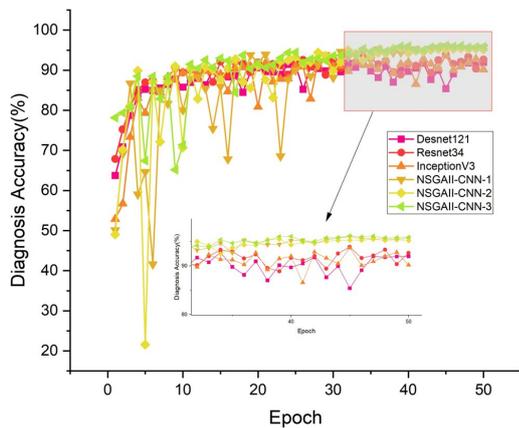


# Scientists develop intelligent fault diagnosis method for nuclear power plants

13 May 2021, by Zhang Nannan



Comparisons of average diagnostic error and complexity. Credit: GE Daochuan

Recently, a research group from the Institute of Nuclear Energy Safety Technology of the Hefei Institutes of Physical Science (HFIPS) made new progress in intelligent fault diagnosis methods for complex systems of nuclear power plants (NPP), which provided theoretical and methodological support for fault diagnosis of the complex systems of NPP.

Fault diagnosis technology is an important part of the nuclear power plant operation support system, which contributes to the safety and reliability of nuclear energy production. At present, the network structure model used in [fault](#) diagnosis usually needs professional design, which is time-consuming and labor-intensive, leading to low efficiency. Therefore, how to optimize the network structure of fault diagnosis and improve the efficiency and accuracy of fault diagnosis is of great significance.

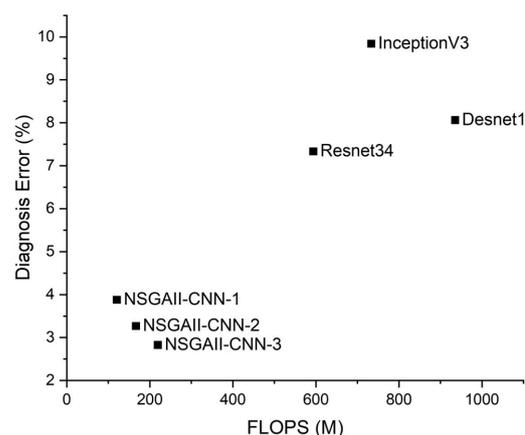
In this study, the researchers analyzed the

characteristics of NPP operation data, then they established a data-driven fault diagnosis model for complex systems of NPP.

In the end, they established the fault diagnosis model of the complex systems of NPP basing on a data-driven method, and developed an adaptive fault diagnosis method basing on the combination of non-dominated genetic algorithm with elite retention strategy and convolutional neural network algorithm (NSGAIL-CNN).

The research results showed significant advantages of the proposed method over the three current classical CNN architecture models in terms of fault diagnosis efficiency and [model](#) structure construction, providing theoretic guidance for [fault diagnosis](#) of complex systems in NPP.

This contribution is supported by the National Natural Science Foundation of China and the National Key R&D Program of China.



The validation accuracy and loss changes of 50 epochs. Credit: GE Daochuan

**More information:** Chen He et al. A data-driven adaptive fault diagnosis methodology for nuclear power systems based on NSGAI-CNN, *Annals of Nuclear Energy* (2021). [DOI: 10.1016/j.anucene.2021.108326](https://doi.org/10.1016/j.anucene.2021.108326)

Provided by Chinese Academy of Sciences

APA citation: Scientists develop intelligent fault diagnosis method for nuclear power plants (2021, May 13) retrieved 18 October 2021 from <https://techxplore.com/news/2021-05-scientists-intelligent-fault-diagnosis-method.html>

*This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.*