ABSTRACT

Fault detection and identification (FDI) of electrical motors is crucial to ensuring smooth operation of several industrial systems. Detection and diagnosis of faults at the incipient stage allows corrective actions to be adopted so as to curb the severity of faults. However, FDI of incipient faults has proved to be elusive to traditional methods of fault diagnosis. With recent developments in statistical machine learning, new methods are proposed that can be used for FDI. In this article we adopt three tools (support vector machine, convolutional neural network and recurrent neural networks) from machine learning and address the challenge of FDI of incipient faults. We perform FDI of a DC motor with the most commonly and readily measured current data. Results from experimental data reveal that the convolutional network performs the best of the three methods. A comparative study of the performance of the three methods under different types of operating conditions is provided. Sensitivity of the techniques to noise in measurements is also studied. The proposed approach serves as a reliable tool for FDI of DC motor under different types of loading conditions.