

The Hybrid Model of Radial Basis Function Neural Network and Principle Component Analysis for Classification Problems

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ABSTRACT

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This paper presents a hybrid model of radial basis function neural network (RBFNN) and principal component analysis (PCA) named RBFNN-PCA. The principal component analysis aims to resolve the multicollinearity in the inputs of the RBFNN-PCA model. The RBFNN-PCA model proceeds the principal component of the inputs instead of the original inputs. All principal components with eigenvalues greater than 1 or the cumulative variance proportion of more than 90 % are involved in RBFNN-PCA modelling. The parameters of the radial basis function and the weights to produce the output neuron are estimated using fuzzy C means clustering and ordinary least squares. The proposed model is implemented in two classification problems to detect breast and brain cancer. Model performance is evaluated in three different sets of training and testing data with the proportions of 60%-40%, 75%-25%, and 80%-20%. The experiment results indicate that the addition of a principal component with an eigenvalue less than one does not significantly increase the accuracy. The data which yields principal components with a higher proportion of component cumulative variances provide higher accuracy results as well.

Kata Kunci: *RBFNN-PCA, Multicollinearity, Breast cancer, Brain cancer, Classification*