

论文

## 一种基于量化方法的3D模型盲水印算法

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收稿日期 2008-12-1 修回日期 2009-4-30 网络版发布日期 2009-12-4 接受日期

摘要

相对非盲算法而言, 盲算法因在水印检测时不需要传输原始载体而使其应用更为广泛。虽然盲水印算法的鲁棒性稍弱, 但仍有提高的空间。该文提出一种3D网格盲水印算法, 利用伪随机数产生经过模型质心的直线, 选取以直线与模型交点为球心的球形邻域作为嵌入对象, 水印信息是通过抖动调制邻域内顶点的重心来嵌入的。因为重心依赖于球形邻域所有顶点坐标, 所以需解决由调整后的重心逆向估计邻域内顶点坐标问题, 文中给出相应的算法。水印算法除了具有抵御顶点重排的免疫力外, 也把每比特水印关联到直线与模型的多个交点和多个交点的球形邻域内的成组顶点上, 能较好地抵抗剪切攻击和随机噪声。实验数据说明了算法的鲁棒性能。

关键词 [数字水印](#) [3D模型](#) [盲检测](#) [量化](#)

分类号 [TP391](#)

## A Blind Watermarking Scheme Based on Quantization for 3D Models

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Abstract

Generally blind watermarking schemes are more secure in various applications because the cover meshes are absent in the watermark extraction stage, even if they are less robust than non-blind ones. But higher robustness of the blind watermarking schemes is pursued. A blind watermarking algorithm for 3D meshes is proposed in this paper. Firstly, a group of lines through the model center depending on a pseudorandom number is generated. Then the intersection points of these lines and the model's surface are chosen as embedding objects. Neighbor balls are centered on these intersection points and all vertices within the balls are adjusted to new positions according to watermark bits. Most lines have two or more intersections with the model and most balls contain several vertices, so by distributing a bit of watermark into multi-ball and multi-vertex make the algorithm be robust against cropping and random noise. Because the algorithm doesn't choose embedding objects according the vertex number, it can resist vertex reorder attack. The algorithm is also robust against translation, rotation and scaling attacks. Finally the robustness is verified by a set of experiments results.

Key words [Digital watermarking](#) [3D model](#) [Blind detection](#) [Quantization](#)

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