

# RbfCon: Construct RBF neural networks with Grammatical Evolution

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**Abstract:** Radial Basis Function networks considered as a machine learning tool, used in classification and regression problems derived from various areas of the modern world. However, in many cases, the initial training method used to fit the parameters of these models can produce poor results either due to unstable numerical operations or its inability to effectively locate the global minimum of the error function. The current work proposes a novel method that constructs the architecture of this model and estimates the values for each parameter of the model with the incorporation of Grammatical Evolution. The proposed method was coded in ANSI C++ and the suggested software was tested on a wide series of problems from various areas. The experimental results certify the adequacy of the new method to solve difficult problems and in the vast majority of cases the error in classification or approximation of functions is significantly lower than the case where the original training method was applied.

**Keywords:** Neural networks; Genetic programming; Grammatical Evolution; Evolutionary algorithms

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The appendix is an optional section that can contain details and data supplemental to the main text—for example, explanations of experimental details that would disrupt the flow of the main text but nonetheless remain crucial to understanding and reproducing the research shown; figures of replicates for experiments of which representative data are shown in the main text can be added here if brief, or as Supplementary Data. Mathematical proofs of results not central to the paper can be added as an appendix. 28  
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