CHAPTER 7

CONCLUSION AND SUGGESTION FOR FUTURE WORK

7.1 SIGNIFICANT RESEARCH CONTRIBUTIONS

The main contribution of this research work is the development of proposed neural network based predictor models hybridized with population based evolutionary optimization algorithms to perform effective software defect prediction with a complete guarantee on accuracy and prediction rate. This research is based on the applicability of the proposed rule mining and optimized neural network architecture model which had proven its effectiveness and efficiency to perform defect prediction with better accuracy and minimized error. In this connection, the following are the major contributions of the research work:

- Development of software defect prediction model employing relational association rules with the combination of Naive Bayes approach. The Naive Bayes approach which is to be employed is simple but yet is powerful. The primary Naive Bayes assumption is that for a given class, the features are conditionally independent. The proposed classifier discovers relational association rules on the metrics data based on user defined confidence and support during training stage and integrates with
traditional Naive Bayes at testing stage to predict whether a software module is defective or non-defective.

- Modeling an emotional ELMAN neural network (EENN) classifier and hybrid Gravitational Search Algorithm (GSA) – Charged System Search Algorithm (CSSA) to perform effective software defect prediction. The weights of the proposed EENN classifier is tuned employing the proposed hybrid GSA – CSSA approach and the accuracy is computed. The hybridization of GSA and CSSA is carried out to achieve faster convergence and perform effective exploration and exploitation process in the search mechanism. The emotional ELMAN model is developed with the anxiety and confidence coefficients included and this makes the neural network minimize the error at faster rate and avoid local and global minima occurrences.

- Optimized Back Propagation and Self Organizing Feature Map Neural Network predictors for Software Defect Prediction. Optimization process on Back Propagation network and Kohonen self organizing maps is done using the developed hybrid GSA – CSSA model. This hybrid form has resulted in balance between the search mechanisms and has resulted in optimal weight values with the error converging to a minimal value. The developed hybrid GSA – CSSA based BPN and KSOM models are applied for the public datasets from the NASA Promise repository. From the simulation results, it is proved that the proposed GSA – CSSA – BPN predictor model involving the merits of GSA, CSSA and BPN model has outperformed in an effective manner.

- A defect prediction approach based on Radial Basis Function Neural Network (RBFNN) and the novel Adaptive Dimensional Biogeography Based Optimization (ADBBO) model. The weights of the radial basis function neural network are tuned employing the novel ADBBO to compute optimal weights for the training process. The developed ADBBO based RBFNN model is tested with five publicly available datasets from the NASA data program repository.
Each of these proposed predictive models contribute in an effective manner and in a unique manner for addressing the problem in the software development process and this is carried out in a cooperative manner for performing software defect prediction for the NASA Promise repository datasets.

7.2 CONCLUSION

In the growing scenario with the rapid growth of software development process and its defect analysis to produce high quality software, it is well noted that carrying out defect prediction via effective defect predictor models is of higher concern. At this stage, it is required to analyze and develop software defect prediction models for performing effective identification of software defects if they exist for the five publicly available NASA Promise repository datasets based on the specified attributes. Henceforth, in this research certain rule mining approaches and optimized neural network architectures are developed to result in better solutions with a guarantee on accuracy with minimized error. The proposed defect predictor model includes – Association rule mining and Naives Model, Hybrid GSA – CSSA – EENN model, Hybrid – GSA – CSSA – BPN, Hybrid GSA – CSSA – KSOM model and ADBBO – RBFNN models which when simulation process is carried out achieved efficient prediction of the software defects in the considered NASA repository datasets.

These proposed software defect predictor models aims to improve the training and generalization ability for the considered NASA Promise repository datasets. Each of these proposed defect predictor models follow their own mechanism for training the considered optimized neural network architectures to achieve higher accuracy with minimized error. All the developed defect predictor models perform their mechanism of searching in a supportive
way rather than in an aggressive way. Each of these rule mining and optimized neural network architectures proposed and simulated for the datasets are noted to be reliable and this proves their higher rate of convergence in reaching the exact identification of the defect process. The computed simulation results are robust providing better solutions in comparison with that of the earlier software defect predictor models as available in the literature.

7.3 SUGGESTION FOR FUTURE WORK

Following are the suggestions for future work:

i. Proposed work can be applied on real time software datasets.
ii. Modeling new nature/ biological inspired optimization algorithms for tuning the weight values of developed neural network predictor models.
iii. Development of other variants of neural network models to achieve faster convergence with better results.
iv. Several other parameters in software quality process can be considered and the developed approaches can be trained to improve these parametric measures.