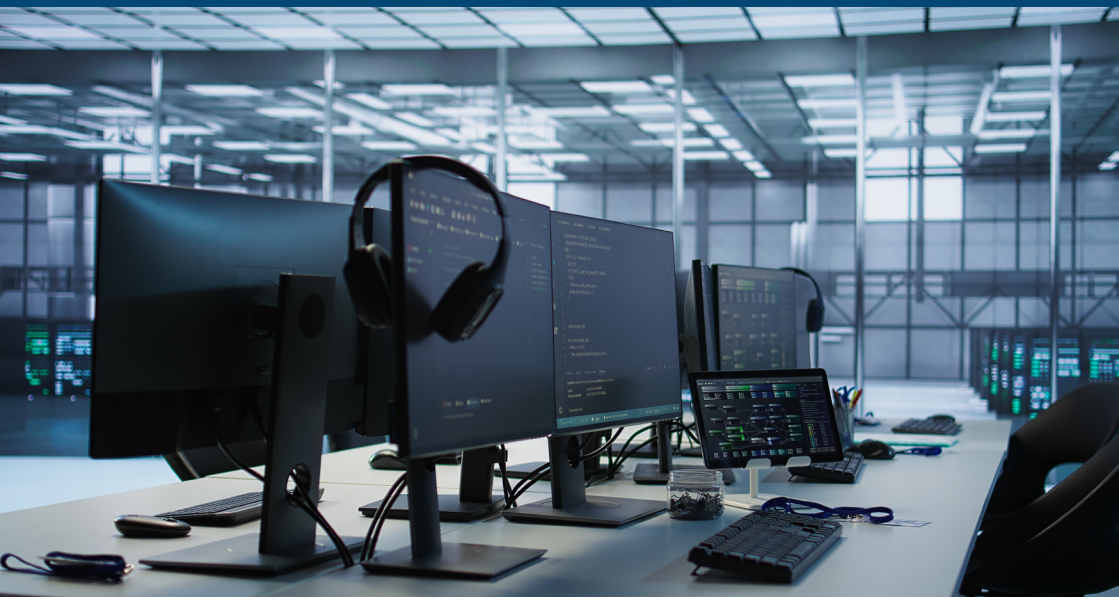
DAMSS
DATA ANALYSIS METHODS FOR SOFTWARE SYSTEMS



16th Conference on

DATA ANALYSIS METHODS for Software Systems

November 27–29, 2025

Druskininkai, Lithuania,
Hotel "Europa Royale"

https://www.mii.lt/DAMSS

LITHUANIAN COMPUTER SOCIETY
VILNIUS UNIVERSITY, INSTITUTE OF DATA SCIENCE AND DIGITAL TECHNOLOGIES
LITHUANIAN ACADEMY OF SCIENCES

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VILNIUS UNIVERSITY PRESS
Vilnius, 2025

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https://doi.org/10.15388/DAMSS.16.2025
ISBN 978-609-07-1200-9 (digital PDF)

Evolution of Artificial Intelligence in Radiological Detection of Lumbar Disc Hernias: Emphasising Trustworthiness and Explainability

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It is widely recognised that artificial intelligence (AI) is profoundly transforming medical imaging, particularly in the radiological detection of lumbar disc hernias [1-2]. This study presents a comprehensive bibliometric analysis based on global research articles extracted from the Web of Science database, aiming to map out the advances made in radiology concerning lumbar disc hernia detection, with an emphasis on trustworthiness and explainability [3-4]. The main contributions and findings have been identified, systematised, and visualised through keyword mapping of relevant AI techniques applied to this domain. These methods primarily facilitate diagnostic accuracy enhancement, automated segmentation, and classification of lumbar spine structures, thereby addressing clinical challenges such as subjective image interpretation and inter-observer variability. A critical focus is placed on the evolution of frameworks ensuring AI trustworthiness, including robustness, fairness, privacy compliance, and clinical reliability, alongside approaches to explainable AI (XAI) that promote transparency by visualising model decision-making processes, such as heatmaps highlighting key anatomical regions on MRI scans. These features are vital for promoting clinician confidence and ensuring ethical, safe AI deployment in clinical workflows.

The present study reveals main trends indicating progressive integration of multimodal data, including clinical, imaging, and genomic information, to enhance diagnostic precision and patient stratification. Additionally, it underscores the challenges faced, such as heterogeneous imaging protocols, limited availability of high-quality annotated datasets, and the need for standardised validation practices. The results support researchers and clinicians by providing valuable insights into AI applications in lumbar disc hernia radiology, guiding future investigations focused on developing robust, interpretable, and clinically relevant AI systems. This work underlines the indispensable role of explainability and trustworthiness as complementary pillars underpinning the responsible adoption of AI technologies, ultimately advancing patient care and resource efficiency in modern radiology.

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