CHAPTER 7
CONCLUSION AND FUTURE SCOPE

7.1 CONCLUSION

Traditional SSA is ineffective in utilizing the available spectrum effectively. Moreover, there is tremendous progression in devices and connections ultimately urging for more channels and bandwidth requirement. Thus, DSA emerges as a favorable technology overcoming the scantiness of SSA. It permits the unlicensed users or secondary users to access the licensed spectrum band when licensed user is not using i.e. the spectrum is idle. It increases the utilization of finite available spectrum alleviating the spectrum scarcity issue. It is best incorporated in CR technology exploiting the spectrum holes or white spaces.

Spectrum Sensing at SU level and taking accurate decision at FC are of key importance. We have designed and developed a sensing scheme considering optimal threshold and SNR values in cooperative environment. Further, we have employed ANN at fusion center thereby achieving significant improvement in detection performance and reduction in false alarm. The proposed scheme is able to improve accuracy by 17.99%, 22.68%, 17.78%, 18% and 18.3% as compared to conventional AND, OR, Majority, semi-soft [158] and Peirce’s algorithm [155] fusion schemes respectively.

The designed trained network model of proposed scheme has been used for testing CRN issues and has shown remarkable enactment enhancement. The performance evaluation parameters of the proposed scheme model are calculated and evaluated using confusion matrix. We have tested the CRN issues like scalability, robustness against security attack and inclusion of SNR in dataset for further performance improvement.

For any CRN, the number of SUs may vary with time and it is desirable that the performance of the system should not be adversely affected. However, the proposed scheme is found to be scalable with consistent accuracy and reduced miss-classification
rate. In the CRN with large number of users, it cannot be ruled out that one or more SU may malfunction or may send wrong decision inadvertently/intentionally. So, we checked robustness of proposed schemes against such attacks and found it robust enough with improved system performance. Although the proposed scheme is performing well and is found to be robust and scalable, still it is desirable to explore ways to enhance its performance further. It can be said without any doubt that at a SU the decision accuracy will be more at larger value of SNR. Therefore if the decision of each SU is clubbed with their respective SNR in the data set for training of ANN, then we get improved performance. Consistent detection accuracy and drastic reduction in false alarm is observed, from 1.2% to 0.1% along with marginal improvement of 0.1% in miss-detection. Hence it can be concluded that consideration of SNR in input dataset is an important factor which could be used to enhance the network performance further. Further, we have tested and investigated all the previously addressed CRN issues in fading environment and found that the proposed scheme is providing consistent performance improvement. The areas which can be explored are discussed in the section.

7.2 FUTURE SCOPE

Though a comprehensive effort is made in designing and developing a robust, scalable sensing and decision-making ANN based CSS scheme, but there is good scope of work in the following areas.

- Consideration of relays in the network
- Consideration of shadowing effect
- Real-time applications