Software design of real-time fault diagnosis system based on joint time-frequency analysis and fuzzy neural networks: II. The data format transform and real-time signal analysis modules

Wu, M.; Shao, He H.

Abstract
This paper introduces an approach combining time-frequency analysis and fuzzy neural networks for pattern recognition and intelligent fault diagnosis based on real-time vibration signal processing. We focus on the software developing of real-time data collection, signal analysis and classification in fault diagnosis software system, which is based on the vibration or sound signal, by means of various feature extraction methods such as wavelet transform, STFT and Wigner-Ville distribution function, and fuzzy neural networks for signal classification and fault recognition. This real-time diagnosis system can be used in modern automobile intelligent diagnosis, human electrocardiogram-based medical diagnosis and speech recognition, and so on. We present its practical application on automobile real-time diagnosis, and the results verify the correctness and effectiveness of our theories and programs. This paper emphasizes the implementation of the data format transform module and real-time signal analysis module of the fault diagnosis system.

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Correspondence address
Wu M.; Institute of Automation, Shanghai Jiaotong University, Shanghai 200030, China

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