Paperwork on Degree Project: Machine Learning Based Fault Prediction for Real-time Scheduling on Shop-floor

First Name 1 Last Name 1
Personal Number 1
E-mail 1

First Name 2 Last Name 2
Personal Number 2
E-mail 2

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BP Neural Network

Overview

The back propagation (BP) neural network algorithm is a multi-layer feedforward network trained according to error back propagation algorithm and is one of the most widely applied neural network models. BP network can be used to learn and store a great deal of mapping relations of input-output model, and no need to disclose in advance the mathematical equation that describes these mapping relations. Its learning rule is to adopt the steepest descent method in which the back propagation is used to regulate the weight value and threshold value of the network to achieve the minimum error sum of square. BP neural network has been studied in many different fields including image recognition: An Optimal Backpropagation Network for Face Identification and Localization-Goutam Sarker(International Journal of Computers and Application), electrical engineering: Flashover forecasting on high-voltage insulators with a back propagation neural net-Manuel Mejia-Lavalle and Guillermo Rodriguez-Ortiz(Canadian Journal of Electrical and Computer Engineering) as well as on-line recommendation: Ubiquitous Hotel Recommendation Using aFuzzy-Weighted-Average and Back propagation-Network Approach-Toly Chen(International Journal of Intelligent Systems).

Algorithm Details

Overall, long computation time, high model complexity, small amount of training data works. Capable of learning complex patterns(correlation between features). Step 1:
...
Step n: equations

References

[] Hassan K Khalil. *Nonlinear systems*. Prentice Hall, Upper Saddle river, 3. edition, 2002. ISBN 0-13-067389-7.

[] Tobias Oetiker, Hubert Partl, Irene Hyna, and Elisabeth Schlegl. *The Not So Short Introduction to LaTeX 2ε*. Oetiker, OETIKER+PARTNER AG, Aarweg 15, 4600 Olten, Switzerland, 2008. http://www.ctan.org/info/lshort/.

[] Shankar Sastry. *Nonlinear systems: analysis, stability, and control*, volume 10. Springer, New York, N.Y., 1999. ISBN 0-387-98513-1.