Abstract

This paper proposes an improved version of particle swarm optimization (PSO) algorithm for the training of a neural network (NN). An architecture for the NN trained by PSO (standard PSO, improved PSO) is also introduced. This architecture has a data preprocessing mechanism which consists of a normalization module and a data-shuffling module. Experimental results showed that the NN trained by improved PSO (IPSO) achieved better performance than both the NN trained by standard PSO and the NN trained by back-propagation (BP) algorithm. The effectiveness concerning the recognition rate and the minimum learning error of the data preprocessing modules (normalization module, data-shuffling module) was also demonstrated through the experiments.

References

2. R. H. Nielsen, Theory of the backpropagation neural network, In processing of the
a systematic introduction, Springer-Verlag, 1996
optimization back-propagation algorithm for feedforward neural network training, Applied
4. Z.A. Bashir, M.E. El-Hawary, Applying Wavelets to Short- Term Load Forecasting Using
PSO-Based Neural Networks, IEEE transactions on power systems, vol. 46, pp. 268-275, 2016
5. A. Suresh, K. V. Harish, N. Radhika, Particle Swarm Optimization over Back Propagation
Neural Network for Length of Stay Prediction, In processing of the international conference on
information and communication technologies, vol. 24, no.1, pp. 20-27, 2009
6. V. G. Gudise, G. K. Venayagamoorthy, Comparison of particle swarm optimization and
backpropagation as training algorithms for neural networks, In processing of 2003 IEEE swarm
intelligence symposium, pp. 110-117, 2003
7. M. T. Das, L. C. Dulger, Signature verification (SV) toolbox: Application of PSO-NN,
Engineering applications of artificial intelligence, vol. 22, issue 4-5, pp. 688-694, 2009
8. R. Mendes, et al., Particle swarms for feedforward neural network training, In processing
9. K. W. Chau, Application of a PSO-based neural network in analysis of outcomes of
Springer, 2012
11. J. Kennedy, R. Eberhart, Particle swarm optimization, In processing of the IEEE
12. R. Eberhart, Y. Shi, Particle swarm optimization: developments, applications and
resources, In processing of the 2001 IEEE international conference on congress on evolutionary
computation, vol. 1, pp. 81-86, 2001
13. Y. Shi and R. Eberhart, Empirical study of particle swarm optimization, In processing of
international conference on evolutionary computation, pp. 1945-1950, 1999
14. J. Han, M. Kamber, J. Pei, Data mining: concepts and techniques, 3rd edn, Morgan
Kaufmann, 2011
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16. E. Orhan, A. C. Tanrikulu, A. Abakay, F. Temurtasa, An approach based on probabilistic
75-81, 2012

Index Terms

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Keywords

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