Chapter 7

Conclusion and Future Works

This chapter concludes the dissertation by summarizing the works done and also giving the direction of possible further research in this area. The thesis presents a method for classification of ground exercises of Sattriya dance. A video dataset, Sattriya Dance Ground Exercises is created as part of the research work. A classification method for ground exercises of Sattriya dance using machine learning approaches has been developed. Also, an empirical analysis of 3 types of features on the developed Sattriya dance ground exercise video dataset with five bench mark classifiers has been presented. Ground exercises are classified using four well known ensemble learning based classifiers. A comparative analysis is given among the classifiers. For better classification accuracy, ground exercises are classified using Convolutional Neural Network. Experimental results on the dataset created as part of this research work are also presented.

7.1 Summary

Following are the major contributions of this research.

- A Sattriya dance ground exercise video dataset is developed in order to classify the ground exercises of Sattriya dance. This dataset includes 560 videos of 28 ground exercises from 20 individuals. Moreover, the dataset contains silhouette frames of 560x30=16800 images by considering the key frames. This dataset also includes a feature dataset by extracting three features, namely- HW ratio of MBRs of each frame, inter-frame energy difference and inter-frame entropy difference. Finally, the dataset comprises 560 videos, 16800 images and a feature dataset. Some of the ground exercises are similar to yogic postures. Therefore, this dataset can be useful for recognition of yogic postures. This dataset can also be useful for benchmarking a variety of computer vision and machine learning methods designed for dynamic dance gesture recognition.
- An empirical analysis has been conducted to evaluate the performance of our own developed dataset with three features- HW ratio of MBRs, inter-frame entropy difference and inter-frame energy difference- that have been extracted. Here, an analysis on all the features for recognition of ground exercises of Sattriya dance have been performed using five benchmark classifiers. The selected popular machine learning classifiers are: KNN, SVM, Bayesian Network, Decision tree and HMM to classify the ground exercises.
- For classification of ground exercises of Sattriya dance, a new method using ensemble classifier is proposed. It is observed from the literature that ensemble methods are one of the most promising research directions. To combine the output of simple classifiers and make final decision, the well-known ensemble learning methods- Random Forest, AdaBoost, Gradient Boost and XGBoost have been chosen.
- For better classification, deep learning approach is introduced in this work. Deep learning techniques help in learning complex features automatically. In deep learning approaches, datasets of small size led to over fitting during the training phase. Transfer learning can be used to resolve the over fitting problem. Mainly transfer

learning depends on the size of the source dataset and its similarity to the original dataset. This method is a simple step in classification of dynamic gestures of Sattriya dance.

7.2 Future Works

The following are some of the possible directions for future research works in this field:

- There is total 64 ground exercises of Sattriya dance. In this work we have considered 28 commonly used ground exercises. Therefore, there is scope to extend the SDGE dataset by including the remaining ground exercises.
- There is scope to explore some more discriminate features for better classification of the ground exercises categorized in group 2.
- The SDGE dataset can be extended using Kinect sensor.
- There is scope to extend the work using modified CNN architecture.
- Future scopes left to elaborately study and analyze this Indian Classical Dance form that led to recognize the dynamic gestures more accurately.

Thus, there is enough scope left for future work.