Three-dimensional Geometric Constraint Evaluation and Analysis for Determining Commercial Knee Prosthesis

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摘要

Abstract

This paper describes a method of automatically determining a knee prosthesis by evaluating geometric constraints that include avoiding abnormal bone tissue in sections and interfaces between prostheses and bones, and achieving maximum contact but avoiding incomplete contact. Our algorithms manipulate volume data of patient's knee to complete the above evaluations. These include using interfaces of prosthetic femur and tibia to intersect with the volumerepresentation femur and tibia and then detect abnormal bone tissue inside the interface, defects and incomplete contacts on interface boundary, and using tangent plane on curve-shaped prosthetic femur to obtain the patella platform for inserting the prosthetic patella and thus compute the size of the prosthetic patella.