Docket #: S20-223

Pareto Optimal Projection Search (POPS) for Automated Radiation Therapy Treatment Planning

As of 2020, radiation therapy has saved over 3.38 million cancer patients in the US. Radiation therapy treatment planning often involves a time-consuming and labor-intensive process where physicians must manually optimize the prescribed radiation dose. Thus, there is a need for a solution that can quickly optimize a patient's treatment plan at high success rates without manual adjustments from physicians. The Xing lab has invented an automated algorithm that can successfully produce clinically acceptable treatment plans in under 1 hour. The pareto optimal projection search (POPS) algorithm relies on an iterative feasibility search to determine the best possible clinical solution. The invention is a versatile tool that can be integrated into any existing treatment planning system, whether hardware or software. POPS is a novel solution that can automate treatment planning workflows, reduce manual labor from physicians, and improve the quality of life for patients with the most effective therapies.

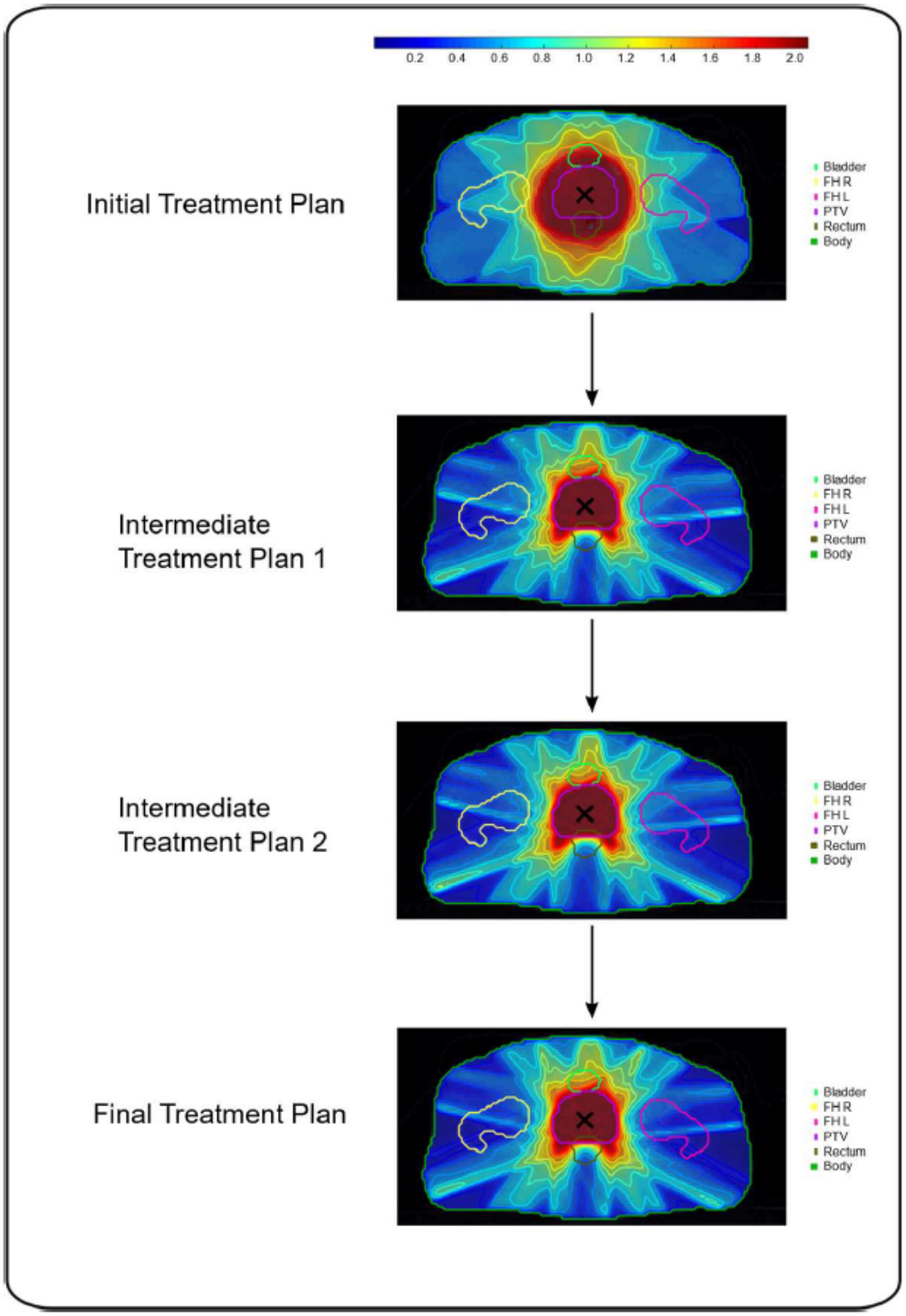

Figure Description: Visual comparison of the stepwise treatment planning for a patient by using POPS

Stage of Development: Prototype

Applications

- Integration into existing clinical treatment planning systems
- Improving clinical workflows
- Radiation therapy planning and optimization

Advantages

- Automated treatment planning process
- Efficient database generation compared to existing approaches
- Robust to patient-specific changes, such as plan configuration and patient geometry
- Optimized to provide clinically acceptable treatment plans
- Processing time of approx 1 hour

Publications

- Huang, C., Yang, Y., Panjwani, N., & Xing, L. (2020). " Pareto Optimal Projection Search (POPS): Automated Treatment Planning by Direct Search of the Pareto Surface." arXiv preprint arXiv:2008.08207.

Patents

- Published Application: 20220008748
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