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BOOK OF ABSTRACTS
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"Explainable Artificial Intelligence for detecting Mild Cognitive Impairment and Alzheimer's Disease from T1 MRI Scans for the Alzheimer's Disease Neuroimaging Initiative"

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Alzheimer's disease (AD) is one of the leading causes of dementia. Neuroimaging permits identification and monitoring of the disease, but radiological analysis requires expert radiologists [1,2]. Artificial intelligence offers high performance in automating this analysis, but it is limited in interpretability [3]. In this work, two Convolutional Neural Networks (CNN) based on the VGG-16 architecture were trained as binary classifiers on T1w structural Magnetic Resonance (MR) images from the Alzheimer's Disease Neuroimaging Initiative (ADNI). The first CNN classifier separates MR images as belonging to Cognitively Normal (CN) or AD subjects, while the second classifier distinguishes between AD subjects and Mild Cognitive Impairement (MCI) ones. Preliminary results on a test set made from ADNI data show an accuracy of 84% for the first classifier and of 74% for the second. An explainable AI technique, Gradient-weighted Class Activation Mapping (Grad-CAM) [4], is employed to highlight the brain regions most relevant to the models' predictions.

References

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[a]Data used for this work were obtained from the Alzheimer's Disease Neuroimaging Initiative (ADNI) database (adni.loni.usc.edu). As such, the investigators within the ADNI contributed to the design and implementation of ADNI and/or provided data but did not participate in the analysis or writing of this report. A complete listing of ADNI investigators can be found at: http://adni.loni.usc.edu/wp-content/uploads/how_to_apply/ADNI_Acknowledgement_List.pdf