International J. of Math. Sci. & Engg. Appls. (IJMSEA)
Vol. 2 No. IV (2008), pp. 209 - 223

STUDY OF EFFECT OF DIMENSIONALITY REDUCTION, ERROR NORMS AND CROSS ENTROPY CRITERION ON MLP NEURAL NETWORK CLASSIFIER FOR CARDIAC ARRHYTHMIAS

R. D. RAUT AND S. V. DUDUL

Abstract

This paper describes a classification system for cardiac arrhythmias using Multi Layer Perceptron (MLP) with back propagation algorithm, thoroughly examined on the UCI Machine Learning Data Base and compares the performance of two MLP NN models derived for complete features and reduced features dataset. Changes in performance measures after dimension reduction with L2 norm, effects of variations of higher order norms L1,L3 to L10 and L1 on the cost of MLP NN is also studied and it is seen that, among this, L2 norm is best criterion (small connection weights, faster and area under receiver operating (ROC) curve approaching unity). Robustness of reduced features model is justified as it can tolerate Uniform noise to the extent of 19% and Gaussian noise to the extent of 18% variance with zero mean. From exhaustive and careful experimentation, we reached to the conclusion that proposed MLPNN classifier ensures true estimation of the complex decision boundaries and remarkable discriminating ability.

Key Words : MLP Neural Network, Error Norms, Noise, Cross Entropy Criterion.
AMS Subject Classification : 90C32.