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Advanced prognosis methodology based on behavioral indicators and chained sequential memory neural networks with a diesel engine applicat

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Abstract-

This paper presents a novel methodology in the field of Prognosis and Multilayer Perceptron (MLP) and two types of Long–Short Term Memory (LSTM) NNs with two different configurations. Among these configurations, this study proposes a novel LSTM architecture characterized by its Chained Sequential Memory (CSM) architecture based on Peephole Connections. The three architectures are studied and compared in detail in order to determine which one achieves better results in prognosis. The originality of this approach lies in the prognosis of behaviors by applying indicators to enhance and make more intuitive the characterization and prognosis of the state of the system. The proposed LSTM CSM architecture reduces the forecast error by around 50% in comparison to MLP and Stacked LSTM architectures. This study includes an application to a real case in which the new methodology is implemented for the prognosis of the cooling system of a power plant diesel generator. The results obtained prove the advantages and possibilities that the proposed methodology has for industrial applications.

Index Terms- Prognosis; Fault diagnosis; Behavior characterization; LSTM; Diesel engines

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