World Academy of Science, Engineering and Technology
International Journal of Cognitive and Language Sciences
Vol:17, No:07, 2023

Radar Fault Diagnosis Strategy Based on Deep Learning

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Abstract : Radar systems are critical in the modern military, aviation, and maritime operations, and their proper functioning is essential for the success of these operations. However, due to the complexity and sensitivity of radar systems, they are susceptible to various faults that can significantly affect their performance. Traditional radar fault diagnosis strategies rely on expert knowledge and rule-based approaches, which are often limited in effectiveness and require a lot of time and resources. Deep learning has recently emerged as a promising approach for fault diagnosis due to its ability to learn features and patterns from large amounts of data automatically. In this paper, we propose a radar fault diagnosis strategy based on deep learning that can accurately identify and classify faults in radar systems. Our approach uses convolutional neural networks (CNN) to extract features from radar signals and fault classify the features. The proposed strategy is trained and validated on a dataset of measured radar signals with various types of faults. The results show that it achieves high accuracy in fault diagnosis. To further evaluate the effectiveness of the proposed strategy, we compare it with traditional rule-based approaches and other machine learning-based methods, including decision trees, support vector machines (SVMs), and random forests. The results demonstrate that our deep learning-based approach outperforms the traditional approaches in terms of accuracy and efficiency. Finally, we discuss the potential applications and limitations of the proposed strategy, as well as future research directions. Our study highlights the importance and potential of deep learning for radar fault diagnosis. It suggests that it can be a valuable tool for improving the performance and reliability of radar systems. In summary, this paper presents a radar fault diagnosis strategy based on deep learning that achieves high accuracy and efficiency in identifying and classifying faults in radar systems. The proposed strategy has significant potential for practical applications and can pave the way for further research.

Keywords : radar system, fault diagnosis, deep learning, radar fault
Conference Title : ICSLP 2023 : International Conference on Speech and Language Processing
Conference Location : Stockholm, Sweden
Conference Dates : July 06-07, 2023