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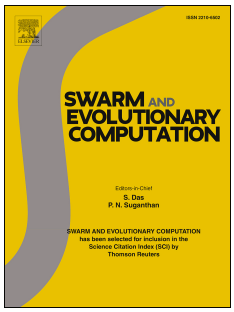

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A cluster-based dissimilarity learning approach for localized fault classification in Smart Grids

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Abstract

Modeling and recognizing faults and outages in a real-world power grid is a challenging task, in line with the modern concept of Smart Grids. The availability of Smart Sensors and data networks allows to "x-ray scan" the power grid states. The present paper deals with a recognition system of fault states described by heterogeneous information in the real-world power grid managed by the ACEA company in Italy. The pattern recognition problem is tackled as two-class classification problem using a Clustering-Evolutionary Computing approach and it is able to generate together with a Boolean decision also a score value. The last is computed through a fuzzy membership function and output values are interpreted as a reliability measure for the Boolean decision rule. As many real-world pattern recognition applications, the starting feature space is structured and the custom based dissimilarity measure adopted leads to a non-Euclidean dissimilarity matrix. Hence, a comparison of the classification performances between the proposed two-class classifier system and the well-known Support Vector Machine, on the data set at hands, is performed using a suitable kernel designed for the non-Euclidean case.

Keywords: Fault Classification, Clustering, SVM, Smart Grids, Genetic Algorithms.

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