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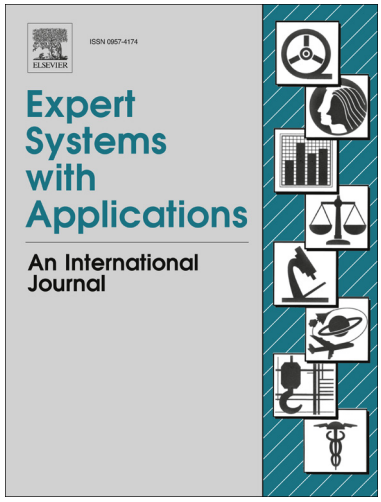

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Fault Diagnosis of Rolling Element Bearings via Discriminative Subspace Learning: Visualization and Classification

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Abstract: Rolling element bearings play an important role in ensuring the availability of industrial machines. Unexpected bearing failures in such machines during field operation can lead to machine breakdown, which may have some pretty severe implications. To address such concern, we extend our algorithm for solving trace ratio problem in linear discriminant analysis to diagnose faulty bearings in this paper. Our algorithm is validated by comparison with other state-of art methods based on a UCI data set, and then be extended to rolling element bearing data. Through the construction of feature data set from sensor-based vibration signals of bearing, the fault diagnosis problem is solved as a pattern classification and recognition way. The two-dimensional visualization and classification accuracy of bearing data show that our algorithm is able to recognize different bearing fault categories effectively. Thus, it can be considered as a promising method for fault diagnosis.

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