Method for neuro-fuzzy inference system learning for ICE tests

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2018, Institute of Advanced Scientific Research, Inc. All rights reserved. The application of an intelligent model for tuning an automated test system for diesel engines is considered. A neuro-fuzzy network has been designed to produce a control effect on the diesel. A technique for designing a knowledge base for controlling the operating modes of a diesel engine during its testing has been developed. In the life cycle of products, including internal combustion engines (ICE), a significant place is occupied by various technological tests of both individual units and the engine as a whole. Modern requirements to constant increase of technical level of let out designs result in that the share of expenses for carrying out of tests of diesel engines at creation of new samples all more increases. Especially large these costs become when the levels of automation of production and scientific research work do not match. In connection with this automation and mechanization of technological trials is one of the main tasks of increasing the technological level of production and the quality of the parts produced.

Keywords

Automated test system, Automated test technology, Diesel engine, Fuzzy rules, Information technology, Knowledge base, Neuro-fuzzy network, Stand, Test

References

[1] N. Deng, C.-S. Jiang, "Fault diagnosis technology based on the fusion of neural network and fuzzy Logic", 2012 International Conference on Systems and Informatics, pp. 419-422, 2012.

[2] D. Wei, "Design of Web based expert system of electronic control engine fault diagnosis", BMEI 2011-Proceedings 2011 International Conference on Business Management and Electronic Information, 1, art. no. 5916978, pp. 482-485, 2011.

[3] X. Li, F. Yu, H. Jin, J. Liu, Z. Li, X. Zhang, "Simulation platform design for diesel engine fault", 2011 International Conference on Electrical and Control Engineering, ICECE 2011-Proceedings, art. no. 6057562, pp. 4963-4967, 2011.

[4] Y. Yu, J. Yang, "The development of fault diagnosis system for diesel engine based on fuzzy logic", Proceedings-2011 8th International Conference on Fuzzy Systems and Knowledge Discovery, FSKD 2011, 1, art. no. 6019556, pp. 472-475, 2011.

[5] Z.T. Yao, H.X. Pan, "Engine fault diagnosis based on improved BP neural network with conjugate gradient", Applied Mechanics and Materials, №536-537, pp. 296-299, 2014.

[6] L.A. Galiullin, R.A. Valiev, "Diagnostics Technological Process Modeling for Internal Combustion Engines", 2017 International Conference on Industrial Engineering, Applications And Manufacturing (ICIEAM), 2017.

[7] L.A. Galiullin, R.A. Valiev, L. B. Mingaleeva, "Development of a Neuro-Fuzzy Diagnostic System Mathematical Model for Internal Combustion Engines", HELIX, Vol. 8, №. 1, pp. 2535-2540, 2018.

[8] L.A. Galiullin, R.A. Valiev, "Automation of Diesel Engine Test Procedure", 2016 2ND International Conference on Industrial Engineering, Applications and Manufacturing (ICIEAM), 2016.

[9] A.N. Iliukhin, R.A. Gibadullin, "Improvement of 'winner takes all' neural network training for the purpose of diesel engine fault clustering", (2017) 2nd International Conference on Industrial Engineering, Applications and Manufacturing, ICIEAM 2016, Proceedings, art. no. 7911587.

[10] M. Shah, V. Gaikwad, S. Lokhande, S. Borhade, "Fault identification for I.C. engines using artificial neural network", Proceedings of 2011 International Conference on Process Automation, Control and Computing, PACC 2011, art. no. 5978891, 2011.

[11] Y. Shatnawi, M. Al-Khassaweneh, "Fault diagnosis in internal combustion engines using extension neural network", IEEE Transactions on Industrial Electronics, 61 (3), art. no. 6511979, pp. 1434-1443, 2014.

[12] A. N. Iliukhin, Sh Sh. Khuzyatov, "Modelling of diesel engine's operating conditions on the basis of fuzzy logic", QUID-Investigacion Ciencia y Tecnologia, Vol. 1(SI). pp. 2557-2563, 2017

[13] L.A. Galiullin, "Development of Automated Test System for Diesel Engines Based on Fuzzy Logic", 2016 2ND International Conference on Industrial Engineering, Applications and Manufacturing (ICIEAM), 2016.

[14] L.A. Galiullin, R.A. Valiev, "Diagnosis System of Internal Combustion Engine Development", Revista Publicando, 4 No 13(2), pp. 128-137, 2017.

[15] L.A. Galiullin, R.A. Valiev, L. B. Mingaleeva, "Method of Internal Combustion Engines Testing on The Basis of the Graphic Language", Journal of Fundamental and Applied Sciences, Vol: 9 pp. 1524-1533, 2017.

[16] L.A. Galiullin, R.A. Valiev, "Mathematical Modelling of Diesel Engine Testing and Diagnostic Regimes", Turkish Online Journal of Design Art and Communication, vol. 7, pp. 1864-1871, 2017.

[17] L. Guihang, W. Jian, W. Qiang, S. Jingui, "Application for diesel engine in fault diagnose based on fuzzy neural network and information fusion", 2011 IEEE 3rd International Conference on Communication Software and Networks, ICCSN 2011, art. no. 6014398, pp. 102-105, 2011.