Radial Basis Neural Network Models: Model Development and Validation

M.H Gadallah - Associate Professor, Operations Research Group, Institute of Statistical Studies & Research, Cairo University, Egypt 12613
K El-Sayed - M.Sc. Student, Department of Mechanical Engineering, The American University in Cairo, Egypt
K Hekman - Associate Professor, Department of Mechanical Engineering, The American University in Cairo, Egypt

A supervised neural network using radial basis network (RBN) is developed. The RBN uses error back-propagation algorithm (EBP) as predictive tools for the modelling process. Since NN based models are expensive techniques, Design of Experiments and statistical techniques have been employed to offset this expense. A comparison between several experimental based models on predictive capability and number of training patterns is given. Very often, the designer is faced with a difficult situation that sometimes information is not available. In such a case, the process modeller can compromise accuracy information for the experimental cost. Several 2-levels, 3-levels, 4-levels, and 5-levels OAs are used. These are L8 OA, L9 OA, L27 OA, and L52 OA respectively. Results show that each individual model has a potential for approximation if used by itself. Besides an attempt to combine the models in a sequence and the resulting composed models are used and compared for approximation. Results of constructing different composed models indicate that using a certain sequence leads to a better model with faster convergence and less predictive error.