

GLOBAL WEBINAR ON ARTIFICIAL INTELLIGENCE & DATA SCIENCE APRIL 15-16, 2024 | WEBINAR



Miss. Milena Živković

Milena Živković¹, Marina Svičević¹, Lazar Krstić¹, Filip Andrić¹, Tatjana B. Miladinović², Dragana Krstić¹

¹University of Kragujevac, Faculty of Science, R. Domanovica 12, 34000 Kragujevac, Republic of Serbia

²Institute for Information Technologies, Department of Physics, Kragujevac, Serbia

AI in radiation therapy optimization: FOTELP-VOX program enhancement

The intersection of Artificial Intelligence (AI) and medical physics heralds a new era for radiation therapy, promising enhancements in precision, safety, and outcomes for cancer patients. This introductory presentation explores the theoretical and practical facets of integrating AI technologies, particularly in the optimization of radiation treatment planning. As the medical community stands on the cusp of this technological revolution, understanding the potential applications, challenges, and benefits of AI in medical physics becomes paramount. Central to our discussion is the potential of AI to automate and refine the processes within the FOTELP-VOX program, a tool critical for simulating particle transport and interactions in radiation therapy. The traditional methodology, heavily reliant on manual optimization, is juxtaposed with AI-driven approaches, showcasing a future where treatment plans are not only devised more efficiently but with greater adherence to the dual objectives of maximizing tumor eradication and minimizing exposure to organs-at-risk (OARs). Our work aims to demystify AI's role in medical physics, offering insights into Bayesian Optimization (BO) and Genetic Algorithms (GA) as pivotal technologies for enhancing the FOTELP-VOX framework. We address the technical and practical challenges associated with the adoption of AI in medical applications, such as computational costs and time consumption. Furthermore, we concentrate on the ethical dilemmas inherent in the utilization of AI in medicine, particularly concerning the preservation of personal data privacy. Finally, we emphasize the significance of interdisciplinary collaboration.

Keywords: Medical physics, Radiation therapy, FOTELP-VOX, Optimization, Organs-at-Risk.

Biography

Miss. Milena Živković born on September 1, 1995, in Kragujevac, Serbia, is a highly accomplished academic excelling in physics and radiation science. Graduating with an exceptional 9.49 GPA during her undergraduate studies, she was consistently recognized as the top-performing student at the Faculty of Sciences and Mathematics for four consecutive years. Currently pursuing postgraduate studies specializing in physics, Milena maintains an impressive 9.67 average grade. Her dedication to advancing the field is evident through her extensive publication record and active involvement in research projects, including a Ministry of Education-funded project on "Experimental and Theoretical Research in Radiation Physics and Radioecology." Additionally, Milena serves as an editor for the journal "Imaging and Radiation Research" and contributes as a reviewer for "Radiation Science and Technology." As one of the authors of the monograph "Application of Monte Carlo programs and phantoms in Dosimetry", she showcases her expertise in dosimetry, further solidifying her reputation as a prominent figure in physics and radiation science.