轨道列车轴箱轴承故障诊断与预测研究综述

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摘要：在低照明环境下，图像往往因缺乏足够的光照而出现图像RGB特征信息少、可见度低、细节丢失和对比度不足等问题，这些问题严重制约了图像质量的提升。为了改善这一状况，本文介绍了一种面向低光照图像增强的方法，该方法基于自校准照明学习框架，通过自适应增强模块对低光照图像进行多阶段增强，恢复图像中的细节信息和光照成分。自校准模块利用学习到的光照模式，自动调整图像亮度，减少噪声，提升图像的整体质量。通过在LOL数据集上的实验验证，本文使用的方法在提升低光照图像亮度、对比度和细节方面表现出色，并且能有效避免过度曝光的问题。

关 键 词：轴箱轴承；故障诊断；故障预测

Based on Self-Calibrated Illumination Learning Low-Light Enhancement Algorithm

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**Abstract：**In low-light environments, images often suffer from insufficient illumination, leading to a lack of RGB feature information, low visibility, loss of details, and inadequate contrast, which seriously hinders the improvement of image quality. To ameliorate this situation, this paper introduces a method for low-light image enhancement based on a self-calibrated illumination learning framework. The method employs an adaptive enhancement module to perform multi-stage enhancement on low-light images, thereby restoring the detail information and lighting components within the images. The self-calibrated module utilizes learned lighting patterns to automatically adjust image brightness, reduce noise, and enhance the overall image quality. Experimental validation on the LOL dataset demonstrates that the method used in this paper excels in improving the brightness, contrast, and details of low-light images and effectively avoids the problem of overexposure.

**Key words**：Low-light image enhancement；Self-calibrated illumination learning；Image quality enhancement

1 引言

随着，

轴箱轴承是轨道列车转向架中的核心旋转部件，类似于列车的“脚踝”，负责承载、支撑以及运动转换等至关重要的功能。

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2 采用的方法

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2.2 自校准模块

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2.3 无监督训练损失

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3 实验及分析

3.1 数据集及评估指标选择

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3.2 训练参数设置及实验结果

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法。

4 结论

针对

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