



OpenGL Data Visualization Cookbook

Raymond C. H. Lo, William C. Y. Lo

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Over 35 hands-on recipes to create impressive, stunning visuals for a wide range of real-time, interactive applications using OpenGL

About This Book

- Get acquainted with a set of fundamental OpenGL primitives and concepts that enable users to create stunning visuals of arbitrarily complex 2D and 3D datasets for many common applications
- Explore interactive, real-time visualization of large 2D and 3D datasets or models, including the use of more advanced techniques such as stereoscopic 3D rendering.
- Create stunning visuals on the latest platforms including mobile phones and state-of-the-art wearable computing devices

Who This Book Is For

This book is aimed at anyone interested in creating impressive data visualization tools using modern graphics hardware. Whether you are a developer, engineer, or scientist, if you are interested in exploring the power of OpenGL for data visualization, this book is for you. While familiarity with C/C++ is recommended, no previous experience with OpenGL is assumed.

What You Will Learn

- Install, compile, and integrate the OpenGL pipeline into your own project
- Create interactive applications using GLFW and handle user inputs with callback functions
- Use OpenGL primitives and features in the OpenGL Shading Language (GLSL)
- Render complex 3D volumetric data with techniques such as data slicers and multiple viewpoint projection
- Implement a hardware-accelerated data visualizer, heat map generator, point cloud rendering, perspective rendering, and alpha blending
- Process images or video sources with texture mapping and custom fragment shader programs for image resizing and wrapping
- Develop video see-through augmented reality applications with OpenGL
- Visualize 3D models using meshes and surfaces with dynamic lighting

In Detail

OpenGL is a great multi-platform, cross-language, and hardware-accelerated graphics interface for visualizing large 2D and 3D datasets. Data visualization has become increasingly challenging using conventional approaches as datasets become larger and larger, especially with the Big Data evolution. From a mobile device to a sophisticated high-performance computing cluster, OpenGL libraries provide developers with an easy-to-use interface to create stunning visuals in 3D in real time for a wide range of interactive applications.

This book provides easy-to-follow, hands-on tutorials to create appealing OpenGL-based visualization tools with minimal development time. We will first illustrate how to quickly set up the development environment in Windows, Mac, and Linux. Next, we will demonstrate how to visualize data for a wide range of applications using OpenGL, starting from simple 2D datasets to increasingly complex 3D datasets with more advanced techniques. Each chapter addresses different visualization problems encountered in real life and introduces the relevant OpenGL features and libraries in a modular fashion. By the end of this book, you will be equipped with the essential skills to develop a wide range of impressive OpenGL-based applications for your unique data visualization needs, on platforms ranging from conventional computers to the latest mobile/wearable devices.

Style and approach

This is an easy-to-follow, comprehensive Cookbook showing readers how to create an application with real-time, interactive data visualization in stereoscopic 3D. Each topic is explained in a step-by-step format. A range of hot topics is included, including data visualization on mobile and wearable platforms.

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