Improved Clonal Selection- based RBF Neural Network Classifier for Feature Selection

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Abstract—Many researchers have been working in data mining for improving the predictive accuracy of statistical classifiers by applying the techniques of feature selection methods. They found that the clonal selection theory can be used as the inspiration for a classification algorithm. A disadvantage of artificial neural networks is that they cannot deal effectively with irrelevant features. Neural networks require long training times for high-dimensional datasets. To overcome this limitation, feature subset evaluation could use a simpler learning algorithm. Clonal Selection Algorithm (CSA) is one of the most famous artificial immune algorithms which are designed based on the clonal selection principle of adaptive immunity and it can filter features leading to reduce dimensionality of the feature space. This paper is a first attempt to apply the clonal selection principle to the training of RBF neural network for feature selection. Our paper is different from others because functions of CSA are used to select relevant attributes of medical datasets for better performance and network architecture of RBF neural network. Clonal search is embedded feature selection which can search relevant features by using data evaluated by Consistency evaluation method.

The training is typically done in two phases, first fixing the width and centers and then the weights. The position of the center can be selected from the training dataset in a random way. In this paper, Gaussian function is used as radial basis function.

\[ y(x) = \sum_{i=1}^{M} \frac{w_i}{\sigma} \exp \left( -\frac{(x - c_i)^2}{2\sigma^2} \right) \]  

The least square error is denoted by \( e \) and it is used as evaluation criterion (affinity) for the better choice of weight units to reduce error rate in network training.

\[ e = \sum_{i=1}^{N} (y_i - y)^2 \]  

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REFERENCES