

ORAL PAPER PRESENTATION 4: INFORMATION AND COMMUNICATION

Improving the assessment of older adults using feature selection and machine learning models

J. Rojo, J. García-Alonso, J. M. Murillo, S. Helal

Purpose The growing capacity of healthcare systems to digitize patient information is enabling the creation of large repositories of patient health data, facilitating the use of Artificial Intelligence techniques, specifically Machine Learning, to analyze this data for insights and discovery. Thanks to this, unprecedented predictions and accurate diagnosis of certain diseases are possible to achieve today. However, this increasing morass of information is a double-edged sword as it makes it difficult for health professionals to navigate and determine which information is most crucial to examine for a given pathology or health condition. Feature Selection techniques have been applied for years to help Machine Learning prediction models to determine which information is most relevant to diagnoses, as demonstrated in Remeseiro et al. (2019). Consequently, these techniques help reduce the amount of information that health professionals need to collect, reducing laborious work while making them aware of which factors are more important for the assessment in contrast with what they initially considered to be important or relevant.

Method We applied Feature Selection in the area of elder care. Specifically, we have studied the prediction of functional profiles of ageing adults currently performed routinely by 50 social and healthcare centers in Portugal using the Elderly Core Nursing Set (ENCS) form¹. We used a web platform which calculates the state of the functional profile of the ageing adult as five continuous values between 0 and 100. We have taken the 31 items that are inputted to the form and analyzed them using different Feature Selection techniques. We used the selected features for the diagnosis of ageing adults in two phases (Figure 1). The first phase is carried out by the ageing adults themselves on their smartphones. The second phase was carried out by the caregivers. **Results and Discussion** first phase used only 14 (out of the 31) items and provided scores with a Mean Absolute Error (MAE) of 1.39 units (error percentage ranges from 1.54% to 3.08%) with respect to the original form. This error indicates the mean difference between the value of each score calculated using the original ENCS form and the one using our proposal. The caregivers phase used only 25 items which provided scores with an MAE of 0.17 units (error percentage ranges from 0.18% to 0.37%). Due to the range of values of the scores, the error introduced in the first phase precludes the use of its results as final assessments. However, it helps determine which users must be evaluated further using the depth with the second phase. The time required by a caregiver to assess the functional profile of an older adult has been reduced from an average of 20 minutes to 15 minutes and the number of unnecessary evaluations to healthy ageing adults has been decreased.

References

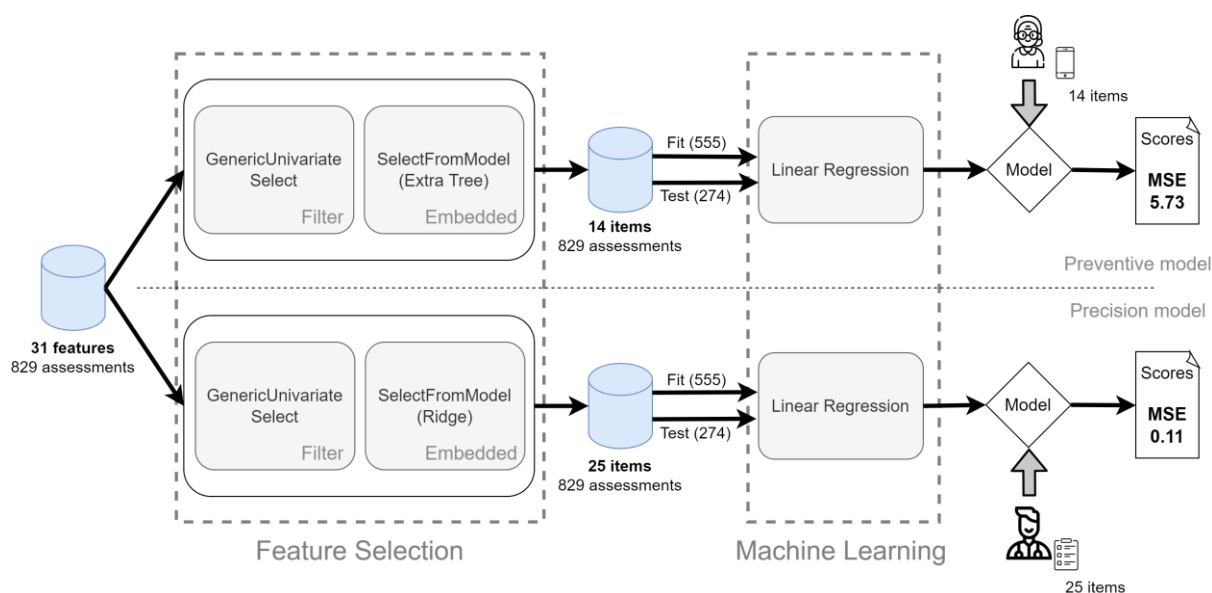
Remeseiro, B., & Bolon-Canedo, V. (2019). A review of feature selection methods in medical applications. *Computers in biology and medicine*, 112, 103375.

Keywords: feature selection, machine learning, aging informatics, healthcare data analytics, eHealth

Address: School of Engineering, University of Extremadura, Spain

Email: javirojo@unex.es

Acknowledgement This work was supported by the projects 0499_4IE_PLUS_4_E (Interreg V-A España-Portugal 2014-2020) and RTI2018-094591-B-I00 (MCIU/AEI/FEDER, UE), the FPU19/03965 grant, the Department of Economy, Science and Digital Agenda of the Government of Extremadura (IB18030,GR21133), and the European Regional Development Fund.



¹ <https://bio-protocol.org/bio101/r10088621>
Figure 1. Proposal of solution