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Abstract
In the last years the applications using and managing 3D data are quickly increasing, the 3D geometric models have been widely used in areas such as CAD/CAM, Computer Graphics, animation, and medical applications. But nowadays are more and more people access digital 2D images or 3D models from Internet without licensing. Among all the research approaches that try to resolve this problem, digital watermarking is no doubt the most attractive one.
In this thesis, we proposed a two new spatial domain robust watermarking schemes for the triangular mesh model of three-dimensional object, first one we embedded the different amounts of watermark data into different 3D mesh structure area, and the other one we embedded the watermark data with different robustness into different 3D mesh structure area; and one fragile watermark to protect the multiple watermarks embedding attack.
Most of the previous spatial domain schemes embed watermark data with a random insertion strategy, the distribution of embedded data may be uneven. Unlike these methods, we develop a strategy to guarantee the even distribution of watermark data. We first calculate the smallest cubic sub-block of various sizes. Whenever the total density in a block exceeds a threshold value, the block is divided into 8 equal size cubic sub-blocks. Each block may contain a piece of triangular mesh, in which a fixed amount of watermark signal is embedded. The experimental results shows that the proposed watermarking scheme could survived the additive random noise, and mesh simplification, cropping and multiple watermark embedding attack, and provide well authentication to prove the copyright of rightful owner.
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