

Predicting MCI to Alzheimer conversion with deep learning methods.

Today, almost half of patients with a diagnosis of mild cognitive impairment (MCI) eventually develop Alzheimer's disease. As a consequence, it is of great interest to identify methods for the early detection of this conversion. In this context two methodologies are presented. In the first method, a voxel-based morphometry (VBM) analysis generated from baseline MRI images obtains first significant volumes of interest. Then a convolutional neural network is trained to extract prognostic features from MR images using a set of convolutional feature detectors acquired by the training of a patch-based auto encoder. In the second method, together with the VBM methodology and CNN, the power of longitudinal data is exploited, revealing the brain differences between two consecutive follow-ups. The comparison of two methods shows that the use of data in different time periods contains information that is beneficial for prognosis prediction purposes and the performance is comparable to systems that use invasive methods or neuropsychological tests.

Short Biography

Dionysis Goularas received the bachelor's degree in the department of Electrical and Computer Engineering in Aristotle University of Thessaloniki, Greece and the Master's and PhD degree in computer science in Paris-Sud University. He is currently working as an assistant professor at the department of Computer Engineering at Yeditepe University, Istanbul, Turkey. His research interests include artificial intelligence, deep learning, image processing, computer graphics, computer vision, virtual reality, medical imaging, and 3D reconstruction.

Related papers:

Er, F., & Goularas, D. (2021). Predicting the prognosis of MCI patients using longitudinal MRI data. *IEEE/ACM Transactions on Computational Biology and Bioinformatics.*, vol. 8, no. 3, pp. 1164-1173, <https://doi.org/10.1109/TCBB.2020.3017872>

Er, F., Goularas, D., & Ormeci, B. (2017). A novel Convolutional Neural Network Model Based on Voxel-based Morphometry of Imaging Data in Predicting the Prognosis of Patients with Mild Cognitive Impairment. *Journal of Neurological Sciences*, 34(1).