique feature of **arivis Vision4D** as an imaging data platform for easy handling and processing of data sets unlimited in size.

Based on the arivis **ImageCore Technology**, arivis Vision4D is unreached in its performance of handling large imaging data sets even on standard hardware. Only arivis Vision4D combines a variety of data pre-processing features and interactive visualization tools with the ability to handle large data sets, giving the user the possibility to standardize complete workflows.

Benefits in a nutshell

Vision4D

- Fastest image handling without any limit of data size
- Powerful stitching and fusion of large 3D volumes
- Large image handling on standard PCs
- Highest quality 3D/4D rendering for easy visualization of faint structures
- Interactive and flexible setup of analysis workflows

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www.arivis.com/imaging-science . info@arivis.com arivis AG . **Imaging Science EU** . Am Kabutzenhof 21 . 18057 Rostock . Germany
Imaging Science US . 1875 Connecticut Ave NW . 10th Floor . Washington, DC 20009 . USA

Study Synopsis

In this study, **Dr. Ali Ertürk** and his team analyzed the mouse spinal cord using Light-Sheet Microscopy (LaVision Ultramicroscope II) and uDisco tissue clearing (https://www.ncbi.nlm.nih.gov/pubmed/27548807). Due to sample size, image acquisition was done via mosaic tile scanning resulting in three individual stacks with different z-orientations. This imaging procedure necessitated a demanding post-imaging processing in order to fuse the individual stacks into one complete data set of the spinal cord. This process was further complicated by the size of one data set (300 GB per volume). Only the interactive Scope fusion tool of **arivis Vision4D** was able to fuse these large data sets to one resulting image 1,2 TB and open the possibility to study the spinal cord in its native structure.

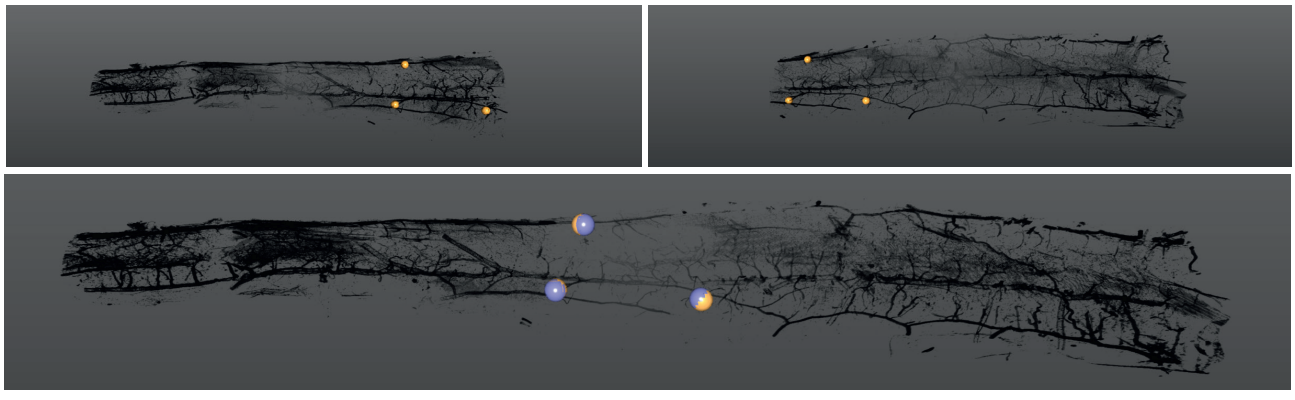

Fig 1: Fusion of separate mouse spinal cord data sets. arivis Scope fusion allows the fast combination of large data sets with different orientations (upper row) into one data set (lower row).

arivis Big Data imaging solutions

arivis AG, headquartered in Munich, Germany, is a market leading software company focused on the life sciences industry. arivis AG provides imaging solutions in multi-dimensional microscopy for datasets of basically unlimited file size based on the in-house developed **ImageCore Technology**. With our desktop software **arivis Vision4D**, scientists are empowered to work with terabyte sized images fast and efficiently on ordinary workstations and laptops. Additional benefit to usability and performance is the possibility to apply color mapping, rendering methods or quantification intuitively with immediate feedback and preview of the corresponding results. This potential can be scaled up with **arivis WebView**, a server-based image analysis framework that allows to access, display and analyze large image data in a standard web browser. With the world's first and only virtual reality visualization system for real microscopy images, **arivis InViewR** allows scientists to gain all-dimensional insights by fully immersing into the data. www.arivis.com/imaging-science

Institute for Stroke and Dementia Research (ISD), Klinikum der Universität München

The Institute for Stroke and Dementia Research (ISD) strives to advance research and treatment options in stroke and dementia. The center is designed as a novel type of research institute bridging the traditional barriers between academic medicine and basic science. By bringing together a critical mass of excellent scientist and clinicians the ISD facilitates the transfer of basic research findings into clinical applications (bench to bedside) while focusing basic research on clinically relevant questions (bedside to bench). At the same time, the Institute seeks to provide the highest quality in patient care by concentrating on the prevention, diagnosis and treatment of stroke and cognitive decline.
http://www.klinikum.uni-muenchen.de/Institut-fuer-Schlaganfall-und-Demenzforschung/de/

Dr. Ali Ertürk
Acute Brain Injury Research Group

The acute brain injury research group of Dr. Ali Ertürk is interested in understanding the cellular and molecular mechanisms leading to chronic neurodegeneration after acute brain damage including early onset dementia, epilepsy and neuropsychiatric disorders. To map the pathological brain, the lab utilizes cutting-edge techniques including high-resolution 3D imaging of the entire brain, a technique recently developed in the lab. Additionally, the lab screens for novel molecular players that are altered in chronically affected brain regions to develop effective ways to halt secondary neurological problems after acute brain injuries. As one of the main struggles in neuroscience is the difficulty to analyze long connections in the brain, the lab in parallel develops and applies new imaging tools to improve the capability to visualize and analyze complicated anatomical connections in the brain.
http://www.erturk-lab.com/
http://research.isd-muc.de/

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