CHAPTER 6

CONCLUSION AND FUTURE WORK

6.1 CONCLUSION

Stroke results in great physical functioning restrictions, which negatively impacts quality of life for survivors and caregivers. A leading cause for serious, long-term disability is stroke. Stroke-affected brain cells start dying at the rate of 12 million cells per minute thereby losing abilities controlled by the affected part. Tissue death is referred to as infarcts. Dying cells release a chemical substance named glutamate which can affect surrounding tissues. Stroke effects range from simple arm or leg weakness to severe effects like paralysis of one side, speech loss and coma. Hence, it is necessary to identify a disease’s important diagnostic features as this helps physicians diagnose quickly and correctly. Multimodal MRI identifies age and vascular territories in infarcts. Diagnosis of ischemic stroke subtype is performed in the first few days/weeks after hospitalization in most centers. To capture brain MRI, it uses a strong, uniform magnetic field. The magnetic field’s strength ranges from 0.3 to 1.5 Tesla.

Physicians may be unable to diagnose correctly in all cases. Experts opt for Computer Aided Diagnosis (CAD) to confirm their predictions. CAD improves prediction efficiency/accuracy. It should be user friendly, so that experts get both classifications with explanations and justification. All strokes and diagnostic mechanisms were reviewed in related works in literature during this work’s initial documentation.
This work presented an optimization technique to improve MRI stroke images classification accuracy using NN. Local feature descriptors are identified/extracted using Gabor filter and watershed segmentation. Extracted features are ranked, based on information provided regarding class labels. KNN and MLPNN were used to train and classify ranked features.

A fused feature technique, where Gabor filter and watershed segmentation features are normalized and feature fusion is achieved by concatenating feature sets, is proposed. Results showed that MLPNN with fused features achieved best classification performance with low root MSE and high precision. The investigation’s next step aims to optimize features to improve classification accuracy.

A novel fitness function with GA based feature selection is proposed. ANN learning parameters are tuned by GA optimization. Numerical results revealed that optimized MLP-NN’s classification accuracy increased 3.16% than KNN and optimized MLP-NN increased 1.74% than compared to MLP-NN with fused features and GA feature selection.

A hybrid optimization approach to overcome GA’s disadvantages is proposed. GA is hybridized with local search to avoid local minima in this work. Hybrid GA is applied to select features. MLP is optimized with a GA based hybrid algorithm and local search for classifying extracted features. The new method’s efficiency in classifying various feature numbers from brain images is investigated. Result revealed that accuracy of the new MLP NN – Hybrid GA optimized with fused feature extraction with Hybrid GA based feature selection & proposed objective increased by 1.7026% compared to MLP NN with fused feature extraction with Hybrid GA based feature selection and the new objective. It was also revealed that the new method reduced root MSE in addition to high precision.
6.2 FUTURE WORK

In this work it was shown that feature selection plays a very important role in improving the classification accuracy. This work has investigated the proposed techniques on a small dataset consisting of 300 images.

- Further work can be carried out by testing the proposed techniques in a larger dataset. The impact of other meta heuristic techniques based on swarm intelligence can be a good scope for future research and compared with Evolutionary Algorithm based techniques investigated in this chapter.

- It was shown that parameter optimization of Neural Network improved the classification accuracy; however it will be interesting to study the optimization of the Neural Network structure.

- The proposed technique can be investigated and optimized for the cloud architecture with low resource devices acting as the client and the cloud used extensively for computation.

- Further work can be carried out by integrating energy features using Wavelets and also investigating Ensemble based classifiers which off late is being used extensively with good results.