PARTIFICIAL NEURAL NETWORKS FOR PROCESSING BIG DATA USING THE EXAMPLE OF VIBRATION TESTS

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Vibration testing is a mandatory step in the development and production of various products, especially in aviation, automotive, energy, etc. They check the reliability, safety and quality of service of products, and also adjust their parameters.

At the site of vibration processes, huge streaming signals and data arise, which characterize both the physical state of most products, as well as the processes occurring when operating in various modes. Collecting and analyzing this data allows you to solve various engineering problems. The more these conditions of fixation and attention, the higher the efficiency of development and the reliability of testing, and the lower the likelihood of sudden emergency situations.

The proposed research work is aimed at creating and studying artificial intelligence neural network models to search for structural dependencies in vibration spectra during bench tests of diesel engines with a wide power range and various design features. Research is carried out on the basis of data obtained from bench tests of engines.

An important feature of neural networks is that, due to their design features, they allow one to successfully solve problems with a large number of variables without requiring a large amount of computing resources (compared to standard deterministic methods).

This problem uses artificial neural network models based on deep learning networks. Training neural networks requires the most complete display of the collected statistics of the subject area. This ensures the accuracy of artificial intelligence in forecasting systems.

The advantage of this algorithm is that it can be applied to unstudied complex processes without constructing a mathematical model. There is no need to change the algorithm; It is enough to build a new neural network trained on experimental data.

Moreover, a neural network trained on Big Data will give a more adequate and complete description of the process.
In conclusion, the proposed research cloud-based vibration testing facility for diesel engines has the potential to revolutionize engine development, testing and maintenance in various industries. By taking advantage of cloud computing, this system improves efficiency and cost-effectiveness while supporting the continuous improvement of diesel engine technology.

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