Turkish Journal

of

Electrical Engineering & Computer Sciences

Keywords
Authors

elektrik@tubitak.gov.tr

Scientific Journals Home Page

Turkish Journal of Electrical Engineering & Computer Sciences

A novel and efficient algorithm for adaptive filtering: Artificial bee colony algorithm

Nurhan KARABOĞA, Mehmet Bahadır ÇETİNKAYA

Department of Electronics Engineering, Faculty of Engineering, Erciyes University, 38039, Melikgazi, Kayseri, TURKEY
e-mail: nurhan$_k$@erciyes.edu.tr, cetinkaya@erciyes.edu.tr

Abstract: The uni-modal error surfaces and intrinsic stable behaviors of adaptive finite impulse response (FIR) filters make gradient based algorithms very effective in the design of these filters. Gradient based design methods are well developed for the design of adaptive FIR filters and widely applied to the distinct areas such as noise cancellation, system identification and channel equalization. However, the studies on adaptive infinite impulse response (IIR) filters are not as common as adaptive FIR filters since the stability during the adaptation process may not be ensured in some applications, and the convergence to the optimal design is not always guaranteed due to their multi-modal error surface structures. Gradient based design approaches may often get stuck at a local minimum in a multi-modal error surface and the stability of the designed filter can not be ensured. However, global optimization algorithms based approaches are able to converge to the global minimum in a multi-modal error surface and ensure the stability of the adaptive IIR filter. One of the most recently proposed swarm intelligence based global optimization algorithms is the artificial bee colony algorithm, which simulates the intelligent foraging behavior of honeybee swarms. In this work, a novel approach based on artificial bee colony algorithm is introduced for the design of adaptive FIR and adaptive IIR filters. Simulations are realized for the noise cancellation problem and the performance of the proposed approach is compared to that of some known gradient and evolutionary based approaches.

Key Words: Artificial bee colony, Particle swarm optimization, Differential evolution, Adaptive filter design, Noise cancellation

---

Turk. J. Elec. Eng. & Comp. Sci., **19**, (2011), 175-190.
Full text: pdf
Other articles published in the same issue: Turk. J. Elec. Eng. & Comp. Sci.,vol.19,iss.1.