

基于小波包和 BAGRNN 的模拟电路故障诊断方法

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摘要: 为了克服模拟电路故障诊断中诊断模型预测精度普遍不高且训练时间过长的问
题, 提出一种基于小波包和 BAGRNN 的模拟电路故障诊断新方法. 该方法选取比 BP 神经网
络更具优势的广义回归神经网络 (generalized regression neural network, GRNN) 作为网络
模型, 用小波包变换获取电路故障特征, 并利用全局搜索能力强, 搜索速度快的寻优算法-
蝙蝠算法 (bat algorithm, BA) 优化 GRNN 的平滑因子构建出 BAGRNN 模型, 最后利用优
化后的 FOAGRNN 模型进行故障识别分类. 仿真实验结果表明, BAGRNN 诊断方法较其他
方法大大缩短了样本训练时间, 具有很高的预测精度, 平均诊断正确率可达 97.1875%.

关键词: 广义回归神经网络; 蝙蝠算法; 小波包变换; 故障诊断; 模拟电路

The Fault Diagnosis of Analog Circuit Based on Wavelet Packets and BAGRNN

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Abstract: In order to overcome the problem that the diagnosis model prediction accuracy is
generally not high and the training time is too long in analog circuit fault diagnosis. Putting
forward a new method of analog circuit fault diagnosis based on wavelet packet and BAGRNN.
The method chooses the generalized regression neural network (GRNN) which has more
advantages than the BP neural network as a network model, obtaining the fault characteristics of
circuit by wavelet packet transform, then building the BAGRNN model by using bat algorithm
which the global search ability is strong and the search speed is fast to optimize smoothing factor
for GRNN, finally applying the optimized BAGRNN model for fault identification and
classification. The simulation results show that the model of BAGRNN greatly reduces the
sample training time and has high prediction accuracy compared with other diagnostic methods,
the average diagnostic accuracy can be 97.1875%.

Key words: GRNN; bat algorithm; wavelet packets transform; fault diagnosis; analog circuit

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