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研究报告

基于信息管理的一种虚拟森林景观构建及应用探讨

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摘要

在分析不同尺度的森林可视化建模内容和技术特点的基础上，提出了一个基于信息管理的虚拟森林景观构造原理和技术体系.把过程建模技术与树木形态结构描述结合，提出了一种交互式、参数化的树木动态建模方法，给出了相应的绘制方法和几何体简化算法以实现加速实时绘制，并以福建省漳浦县为例，建立了典型树种的几何模型库.利用森林调查和遥感动态空间数据，借助地理信息系统ArcObject组件、图形环境OpenGL和Visual C^{++}语言，开发了虚拟森林管理原型系统，实现森林二维/三维交互漫游、查询分析、森林生长仿真模拟，其真实感与模拟精度满足实际森林资源管理需求.最后给出了系统的典型用户界面以及在考虑竞争条件下马尾松自然生长模拟和人工间伐前后的虚拟景观对比的应用例子.

关键词 森林景观,几何建模,林分生长模型,地理信息系统

分类号

Construction of information management?based virtual forest

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Abstract

Based on the analysis of the contents and technical characteristics of different scale forest visualization modeling,this paper brought forward the principles and technical systems of constructing an information management?based virtual forest landscape.With the combination of process modeling and tree geometric structure description,a software method of interactively and parameterized tree modeling was developed,and the corresponding renderings and geometrical elements simplification algorithms were delineated to speed up rendering run－timely.As a pilot study,the geometrical model bases associated with the typical tree categories in Zhangpu County of Fujian Province,southeast China were established as template files.A Virtual Forest Management System prototype was developed with GIS component (ArcObject),OpenGL graphics environment,and Visual C++ language, based on forest inventory and remote sensing data.The prototype could be used for roaming between 2D and 3D,information query and analysis,and virtual and interactive forest growth simulation,and its reality and accuracy could meet the needs of forest resource management.Some typical interfaces of the system and the illustrative scene cross?sections of simulated masson pine growth under conditions of competition and thinning were listed.

Key words Forest landscape Geometrical modeling Stand growth model GIS

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