XVIII International Conference on Water Resources
CMWR 2010
J. Carrera (Ed)
CIMNE, Barcelona 2010

ON THE USE OF RANDOM-WALK BASED TRAINING ALGORITHMS FOR NEURAL NETWORKS APPLIED IN ENVIRONMENTAL MODELING

Ioannis C. Trichakis[*], Ioannis K. Nikolos[†] and George P. Karatzas[*]

[*] Department Environmental Engineering, Technical University of Crete
University Campus, 73100, Chania, GREECE
e-mail: ioannis.trichakis@enveng.tuc.gr, karatzas@mred.tuc.gr

[†] Department of Production Engineering and Management, Technical University of Crete
University Campus, 73100, Chania, GREECE,
e-mail: jnikolo@dpem.tuc.gr

Summary. Neural networks have found their way in environmental modeling and their use increases with time. The physical systems, though, are quite complicated and difficult to describe. This may result in poor training when a traditional method like Back-Propagation (BP) or even a more advanced like Conjugate Gradient (CG) is applied. These methods have the advantage that they converge to a minimum after a finite number of iterations, but this minimum could be a local one. In this work, a neural network that simulates the change to an aquifer's level between successive days, using hydrological and meteorological parameters as inputs, is trained using different algorithms in order to evaluate whether the conventional, widely accepted, methods may be trapped in local minima. An alternative training procedure, a random walk (RW) based training algorithm, proposed by Tan and Gu[1] is used as a better methodology to explore the solution hyperspace. The alternative algorithms are tested in two field cases, related to karstic aquifers, where adequate field measurements are available. One must never forget though that algorithms like the random-walk based one may provide better results than BP or CG but on the cost of large computational times. As a second remark these methods' convergence rate depends on the selection of the method's parameters. The use of RW based algorithms could prove to be valuable when a researcher is trying to discover if the widely used methods converge to a subpar local optimum.