

基于四叉树包围球和屏幕误差的 LOD 算法

王 倩¹, 高保禄¹, 高锐军¹, 阴桂梅²

(1 太原理工大学 计算机科学与技术学院, 山西 太原 030024;

2 太原师范学院 计算机科学与技术系, 山西 太原 030024)

摘 要: 针对大规模地形数据庞大、帧速低的问题, 提出一种基于四叉树包围球和屏幕误差的 LOD 算法. 该算法对地形进行分块编号, 实现部分地形读取; 预处理阶段对分块地形构造包围球, 减少数据存储量和实时阶段计算量. 实时绘制阶段, 依据基于投影和包围球的视锥裁剪方法实时调入可见地形块, 结合四叉树结构建立基于包围球屏幕误差的 LOD 模型, 实现大规模地形的实时绘制. 实验表明该方法可提高帧速率, 保证大规模地形绘制的流畅性和实时性.

关键词: 地形; 四叉树; 包围球; 屏幕误差; LOD

LOD Algorithm Based on Enclosing Ball Screen

Error of Quad-tree

WANG Qian¹, GAO Bao-lu¹, GAO Rui-jun¹, YIN Gui-mei²

(1 College of Computer Science and Technology, Taiyuan University of Technology, Taiyuan 030024, China;

2 Computer Science and Technology Department, Taiyuan Normal University, Taiyuan 030024, China)

Abstract: Aiming at the problem of the huge terrain data and low frame rate in large-scale terrain rendering, this paper proposes a LOD algorithm based on Enclosing Ball Screen Error of Quad-tree. It divides many blocks and indexes data blocking for terrain data, implementing the local loading of terrain data. In the preprocessing phase, the algorithm builds the enclosing ball for every terrain block to reduce the data storage and computation in real-time rendering stage. In real-time rendering stage, it establishes LOD model based on enclosing ball and implements the real-time rendering for large-scale terrain, according to the viewing frustum culling based on projection and bounding sphere to loading terrain blocks, combined with the data structure of quad-tree to build bounding spheres. Experiments results show that the method can improve the frame rate to ensure smooth large-scale terrain rendering and the performance of real-time.

Key words: terrain; quad-tree; enclosing ball; screen error; LOD

作者简介:

王 倩 女, (1990-), 硕士研究生. 研究方向为虚拟现实.

高保禄 男, (1971-), 博士, 讲师. 研究方向为智能信息处理.

高锐军 男, (1990-), 硕士研究生. 研究方向为智能信息处理.

阴桂梅 女, (1975-), 硕士, 副教授. 研究方向为数据挖掘与机器学习.

高保禄 (通讯作者) 男, (1971-), 博士, 讲师. 研究方向为智能信息处理. E-mail: 85389301@qq.com.