基于机器学习的智能冶炼与清洁生产

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摘要：随着工业化进程的加速，工业生产所产生的环境问题也越来越严重。智能冶炼和清洁生产技术的研究应运而生。机器学习作为一种强大的技术工具，在智能冶炼和清洁生产方面发挥了重要作用。本文探讨了机器学习在智能冶炼和清洁生产中的应用，包括机器学习在冶炼过程中的控制和优化、智能传感器的应用、机器学习在工厂排放监测和控制方面的应用等。通过机器学习技术的应用，冶炼过程中的能源和资源利用率得到了提高，同时也有效地减少了环境污染的程度，促进了工业的可持续发展。

关键词：智能冶炼；清洁生产；机器学习；冶炼过程优化

Intelligent Smelting and Clean Production based on Machine Learning

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Abstract: With the acceleration of industrialization, the environmental problems caused by industrial production are becoming increasingly serious. The research of intelligent smelting and clean production technology has emerged accordingly. Machine learning, as a powerful technical tool, has played an important role in intelligent smelting and clean production. This paper discusses the application of machine learning in intelligent smelting and clean production, including the control and optimization of smelting processes, the application of intelligent sensors, and the application of machine learning in factory emission monitoring and control. Through the application of machine learning technology, the energy and resource utilization efficiency in the smelting process has been improved, and the degree of environmental pollution has been effectively reduced, promoting sustainable development of the industry.
Keywords: Intelligent smelting, clean production, machine learning, smelting process optimization

基于 UNet 的干式磁选分选颗粒轨迹在线检测识别方法

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摘要：针对干式磁选分选过程中颗粒形状、大小和颜色等特征多样性所带来的颗粒轨迹检测和识别难点，提出了一种基于 UNet 的颗粒轨迹在线检测识别方法。该方法采用深度学习技术对干式磁选分选过程的图像序列进行处理，快速识别颗粒轨迹，并提取分析颗粒特征。实验结果表明，该方法的识别准确率高达 93.5%以上，有效提高了干式磁选分选过程的效率和精度，降低了人工操作的成本和误差率。该方法还为干式磁选分选过程的精细化管理提供了技术支持。其现实意义在于提高干式磁选分选过程的自动化和智能化水平，为矿山企业的高效、稳定和可持续发展提供支持。本文的研究方法和结论可以为其他颗粒轨迹检测和识别领域提供借鉴和参考。

关键词：干式磁选分选；颗粒轨迹检测；UNet；深度学习

Method for online detection and recognition of particle trajectories in dry magnetic separation based on UNet

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Abstract: The article proposes a UNet-based online detection and recognition method for particle trajectories to address the challenges of detecting and identifying particle trajectories in dry magnetic separation processes due to the diversity of particle characteristics, such as shape, size, and color. The method processes image sequences in dry magnetic separation processes using deep learning technology to quickly identify particle trajectories and extract and analyze particle features. The experimental results show that the method achieves a high recognition accuracy of over 93.5%, effectively improving the efficiency and accuracy of dry magnetic separation processes and reducing the cost and error rate of manual operations. The method also provides technical support for the refined management of dry magnetic separation processes. Its practical significance lies in improving the automation and intelligence level of dry magnetic separation processes and providing support for the efficient, stable, and sustainable development of mining enterprises. The research methods and conclusions can serve as a reference for other fields of particle trajectory detection and recognition.

Keywords: Dry magnetic separation; Particle trajectory detection; UNet; Deep learning