

Abstract

The thesis is aimed to showcase how neuro-fuzzy systems can be applied for identifying a general model of a given problem defined by a set of variables and to propose an accelerated training algorithm for these systems. Neuro-fuzzy systems combine Artificial Neural Network (ANN) and Fuzzy System (FS) methodologies, resulting in a highly accurate and still easily understandable model, meaning it can be considered as an Explainable Artificial Intelligence (XAI) technique. The input-output search algorithm is able to determine an optimal system configuration for any arbitrary set of variables. By implementing the algorithm using a neuro-fuzzy approach, the resulting model becomes more interpretable with no significant loss of accuracy, especially when using the FALCON neuro-fuzzy architecture. The inner rules of the FALCON model provides additional information about the relationships between variables in a specific problem, which enhances the interpretability of the algorithm.

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