SIP Project Overview

Task #1: Data Preprocessing for Cardiac SPECT Classification

In the initial phase of the project, the focus was on preparing the dataset for the Cardiac SPECT classification model. The dataset consisted of combined Cardiac SPECT images, and the primary objective was to segregate them into individual images using Python. This step ensured that the data was formatted in a manner compatible with the subsequent training of the classification model.

Task #2: Convolutional Neural Network (CNN) Model Training

Following the data preprocessing, a Convolutional Neural Network (CNN) model was designed and trained on the processed dataset. The model aimed to classify the small Cardiac SPECT images. Notably, the results obtained from this phase indicated a high level of performance, with accuracy surpassing 90% in both the training and testing sets. This stage laid the foundation for the subsequent optimization efforts with more sophisticated models.

Task #3: Implementation of GoogleNet InceptionV3

To enhance the classification task, GoogleNet InceptionV3 was chosen as the base architecture. However, due to the limited size of the dataset, achieving satisfactory accuracy presented challenges. As per the provided specifications, custom modifications were introduced to the InceptionV3 model. Additional layers, including 512, 256, 128, and 64 layers, were incorporated to tailor the model to the specific requirements of the Cardiac SPECT image classification task.

Despite these customizations, the model struggled to surpass 62% accuracy in various attempts. This limitation can be attributed to the constrained size of the dataset, emphasizing the need for an expanded and diverse dataset for effective training and fine-tuning of the more complex InceptionV3 architecture.

Conclusion

In summary, the project commenced with data preprocessing for Cardiac SPECT images, followed by successful CNN model training. Subsequently, attempts were made to leverage the GoogleNet InceptionV3 architecture with custom modifications, yet challenges in achieving higher accuracy persisted due to the limited dataset size. Future directions may involve acquiring a more extensive dataset to better harness the capabilities of the InceptionV3 model for improved classification accuracy.