Chapter 10[1]

Data Mining of Multi-Dimensional Functional Data for Manufacturing Fault Diagnosis

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Abstract: Multi-dimensional functional data, such as time series data and images from manufacturing processes, have been used for fault detection and quality improvement in many engineering applications such as automobile manufacturing, semiconductor manufacturing, and nano-machining systems. Extracting interesting and useful features from multi-dimensional functional data for manufacturing fault diagnosis is more difficult than extracting the corresponding patterns from traditional numeric and categorical data due to the complexity of functional data types, high correlation, and nonstationary nature of the data. This chapter discusses accomplishments and research issues of multi-dimensional functional data mining in the following areas: dimensionality reduction for functional data, multi-scale fault diagnosis, misalignment prediction of rotating machinery, and agricultural product inspection based on hyperspectral image analysis.

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[1]   Liao, T.W. and E. Triantaphyllou, (Eds.), **Recent Advances in Data Mining of Enterprise Data**, *World Scientific*, Singapore, pp. 463-504, 2007.