

System and method for training radiation treatment planners using knowledge-based models

Unmet Need

Cancer is a leading cause of death worldwide, with almost 10 million deaths and over 19 million new cases in 2020. These numbers are expected to grow, with 28 million new cases estimated to be diagnosed in 2040. Some of the most effective therapies for cancer are based around beams of radiation applied by an external source, such as intensity-modulated radiation therapy (IMRT). External radiation therapy is an almost \$6B a year market, which is expected to grow at a CAGR of about 6.3% to almost \$8B by 2023. However, these types of radiation treatments have to be planned for each individual patient so that the beams deliver the maximum dose to the planning target volume (PTV) while sparing nearby healthy tissue and organs at risk (OAR), a time-consuming process managed by a team of clinical professionals. Training new radiation planners is also a complex and time-consuming process, since optimizing treatment plans requires building up intuition from personal experience – not an easily-transferrable skillset. There is a need for improved systems and methods for training in the field of radiation therapy planning.

Technology

Duke inventors and colleagues have developed systems and methods for efficient knowledge-based model training of novice radiation treatment planners. The tutoring software guides users through radiation treatment plan training cases and evaluates their attempts at generating their own treatments through a knowledge-based model and a scoring system. The current instantiation of the software includes a beam angle prediction model and a dose-volume histogram



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Publication(s)

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External Link(s)

• [From the lab of Dr. Jackie Wu](#)

prediction model for lung and pancreatic cancers, though other capacity is being added. Early versions of this technology have already shown promise, with inexperienced planners achieving IMRT plan development at a level close to experienced planners in fewer than 2 days.

Advantages

- Goes beyond traditional binary correct-or-incorrect teaching to provide more thorough, strategies-based feedback
- Faster than traditional teaching techniques
- More personalized than traditional techniques
- Can be updated to account for new automated planning techniques as they become adopted

