Segmenting 3D Bone Computed Tomography Data

Technology No. 20180063

IP Status: Pending US Patent; **Application #:** 16/701,562

Two-stage Variational Approach

A two-stage variational approach for segmenting 3D bone computed tomography (CT) data performs robustly with respect to thin cartilage interfaces. The method uses fracture mechanics in the second stage to remove fine-scale contact bridges that connect object contours generated in the first stage. This approach eliminates spurious contacts between individual segmentation regions based on the transfer of the phase-field fracture approach to segmentation and the seamless integration of fracture mechanics principles with existing (variational) segmentation methods. The process segments objects (e.g., bone objects) from surrounding tissues in a medical image (e.g., those obtained with CT or other x-ray imaging).

Applies to Any Bone Type

Existing segmentation methods suffer from low quality image resolution and/or fuzzy color information, limiting their ability to identify individual objects and their segmentation region in the presence of thin cartilage interfaces. Competitive approaches are developed for a particular bone and therefore lack generalization to other bones. This new method is general and robust and can easily be adjusted to any bone extraction situation. In addition, its variational framework can be easily combined with downstream patient specific bone strength simulations.

BENEFITS AND FEATURES:

- Two-stage variational approach
- Segmenting 3D bone from CT or other x-ray imaging
- Performs robustly with respect to thin cartilage interfaces
- Fracture mechanics remove fine-scale contact bridges that connect object contours
- Full automation potential
- General, robust and easily adjusted to any bone extraction situation
- Can be combined with downstream patient specific bone strength simulations

APPLICATIONS:

- Computed tomography (CT) or other x-ray imaging
- Extracting only targeted bone parts of diagnostic CT data
- Multiple potential clinical implications
- New screening scan protocols

Phase of Development - Prototype dev

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