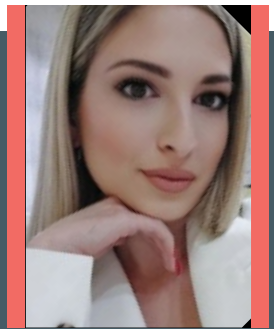

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Development of a python-based tool for estimating effective radiation dose in diagnostic imaging

Abstract:

Accurate estimation of the effective radiation dose received by patients during diagnostic imaging is pivotal for risk assessment and therapeutic strategy. This paper presents a Python-based computational tool, enhanced by artificial intelligence (AI), designed to calculate the effective dose using the Dose Area Product (DAP) and specific conversion factors tailored to various imaging procedures. The integration of AI facilitates the adaptation of conversion factors based on evolving data trends and imaging techniques, ensuring precise and dynamic dose calculations. The program utilizes established conversion factors for common imaging procedures like chest X-rays, head CT scans, and abdominal CT scans to compute the effective dose in millisieverts (mSv). Such estimations are vital for maintaining compliance with safety standards and minimizing patient exposure to unnecessary radiation, thereby optimizing patient care. Results indicate that this AI-enhanced tool provides rapid, accurate dose estimates essential for informed clinical decision-making and effective patient communication. The implementation of this tool in clinical practice not only advances radiological safety protocols but also supports the psychological well-being of patients by reducing anxiety associated with radiation exposure risks. Looking forward, we aim to expand the tool's capabilities to include a wider array of diagnostic procedures and to refine the AI algorithms, enhancing the tool's responsiveness to new research and technological advances. This tool can be particularly crucial in the fields of gynecology and obstetrics, where precise radiation dose is essential for the safe and effective imaging of sensitive reproductive organs and during pregnancy, thus supporting not only advanced diagnostic capabilities but also ensuring maternal and fetal safety.

Biography

Milena P. Zivkovic, 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.