## Abstract

Machine learning algorithms have been used widely for analysing the data and extracting precise rules. Fuzzy sets have been used for pattern recognition and for processing an image, thus providing information about the pattern and the images, for classifying them. Neural networks have been used for classifying the real-world data and for generating models for the same. The models generated are extremely difficult to analyse and interpret. A study of these algorithms revealed the lack of simplicity and human readability in the models.

The major contribution of this thesis is to generate a model that overcomes the limitations of the existing algorithms in simplifying and generating models that are precise and easy to understand thus reducing the complexity of the algorithm. Weight based rule extraction algorithm generates a model based on the strength of the links in the network. The best pathway to the desired output is extracted by extracting all the positive neurons forward and backward. The combination of the neurons is generated as the resulting model. This algorithm reduces the complexity of the existing algorithms, generating the precise set of rules and thus enhancing the machine learning algorithm. The second contribution of the thesis is on similar ground, but with a different approach. The differential rule generation algorithm takes into account the positive and negative neurons. The strength of each link is identified and the model is pruned by discarding the weak neurons. Hence the model with the strong neurons is generated. These two algorithms are the major contributions of the thesis that help in the enhancement of the existing rule based machine learning algorithms. Accuracies generated are moderately high compared to the existing algorithms.

The application of these algorithms on medical data did yield a good result. This research would be useful to the medical professionals and also to the common man in understanding the nature of the disease, and also the extent of the spread of the disease as a prediction system.