A MULTIMODAL DISCRIMINANT ANALISYS OF BIOMARKERS FOR EARLY PREDICTION OF ALZHEIMER'S DISEASE

(Castro, S.A.[1,3]); (Sanchez, L.[2]); (Busatto, G.F.[2]); (Thomaz, C.E.[3]);

[1]FTT - Faculdade de Tecnologia Termomecanica, São Bernardo do Campo, SP, Brazil

[2]FMUSP – Faculdade de Medicina da Universidade de São Paulo, São Paulo, SP, Brazil

[3]FEI, Departamento de Engenharia Elétrica, São Bernardo do Campo, SP, Brazil

Category: (X) structural (e.g. MRI, CT);

Introduction: The cognitive impairment in Alzheimer's Disease (AD) has a progressive advance, there is no cure and the confirmation of the diagnosis is made only by *postmortem* examination. The need for an accurate and early prediction of this disease is a major issue [2], challenging researchers from several scientific areas, such as Medicine and Engineering, to propose and implement innovative and feasible solutions to this problem.

Methods: This study describes a multivariate analysis of several biomarkers for AD, aiming to increase the accuracy of prediction systems commonly based only on imaging or in a very limited number of biomarkers [5]. More specifically, this study analyzes and combines information through a multimodal discriminant model based on statistical pattern recognition [1,3,4] and data fusion of different types of biomarkers.

Results: Using structural image information, genetics, cognitive and demographic data, totaling 22 markers, and randomly selected samples of 30 AD individuals and 36 controls obtained from the Alzheimer's Disease Neuroimaging Initiative [5], it has been possible to predict with total accuracy of 72% a sample of 108 individuals with Mild Cognitive Impairment (MCI) who have or have not converted to AD. Among those who converted (58 subjects), it has been possible to predict this conversion in 80% of the cases with up to 3 years in advance.

Discussion and Conclusions: Since MCI is an intermediate condition between normal brain and dementia, these results are promising because our experiments have been carried out taking into account differences between confirming and non-confirming biomarkers of the disease, contextualizing in a more realistic way the difficulty of early prediction of AD.

References:

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