Improving recognition and generalization capability of back-propagation NN using a self-organized network inspired by immune algorithm (SONIA)

Muhammad R. Widyanto\textsuperscript{a}, Hajime Nobuhara\textsuperscript{a}, Kazuhiko Kawamoto\textsuperscript{a}, Kaoru Hirota\textsuperscript{a} and Benyamin Kusumoputro\textsuperscript{b}

\textsuperscript{a}Department of Computational Intelligence and Systems Science, Tokyo Institute of Technology, G3-49, 4259 Nagatsuta, Midori-ku, Yokohama 226-8502, Japan

\textsuperscript{b}Faculty of Computer Science, University of Indonesia, Depok Campus, West Java, Indonesia

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Abstract

To improve recognition and generalization capability of back-propagation neural networks (BP-NN), a hidden layer self-organization inspired by immune algorithm called SONIA, is proposed. B cell construction mechanism of immune algorithm inspires a creation of hidden units having local data recognition ability that improves recognition capability. B cell mutation mechanism inspires a creation of hidden units having diverse data representation characteristics that improves generalization capability. Experiments on a sinusoidal benchmark problem show that the approximation error of the proposed network is 1/17 times lower than that of BP-NN. Experiments on real time–temperature-based food quality prediction data shows that the recognition capability is 18% improved comparing to that of BP-NN. The development of the world first time–temperature-based food quality prediction demonstrates the real applicability of the proposed method in the field of food industry.

Keywords: Back-propagation; Immune algorithm; Self-organization; Food quality prediction

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