Focus

The research group Scientific Visualization and Computer Graphics carries out research in the areas of scientific visualization, information and software visualization, illustrative computer graphics, innovative interfaces using large displays, geometry modelling and processing, and vector graphics. We apply our research to fundamental and practical problems from the life sciences (functional brain imaging, bioinformatics), astronomy, and computer-aided design (CAD). The group participates in the research school Behavioural and Cognitive Neuroscience (BCN) and the Neuroimaging Center (NIC) of the University of Groningen and the University Medical Center Groningen.

Scientific and Information Visualization

We investigate how to visualize medical and biological data. Methodologies such as functional MRI (fMRI), multichannel EEG, and diffusion tensor imaging (DTI) are used to extract functional brain networks and pathways. DNA microarray measurements allow us to visualize regulatory gene networks. We employ insights from perception science to improve current visualization techniques.

Software Visualization

Modern software systems have an increasing size and structural complexity; also, they evolve in time. Software visualization methods address the challenge of understanding and maintaining large code bases by presenting the structure, attributes, and evolution of source code in scalable and intuitive ways. We develop methods that show the structural evolution of code at class, function, or statement level and that combine the visualization of software architecture diagrams with software metrics defined on groups of diagram elements. We implement our methods in tools that can be tested on real-world software systems.

Visual Storytelling

Visual storytelling is an innovative approach for visual presentation and communication that is especially important in situations where the data analyst is not the same person as the decision-maker, and information needs to be exchanged in an intuitive and reproducible way. We focus on how to develop IT support for diagnostic and decision processes based on large and complex imaging data, with radiology being our primary use-case, relying on the concept of provenance graphs.

Vector Graphics

Vector graphics, as opposed to raster graphics, represent digital images in a scalable and resolution independent manner, and are based on so-called primitive. These primitives range from simple ones such as lines, circles, disks, and rectangles, to more complicated ones like diffusion curves. We focus on the gradient mesh primitive, available e.g. in Adobe Illustrator and Inkscape, and its extensions, including (gradient) meshes of arbitrary manifold topology, sharp transitions, and local refinement.

Contact

Prof. Dr. Jos B.T.M. Roerdink, chair
Scientific Visualization and Computer Graphics, Bernoulli Institute for Mathematics, Computer Science and Artificial Intelligence
University of Groningen
Nijenborgh 9
9747 AG Groningen
www.cs.rug.nl/svcg