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Development of Web-Based Customized Cancer Radiation Treatment Planning Simulation System

Oyeon Kum
Combinatorial and Computational Mathematics Center
Pohang University of Science and Technology

Customized cancer radiation treatment planning for each patient is very useful for both a patient and a doctor because it makes possible for the most effective treatment with the least possible dose to patient. Radiation planners know that too small a dose to the tumor can result in recurrence of the cancer, while too large a dose to healthy tissue can cause complications or even death. The best solution is to build an accurate planning simulation system to provide better treatment strategies based on each patient's computerized tomography (CT) image. We are developing a web-based customized cancer radiation therapy simulation system consisting of three important computer codes; the parallel Monte Carlo high-energy beam code (PMCEPT code) for calculating doses against the target generated from the patient CT image, the parallel mixed integer linear programming code for optimizing the treatment plan, and scientific data visualization code for efficient pre/post evaluation of the results. This independent system with a Beowulf PC cluster of about 100 CPUs is operated by the client-server system via web because managing a big PC cluster and continuous updating of the complicated MC and optimization codes are not an easy job for a hospital. Another benefit for an independent client-server system is to provide high quality results to many hospitals, which will eventually lead to decrease the medical cost and provide high-quality medical service to local area hospitals. At the conference, we are going to introduce the idea and progress of this project. This work was supported, in part, by the SRC/ERC program of MOST/KOSEF (grant number: R11-1999-054).