Fuzzy Cognitive Explainable Analytics for Translating Model Complexity in Nuclear Medical Diagnosis

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 & Researchers" (Project Number: 3656).

AI-Framework

Fuzzy Cognitive maps
Model interconnections among concepts, offering a transparent representation of relationships.

Deep Learning
Integrates CNNs to extract features and analyze high-dimensional data effectively.

Machine Learning
Identifies patterns in data for predictive modeling and adaptive decisions.

Object Detection
Detects and localizes objects in images, aiding tasks like diagnostics and anomaly detection.

Interpretability Techniques

Demonstration of Influence of Concepts on Output
Quantifies and visualizes concept contributions, enhancing interpretability and trust in model decisions.

Grad-CAM (Gradient-weighted Class Activation Mapping)
Creates heatmaps to show image regions influencing predictions, linking features to outcomes.

NLG Reasoning with GPT
Generates textual explanations for decisions, making results accessible and easy to understand.

Medical Decision Support System

An advanced MDSS for malignancy detection, offering interpretable results to aid clinicians in informed decision-making. It combines robust algorithms with transparency for accurate diagnosis and practical utility.

End-Users

Nuclear Physicians

Contact: Dr. Elpiniki I. Papageorgiou
Prof. in Computer Science-AI
University of Thessaly, Greece
elpinikipapageorgiou@uth.gr

External Collaborators: University of Santiago de Compostela, University of Essex

Lab of **A**rtificial Intelligence
Computational Systems and **T**echnological **A**pplications