Research on transformer fault diagnosis based on ISOMAP and IChOA-LSSVM

Wanjie Lu[1], chun shi[1], hua fu[1], and yaosong xu[1]

[1]Liaoning Technical University

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Abstract

Oil-immersed transformers play an important role in the stable operation of power systems. In order to improve the accuracy of transformer fault diagnosis, a transformer fault diagnosis method based on Isomap and IChOA-LSSVM is proposed. Firstly, Isomap is used to reduce the dimensionality of the 14-dimensional transformer fault characteristics data to eliminate redundant data between variables; then the Chimpanzee Optimisation Algorithm (ChOA) is improved by combining Circle uniform initialisation, position weighting strategy with proportional weights, and the Cauchy Gaussian variation factor. Circle uniform initialisation to make the population distribution uniform, position weighting strategy with proportional weights to improve the convergence speed and Cauchy Gaussian variation factor to optimize the population selection. The improved ChOA is compared with the original ChOA, PSO, and GWO algorithms by five benchmark test functions. Finally, the improved Chimpanzee Optimisation algorithm was used to find the parameters of the Least Squares Support Vector Machine (LSSVM) to obtain the fault diagnosis model combining Isomap and IChOA-LSSVM. The model is compared with PSO-LSSVM, ChOA-LSSVM, and GWO-LSSVM. The diagnostic accuracy is 90.83%, 81.67%, 83.33%, and 80%, respectively. The results demonstrate that the proposed method can effectively improve the performance of transformer fault diagnosis.

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