



# Multilayer-Based HMM Training to Support Bearing Fault Diagnosis

Jorge Fernández<sup>1</sup>  
Andrés Álvarez<sup>1</sup>  
H. Quintero<sup>2</sup>  
J. Echeverry<sup>1</sup>  
Álvaro Orozco<sup>1</sup>

<sup>1</sup>Automatics Research Group. Pereira. Colombia. jorgeferram17@utp.edu.co

<sup>2</sup>Procesos de Manufactura y Diseño de Máquinas. Universidad Tecnológica de Pereira. Pereira. Colombia

## Abstract

*The bearings are among the most critical components in rotating machinery. For this reason, fault diagnosis in those elements is essential to avoid economic losses and human casualties. Traditionally, the automatic bearing fault diagnosis has been addressed by approaches based on Hidden Markov Models (HMM). However, the efficiency and reliability of the HMM-based diagnostic systems are still relevant topics for many researchers. In this paper, we present a modified training approach based on multilayer partition to support bearing fault diagnosis, that we called MHMM. The proposed strategy seeks to increase the system efficiency by reducing the number of HMM required to perform a proper diagnosis, making it more intelligent and suitable for this application. For concrete testing, the bearing fault databases from the Western Case Reserve University and the Politecnica Salesiana University were employed to assess the MHMM under a training and testing scheme. Attained results show that the proposed approach can effectively reduce the number of models required to perform the diagnosis while keeping high accuracy ratings when we compare the MHMM with the benchmarks. Also, the diagnosis process time is reduced as well.*

Keywords: Computer science, Fault diagnosis Multilayer partition, HMM, Maintenance

Disponible en <https://www.springer.com/gp/book/9783030011314>



Este contenido se publica bajo licencia CC-BY 4.0

