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应用SVM的发动机故障诊断若干问题研究

徐启华¹, 师军²

1. 淮海工学院 电子工程系, 江苏 连云港 222005; 2. 西北工业大学 自动化学院, 陕西 西安 710072

Some Studies in Aero-engine Fault Diagnosis Using Support Vector Machines

XU Qi-hua¹, SHI Jun²

1. Electronic Engineering Department, Huaihai Institute of Technology, Lianyungang 222005, China; 2. College of Automatic Control, Northwestern Polytechnical University, Xi'an 710072, China

摘要

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摘要 支持向量机能够克服一般神经网络容易出现的过学习和泛化能力低等不足。提出一种基于支持向量机的航空发动机气路部件故障诊断方法, 讨论了支持向量机的核函数选择和参数确定问题, 并对“块算法”进行了分析。仿真实验表明, 设计的正则化参数和核参数合理, 故障分类器具有良好的分类准确性和泛化性能, 可以对发动机气路部件的典型故障进行正确诊断。

关键词: 航空发动机 支持向量机 故障诊断 核函数 泛化

Abstract: Support vector machines can avoid over-fitting and have better generalization ability as compared with neural networks. In this paper, the support vector machines based fault diagnosis algorithms are developed for aero-engines. The influence of kernel function is discussed and the chunking algorithms are analyzed. The methods are presented to select normalized parameter and kernel parameter. With the proposed algorithms, the support vector machines can give correct fault diagnosis results for the gas path components of an aero-engine. The results show that the fault diagnosis algorithms are also able to meet the application requirements and can keep robust when the measurement inputs are disturbed by noises.

Keywords: aero-engine support vector machines fault diagnosis kernel generalization

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