

Surrogate models assisted by neural networks to assess the resilience of networks

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Abstract

The assessment of networks is frequently accomplished by using time-consuming analysis tools based on simulations. For example, the blocking probability of networks can be estimated by Monte Carlo simulations and the network resilience can be assessed by link or node failure simulations. We propose in this paper to use Artificial Neural Networks (ANN) to predict the robustness of networks based on simple topological metrics to avoid time-consuming failure simulations. We accomplish the training process using supervised learning based on a historical database of networks. We compare the results of our proposal with the outcome provided by targeted and random failures simulations. We show that our approach is faster than failure simulators and the ANN can mimic the same robustness evaluation provide by these simulators. We obtained an average speedup of 300 times.

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