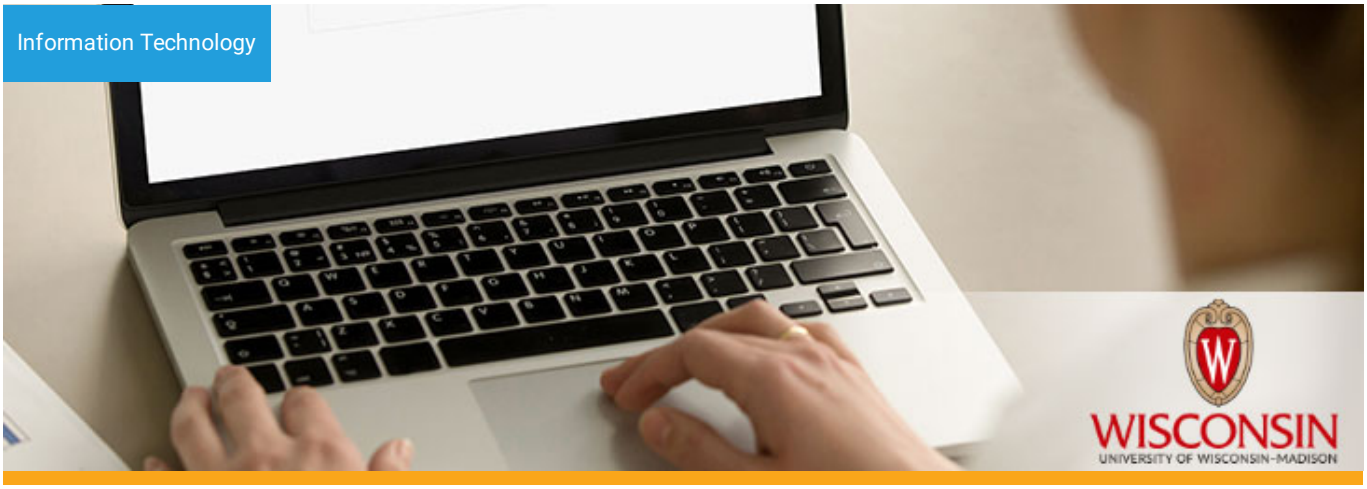
Information Technology



Automated Software System for Optimal Beam Setup in Radiation Cancer Therapy Systems

View U.S. Patent No. 7,876,882 in PDF format.

WARF: P07197US

Inventors: Robert Meyer, Leyuan Shi, Warren D'Souza

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing software that significantly improves the selection of the optimal beam angles to treat tumors with minimal exposure to surrounding healthy tissue.

Overview

Radiation therapists must carefully determine beam angles and radiation dose to accurately target tumors while avoiding healthy tissue. Of special importance are nearby organs-at-risk, which often are affected by particular radiation treatments.

Currently, beam optimization relies on an estimate by an expert in the field to select an appropriate beam configuration. Intensity Modulated Radiation Therapy (IMRT) is a technique that uses highly precise external beams to optimize the radiation distribution to reduce exposure to healthy tissue. This method is vital in reducing adverse outcomes in patients with prostate cancer, primary brain tumors, metastatic brain tumors, head and neck cancers and other cancers with important surrounding tissue. While the system can significantly reduce treatment time, the use of multiple beam orientations and radiation blocking makes it extremely complex to configure.

The Invention

UW-Madison researchers have developed software that uses iterative processes and parallel computing power to select the optimal beam setup to treat tumors while sparing surrounding tissue. Therapists begin with an estimate of a dosage scheme, and the software computes the average dose that can be applied to each organ that may be at risk of radiation exposure. Each organ is given an adjustable weight of its importance. Based on those weights and potential beam configurations, the program uses nested partitioning—an industrial engineering technique that has never been applied to radiation treatment planning before—to evaluate each potential beam setup.

Applications

- Radiation treatment software

Key Benefits

- Selects optimal beam angles to treat tumors and spare healthy tissue
- Offers significantly better treatment plans than experts can produce
- High accuracy allows greater daily doses, reducing treatment time.
- Can be used with any type of radiation treatment
- May be implemented as a module to an existing planning system
- Parallel computation accelerates the process.

- High throughput computing system performs steps quickly.
- Relative weights of organs-at-risk can be adjusted to give certain organs more or less value.
- Reduces patient discomfort
- Reduces time required to select appropriate treatment
- Significantly reduces radiation delivered to non-cancerous organs-at-risk near tumors

Publications

- D'Souza W., Zhang H., Nazareth D., Shi L. and Meyer R.R. 2008. A Nested Partitions Framework for Beam Angle Optimization in Intensity-Modulated Radiation Therapy. Phys. in Med. and Bio. 53, 3293-3307.

Tech Fields

- Information Technology : Computing methods, software & machine learning
- Radiation Therapy : Treatment planning

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846