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大规模地下空间在线展示关键技术

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Key technologies for online visualization of large-scale underground space

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摘要 简述了通过网页3D来分享信息及进行3D交互的相关技术。针对大规模的地下空间场景以及对该场景进行网页实时展示的需求,提出了一套基于互联网进行大规模地下空间实时展示的轻量级场景管理机制。首先,对地下空间场景数据进行轻量化预处理,构建轻量级场景管理结构。然后,根据场景数据特点提出相应的场景管理策略,即基于兴趣区域的室外场景管理策略和基于入口的室内场景管理策略。通过视点位置驱动实现室内外场景切换,并自动选择管理策略,达到在网页上进行远程实时漫游大规模地下空间场景的效果。实验表明:该方法能大幅度剔除不必要的场景数据,提高资源利用率,满足在线展示大规模地下空间场景的需求。由于网页应用具有跨平台优势,提出的系统支持用户跨平台对大规模地下空间场景进行实时漫游与操控。

关键词 : Web3D, 地下空间, 场景管理, 在线展示, 轻量化

Abstract : The corresponding technologies for sharing information and 3D interaction by Web3D were described briefly. An efficient scene management scheme for real-time visualization of a large-scale underground scene was proposed to meet its demands for webpage visualization. Firstly, the raw data from the underground scene were preprocessed in lightweight, and a shell structure-aware scene analysis algorithm was employed for constructing a scene management structure. Then, some strategies were put forward according to the characteristics of the underground scene data, and those are a SOI-ExteriorShell strategy based on Sector Of Interest (SOI) management for outdoor scenes and a Portal-InteriorShell strategy supporting progressive loading for indoor ones. With the switch between indoor and outdoor scenes, the method dynamically chooses the corresponding strategy and makes it possible to roam in the large-scale underground scene online. From the final experiment, it concludes that the proposed method efficiently culls unnecessary scenes in a greatly large extent and is capable of meeting the requirements for real-time visualization of the large-scale underground scene over Internet. As the webpage has an advantage of cross-platform, the system supports users to roam and control the large-scale underground scene under cross-platform.

Key words : Web3D underground space scene management online visualization lightweight

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