Testing and Application of Spatial Analysis Neural Networks: Sensitivity to Structural Parameters

Ana Martinez[1] and Jose D. Salas
Department of Civil Engineering, Colorado State University, Fort Collins, CO

Timothy R. Green
USDA-ARS, Great Plains Systems Research Unit, Fort Collins, CO

Abstract. A Spatial Analysis Neural Network (SANN) algorithm [Shin and Salas, 2000], was developed for the spatial analysis of geophysical data, based on non-parametric statistical analysis and the concepts of traditional Artificial Neural Networks. It consists of a number of layers in which the neurons or nodes between layers are interconnected successively by feed-forward direction. The Gaussian Kernel Function (GKF) layer has several nodes and each node has a transfer or activation function that only responds (or activates) when the input pattern falls within its receptive field, which is defined by its smoothing parameter or width. The activation widths are functions of the model parameters, including the number of the nearest neighbor points *P*, and a control factor *F*. There are two operation modes, namely, a training mode in which the model structure is constructed, and an interpolation mode. In this paper we discuss the effect of varying *P* and *F* upon the accuracy of the estimation in a two-dimensional domain for different input field sizes using spatial data of wheat crop yield and several topographic attributes from eastern Colorado. Crop yields are estimated as functions of the two-dimensional Cartesian coordinates (easting and northing).

[1] Water Resources, Hydrologic and Environmental Sciences Division
Civil Engineering Department
Colorado State University
Fort Collins, CO 80523-1372
Tel: (970) 491-3384
e-mail: pelos@lamar.colostate.edu