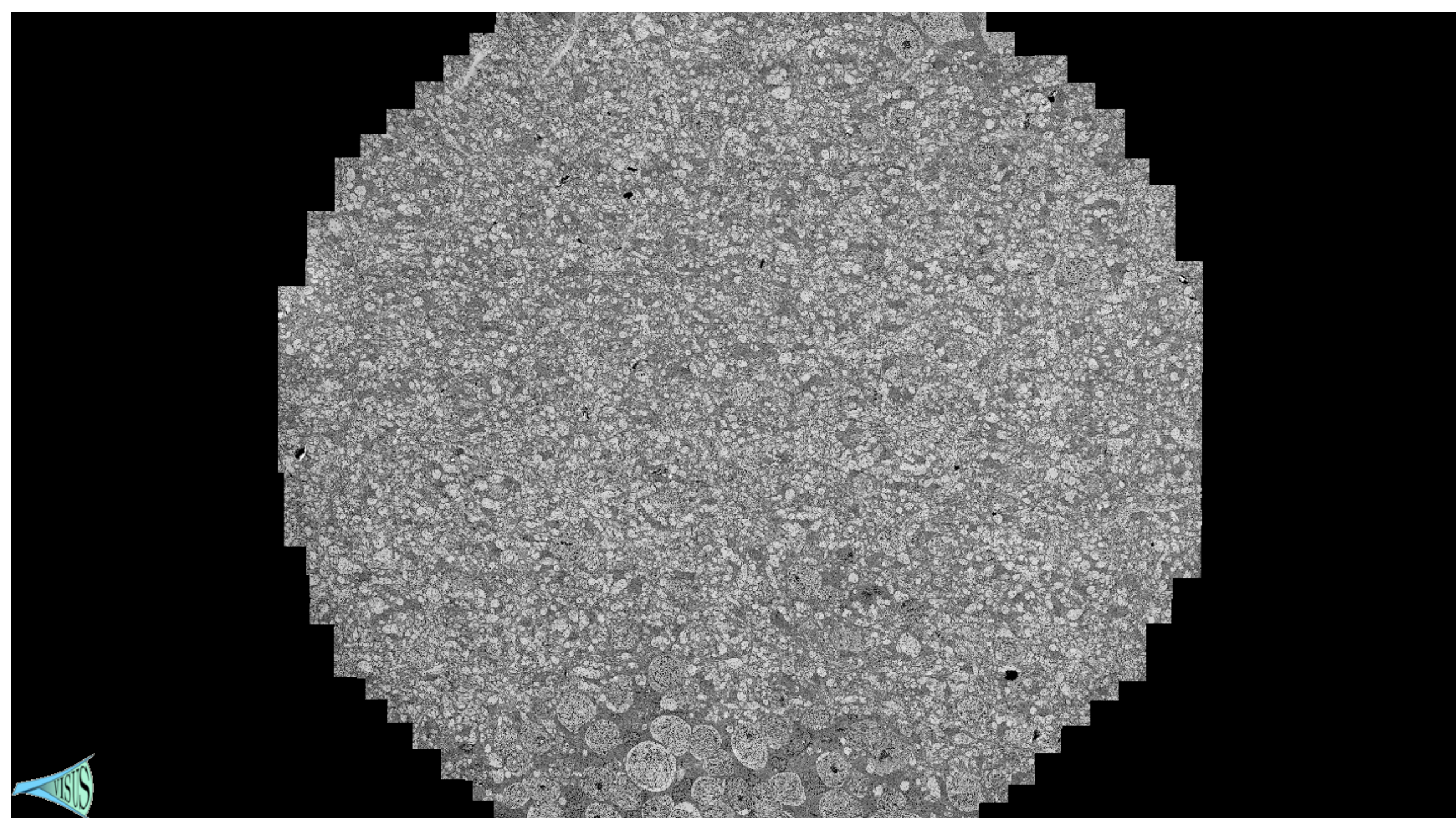


Question

How can we present hundreds or thousands of gigabytes of scientific data to a user for analysis and interpretation?

Motivation

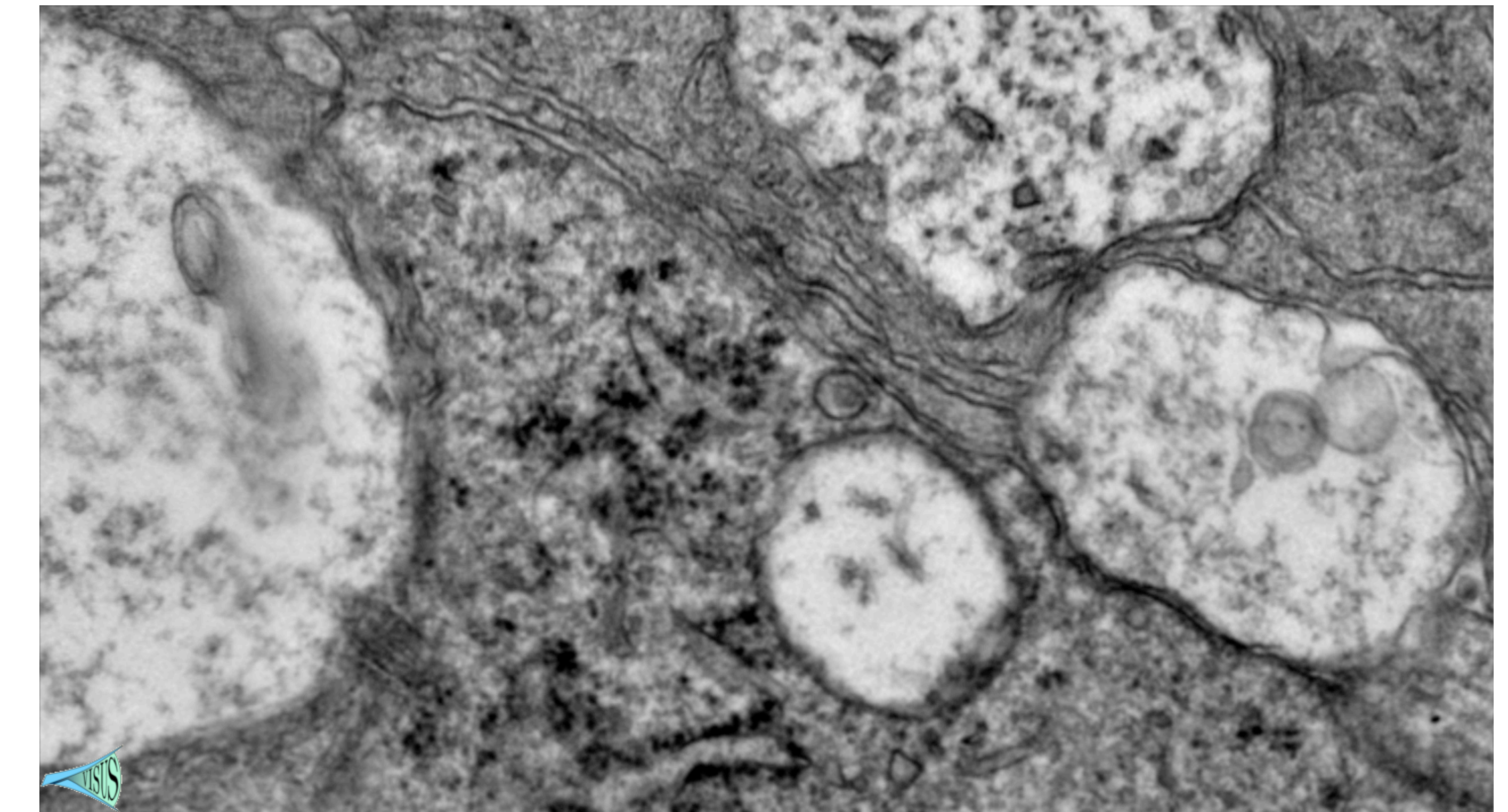
- The Scientific Computing and Imaging Institute is responsible for helping scientists visualize massive amounts of data.
- Sources of large scientific data include medical imaging equipment (CAT, PET, MRI, etc.), fluid dynamics simulations, and genetic sequence mapping
- Some of these simulations produce hundreds of gigabytes of data per simulation time step.



Microscopy data from the Moran Eye Center visualized with the ViSUS software package

Hierarchical Z-Order

- Based on the Lebesque curve
- Indexes Z-curve resolution levels in hierarchical order from coarser to finer.
- Maintains the same geometric locality for each Z-curve resolution level
- Beneficial for progressive resolution requests. (e.g. an "object search" application may first attempt to perform filtering on a coarser resolution)

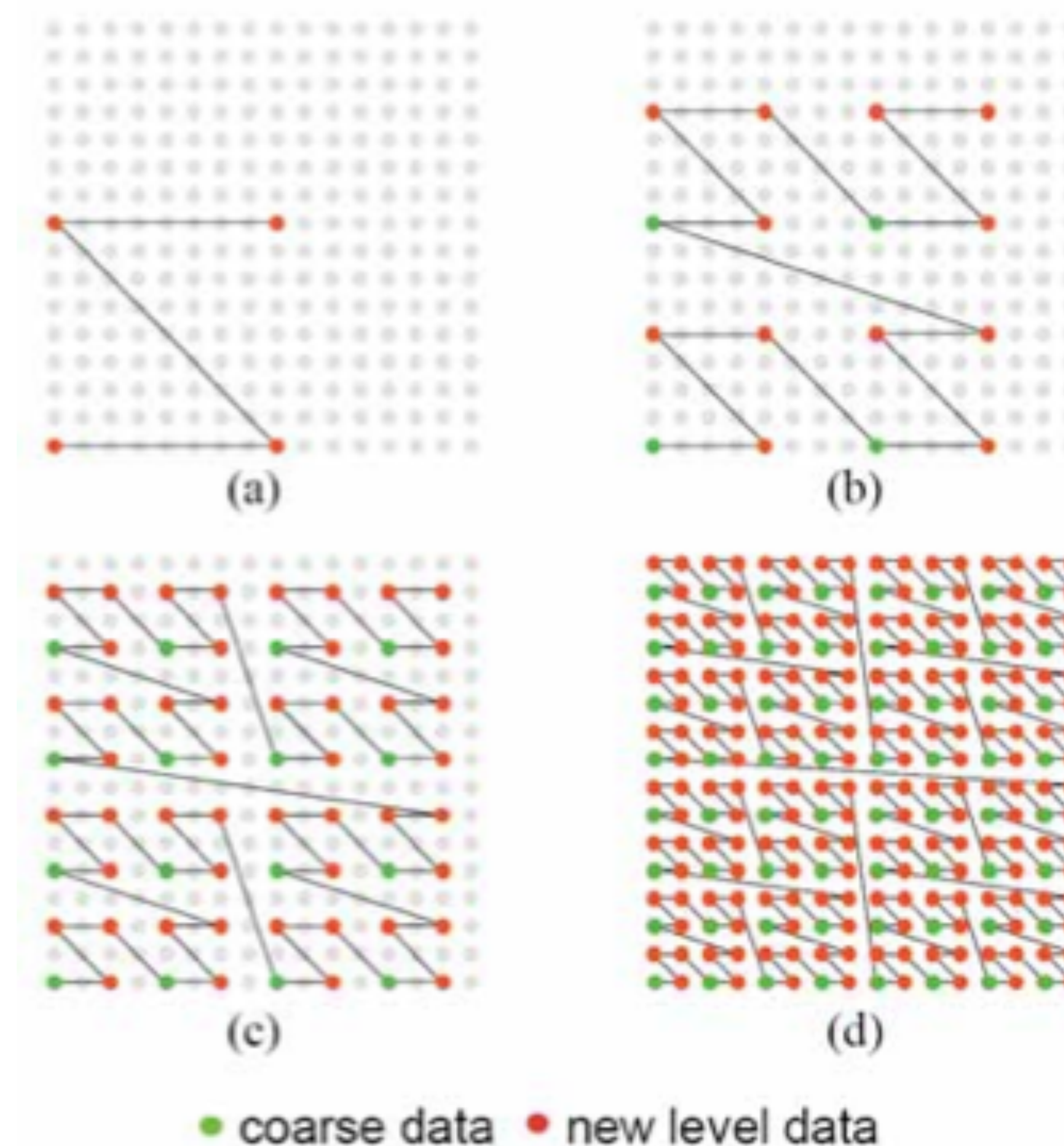


A high-resolution segment of the Moran Eye Center microscopy data set visualized with the ViSUS software package.

Evaluation

Evaluating the speed of loading a set of random samples from an 8GB 3D image showed that:

- Both Z and HZ-order significantly outperform the standard Row Major mode representation
- HZ-order also outperforms Z-order for progressive requests



● coarse data ● new level data

HZ-Order Curve

