УДК 616-073.75:004.9

MEDICAL INFORMATION SYSTEM FOR RADIOGRAPHIC IMAGE PROCESSING

М. В. ПАШКЕВИЧ
Научный руководитель В. А. ШИРОЧЕНКО, канд. техн. наук, доц.
Консультант Е. Н. МЕЛЬНИКОВА
Белорусско-Российский университет
Могилев, Беларусь

The Medical Information System (MIS) is designed to optimize the radiographic imaging workflow through Artificial Intelligence (AI). By leveraging deep learning architectures, the system aims to bridge the gap between raw data acquisition and clinical decision-making, addressing the growing demand for efficient and accurate diagnosis. The platform facilitates complex clinical workflows and ensures regulatory compliance while integrating advanced image processing algorithms to enhance diagnostic precision.

By transitioning from qualitative visual inspections to quantitative data analysis, the MIS allows for faster diagnosis and personalized treatment strategies within a globally interconnected digital healthcare ecosystem.

In traditional clinical environments, radiologists face high workloads that can result in diagnostic fatigue and reporting delays. The MIS addresses these challenges by creating a robust software framework capable of identifying subtle pathological markers that may be difficult to detect through visual inspection alone. The system assists in prioritizing urgent cases (triage) within the MIS based on AI-detected anomalies and reduce variability in image interpretation.

The system architecture is based on a modular design that ensures seamless DICOM integration with existing hospital infrastructure.

The core of the processing engine utilizes Convolutional Neural Networks optimized specifically for medical imaging tasks, including noise reduction and contrast enhancement while maintaining radiation dose levels and classifying images into diagnostic categories (e.g., normal vs. abnormal) through transfer learning with pre-trained models.

The MIS demonstrates that integrating AI directly into the medical information system significantly reduces the reporting turnaround time for critical findings. Key performance indicators evaluated during the study include:

1) achieving high diagnostic accuracy across diverse datasets;

2) ensuring near real-time AI inference to maintain clinical throughput;

3) providing clinicians with heatmaps to visualize the AI reasoning, fostering trust through Explainable AI.

However, while AI serves as a powerful assistant for detecting pathological patterns and subtle abnormalities, the final diagnosis and clinical responsibility remain with the physician. The implementation of such systems is aimed to support human expertise rather than replace it.