Volume Manipulation Algorithms for Simulating Sophisticated Surgical Operations

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摘要

Abstract

In this paper, we developed the volume manipulation algorithms for simulating orthographic surgery. Our system can section the anatomical structure of bone along any direction, move the bone structure together with this attached soft tissues and simulate the tissue healing. These operations are based on 3D images, and can satisfy the requirements of orthographic surgery. We use boundary pointers to represent boundaries of anatomical structures and the soft tissues. We use local quadratic surfaces to approximate the tissue surface. Using the information of the tissue surface, we can manipulate the pointers along the boundary pointer direction to simulate the boundary changes along arbitrary directions. We normalize all voxels to let the voxel value depend only on the boundary shape, not the tissue type. Then, we can move the sectioned structure and its associated soft tissues from voxel to voxel by the normalized values to achieve the sophisticated simulation purposes.