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Train RBF networks using a method of three phases

Ioannis G. Tsoulos[1,*], Vasileios Charilogis[2], Dimitrios Tsalikakis[3]

[1] Department of Informatics and Telecommunications, University of Ioannina, Greece;itsoulos@uoi.gr
[2] Department of Informatics and Telecommunications, University of Ioannina, Greece; v.charilog@uoi.gr
[3] Department of Engineering Informatics and Telecommunications, University of Western Macedonia, 50100 Kozani, Greece; dtsalikakis@uowm.gr
* Correspondence: itsoulos@uoi.gr

Abstract

Radial Basis Function (RBF) networks are well established machine learning tools used in a variety of classification and regression problems. A key component of these networks is their radial functions. These networks acquire adaptive capabilities through a two-stage training technique in most cases. In the first stage, the centers and variances for the radial functions are estimated, and in the second stage, through the solution of a linear system, the external weights for the radial functions are adjusted. However, in many cases this training technique has reduced performance either due to instability in arithmetic operations or due to trapping in local minima of the training error. In this paper, a three-stage method is proposed to address the above problems. In the first stage, an initial estimate of the intervals for the network parameter values is made, in the second stage, the network parameter values are adjusted within the intervals of the first phase, and finally in the third stage of the proposed technique, a local optimization method is used for the final adjustment of the network parameters. The proposed method was tested for its efficiency on a wide series of regression and classification datasets from the related bibliography with exceptional results.

Keywords: Machine learning; Neural networks; Genetic algorithms; Optimization

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