AUTOMATIC DETERMINATION OF RADIAL BASIS FUNCTIONS: AN IMMUNITY-BASED APPROACH

LEANDRO NUNES DE CASTRO
Department of Computer Engineering and Industrial Automation, UNICAMP
Campinas, São Paulo, Caixa Postal 6101, CEP 13081-970, Brasil
E-mail: lnunes@dca.fee.unicamp.br

FERNANDO J. VON ZUBEN
Department of Computer Engineering and Industrial Automation, UNICAMP
Campinas, São Paulo, Caixa Postal 6101, CEP 13081-970, Brasil
E-mail: vonzuben@dca.fee.unicamp.br

The appropriate operation of a radial basis function (RBF) neural network depends mainly upon an adequate choice of the parameters of its basis functions. The simplest approach to train an RBF network is to assume fixed radial basis functions defining the activation of the hidden units. Once the RBF parameters are fixed, the optimal set of output weights can be determined straightforwardly by using a linear least squares algorithm, which generally means reduction in the learning time as compared to the determination of all RBF network parameters using supervised learning. The main drawback of this strategy is the requirement of an efficient algorithm to determine the number, position, and dispersion of the RBFs. The approach proposed here is inspired by models derived from the vertebrate immune system, that will be shown to perform unsupervised cluster analysis. The algorithm is introduced and its performance is compared to that of the random, *k*-means center selection procedures and other results from the literature. By automatically defining the number of RBF centers, their positions and dispersions, the proposed method leads to parsimonious solutions. Simulation results are reported concerning regression and classification problems.