World Academy of Science, Engineering and Technology
International Journal of Computer and Systems Engineering
Vol:11, No:11, 2017

Continuous Differential Evolution Based Parameter Estimation Framework for Signal Models

Authors : Ammara Mehmood, Aneela Zameer, Muhammad Asif Zahoor Raja, Muhammad Faisal Fateh

Abstract : In this work, the strength of bio-inspired computational intelligence based technique is exploited for parameter estimation for the periodic signals using Continuous Differential Evolution (CDE) by defining an error function in the mean square sense. Multidimensional and nonlinear nature of the problem emerging in sinusoidal signal models along with noise makes it a challenging optimization task, which is dealt with robustness and effectiveness of CDE to ensure convergence and avoid trapping in local minima. In the proposed scheme of Continuous Differential Evolution based Signal Parameter Estimation (CDESPE), unknown adjustable weights of the signal system identification model are optimized utilizing CDE algorithm. The performance of CDESPE model is validated through statistics based various performance indices on a sufficiently large number of runs in terms of estimation error, mean squared error and Thiel's inequality coefficient. Efficacy of CDESPE is examined by comparison with the actual parameters of the system, Genetic Algorithm based outcomes and from various deterministic approaches at different signal-to-noise ratio (SNR) levels.

Keywords : parameter estimation, bio-inspired computing, continuous differential evolution (CDE), periodic signals
Conference Title : ICCIIS 2017 : International Conference on Computational Intelligence and Intelligent Systems
Conference Location : Melbourne, Australia
Conference Dates : November 29-30, 2017