EMERALD

June 2023
Issue #3

The latest news, views, and announcements - Issue #3

Welcome to the third edition of the EMERALD newsletter.

Dear readers,

We're excited to share key updates from January 2023 to June 2023. Stay informed of the latest developments and achievements.

Enjoy,

The EMERALD Team

INSIDE

—

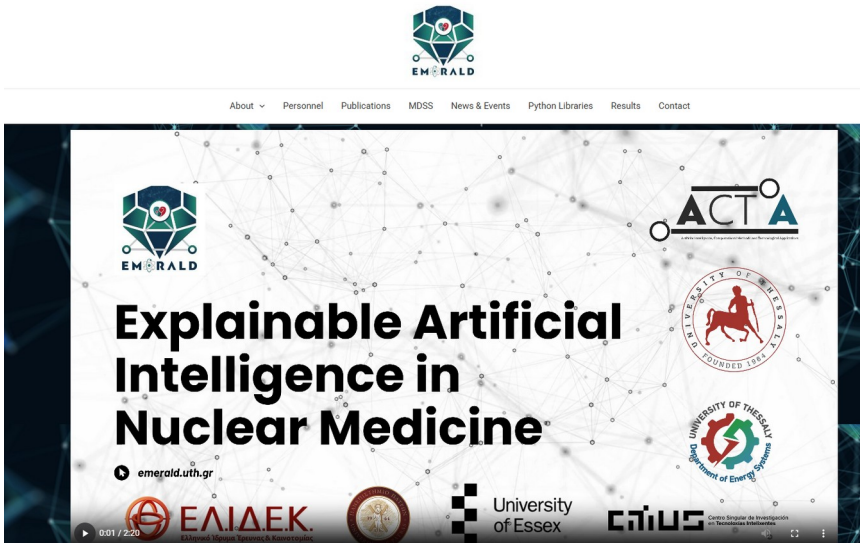
Published works

The Emerald team published in reputable journals and conferences

—

MDSS Website

The MDSS website was launched



Progress catch-up

The EMERALD project continues to advance AI-driven diagnostics, with a strong focus on coronary artery disease (CAD) and nuclear medicine imaging. A major milestone was the launch of the EMERALD website, providing a dedicated platform for research collaboration.

Recent publications highlight advancements in nuclear medicine imaging, deep learning applications, and predictive modeling, demonstrating AI's potential to transform disease classification, imaging analysis, and decision-support systems. As AI-driven methodologies evolve, EMERALD remains committed to bridging technology and medical expertise, shaping the future of intelligent and interpretable healthcare solutions.

Article in Nuclear Medicine Communications

DOI: 10.1097/MNM.0000000000001634, Date: 1 January 2023

REVIEW ARTICLE

AI-based classification algorithms in SPECT myocardial perfusion imaging for cardiovascular diagnosis: a review

Papandrianos, Nikolaos I.[a]; Apostolopoulos, Ioannis D.[b]; Feleki, Anna[a]; Moustakidis, Serafeim[a,c]; Kokkinos, Konstantinos[a]; Papageorgiou, Elpiniki I.[a]

Author Information

Nuclear Medicine Communications 44(1):p 1-11, January 2023. | **DOI:** 10.1097/MNM.0000000000001634

Our team published a study named "AI-based classification algorithms in SPECT myocardial perfusion imaging for cardiovascular diagnosis: a review" in the Journal Nuclear Medicine Communications 44(1): p 1-11, January 2023

The study highlighted significant advancements in deep learning, particularly in medical image analysis, with a focus on nuclear cardiology. It provided a comprehensive literature review on the progress of AI-driven classification for diagnosing heart diseases using SPECT MPI scans. A total of 23 studies were analyzed, sourced from reputable online databases, offering insights ranging from theoretical foundations to practical applications. The findings underscored the crucial role of CNN models in enhancing heart disease diagnosis within nuclear medicine, demonstrating their impact on improving automated classification and clinical decision support. A key aspect of the review was its emphasis on model explainability, addressing the increasing shift towards interpretable deep learning systems in clinical practice. The study also highlighted the growing importance of explainable AI (XAI) in automated diagnosis and computer-aided systems, enabling nuclear medicine professionals to make more informed decisions. The paper concluded by reinforcing the necessity of explainable deep learning models, which not only enhance diagnostic accuracy but also provide transparency, bridging the gap between AI-driven analysis and real-world clinical needs. Check the full article here.

Article in EJNMMI Physics

DOI: 10.1186/s40658-022-00522-7, Date: 27 January 2023

EJNMMI Physics Publication: Deep Learning-Enhanced Nuclear Medicine SPECT Imaging Applied to Cardiac Studies

Exploring the burgeoning field of deep learning (DL) in nuclear medicine, Apostolopoulos et al. conducted a comprehensive review focusing on DL applications in cardiac single-photon emission computerized tomography (SPECT) imaging. The review identified and analyzed fifty-five relevant studies, highlighting the limited application of DL in cardiovascular disease within nuclear medicine compared to other domains. The paper discussed various DL approaches, including disease diagnosis, SPECT attenuation correction, image denoising, full-count image estimation, and image reconstruction, shedding light on major findings and dominant techniques employed in these areas. By addressing current limitations and proposing future research directions, this review contributes to advancing DL methodologies in cardiac SPECT imaging, promising enhanced diagnostic accuracy and improved patient care in nuclear cardiology. Check the full article here

Article in Scientific Reports

DOI: 10.1038/s41598-023-33500-9, Date: 24 April 2023

Article | Open access | Published: 24 April 2023

Classification models for assessing coronary artery disease instances using clinical and biometric data: an explainable man-in-the-loop approach

Agorastos-Dimitrios Samaras, Serafeim Moustakidis, Ioannis D. Apostolopoulos, Nikolaos Papandrianos & Elpiniki Papageorgiou

Scientific Reports **13**, Article number: 6668 (2023) | Cite this article

Our team published a study named "Classification Models for Assessing Coronary Artery Disease Instances Using Clinical and Biometric Data: An Explainable Man-in-the-Loop Approach" in Journal Scientific Reports volume 13, Article number: 6668 (2023)

In this journal, Samaras et al. presented a study focused on developing computer-aided classification models for coronary artery disease (CAD) using clinical data. The study incorporated a "man-in-the-loop" approach, integrating the expert's opinion into the classification process to enhance accuracy and transparency. Utilizing biometric and clinical data from 571 patients, the researchers applied five machine-learning algorithms to develop and evaluate predictive models. Each ML model's performance was evaluated using common metrics. SVM outperformed with achieving an accuracy of 83.02%, sensitivity of 90.32%, and specificity of 85.49, where expert diagnostics as input concept significantly improved model performance. This innovative approach not only enhanced the reliability of CAD diagnosis but also underscored the vital role of human expertise in augmenting AI-driven medical diagnostics. By combining machine learning with expert input, the study provides a more transparent and trustworthy diagnostic tool, paving the way for improved patient care and clinical decision-making in cardiovascular medicine. Check the full article here.

EMERALD Website (Link)

The EMERALD project has launched its official website at https://emerald.uth.gr/, offering a detailed overview of its mission, objectives, and advancements. The site outlines the project's work, describing its structured activities and methodologies aimed at improving early diagnosis and decision support for complex medical conditions. A key focus is placed on use cases related to Coronary Artery Disease (CAD) and Non-Small Cell Lung Cancer (NSCLC), where advanced AI-driven predictive models are being developed to enhance clinical decision-making. A section is dedicated to the analysis of the EMERALD team (personnel), introducing the experts leading and contributing to the project. Furthermore, the website provides updates on news and events, ensuring the community stays informed about ongoing research, collaborations, and project milestones. Moreover, the published works are demonstrated, including conference presentations and journal articles, demonstrating the project's impact on the scientific community. The website serves as a central hub for sharing knowledge and fostering collaboration among researchers, clinicians, and stakeholders in the field of medical AI and decision support systems. It is available in the following link.

Contact Us

EMERALD Website Linkedin Facebook Email ACTA Lab Website

ΕΛΙΔΕΚ
Ελληνικό Ίδρυμα Έρευνας & Καινοτομίας

The research project was supported by the Hellenic Foundation for Research and Innovation (H.F.R.I.) under the “2nd Call for H.F.R.I. Research Projects to support Faculty Members & Re-searchers” (Project Number: 3656).