Data screening based on correlation coefficient and deep learning for fault diagnosis of arc fault

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Abstract

The effective identification of series arc faults is of great significance for preventing fires in residential buildings. Considering the disadvantage that the fault features of the current signal are hidden deeply and different correlation features and irrelevant features are mixed in the current signal, which makes the training speed of the learning algorithm slow and the recognition accuracy low, this work proposes a method based on complete ensemble empirical mode decomposition with adaptive noise (CEEMDAN) decomposition and convolutional neural network (CNN). The CEEMDAN algorithm is used to decompose the collected current signals. Then the IMF components with no representational significance are eliminated by calculating the spearman correlation coefficient before being fed into the CNN. We select five different electric loads for experimental validation with various signal characteristics, including heaters, induction cooktops, computers, microwave ovens and vacuum cleaners. The experimental results show that the proposed method has an accuracy rate of 95.23%. Therefore, it can be used for serial fault arc recognition in residential building power distribution systems.

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