"A Method for Accurately Generating Hollow Organ Models for Radiation Therapy"
VCU #16-024

Applications
- Radiation Therapy
- Medical imagery of hollow organs
- Other complex deformable structure applications

Advantages
- Accurate generation of smooth organ surfaces
- Plausible and reliable thickness of organ walls
- Overcome random contouring errors in imaging

Technology Summary
In Radiation Therapy, the finite element method (FEM) has been widely used to calculate organ deformation between two time frames by solving partial differential equations for accumulating the doses during treatment. The precise and efficient calculation of this deformation is critical and important for accurate results to plan treatment for radiation therapy patients. Particularly with regards to hollow organs, current methods do not provide accurate results for determining wall thickness and surface deformations. Current methods used for such calculations are subject to limitations with regards to physician manually drawn contours and poor image quality of multimodality images.

Researchers at VCU have developed a method for generating smooth, continuous organ surfaces in 3-D imagery from multimodality images. Replacing the current FEM mesh generation techniques for hollow organs, this new method improves upon the accuracy of determining true organ wall thickness and organ displacement allowing for precise treatment and improved outcomes during radiation therapy. Using a two-step process (shown in figure), the developed method focuses on reconstructing the inner and outer organ surfaces of the hollow organ, and then further accounts for wall thickness by modifying the inner surface in step two for increased wall thickness accuracy. By increasing organ wall thickness and displacement measurement reliability, treatment plans for radiation therapy can better be assessed leading to better patient outcomes.

Technology Status
Method has been developed and proven to provide plausible and reliable results.
Patent Pending: U.S. and Foreign Rights Available
This technology is available for licensing to industry for further development and commercialization.

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