Coronary Artery Disease Predicting Using Computed Tomography Images

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Introduction

Prediction of the Coronary Artery Disease to identify the stage and give the appropriate treatment at the appropriate time. CAD disease is identified using the Computed Tomography Images and the affected area and volume affected is measured.

Motivation

Optimizers like ADAM, AdaBoost, SGD are tested for the effective prediction of Cardio Vascular Disease to achieve better accuracy.

SCOPE of the Project

Various CT Scan Images data is taken and it is Pre-Processed. Feature extraction is done by mapping relevant data from the two datasets. The data is split into test set, Validation Set, train data are defined accordingly. This data is now ready for training and can be imported inside the algorithm and various optimizers. The predicted values are much efficient than the actual values. This data is trained repeatedly for better prediction.

Methodology

The process of training and testing large data the Deep CNN is chosen for better improved accuracy rates in shorter time. The steps are as follows- Collecting the data from Real Time Patients and clean the data. The Feature selection is mandatory to improve the efficiency of the algorithm. The most influencing Feature is selected. The data is pre-processed and fed to the Deep learning algorithm. Feature scaling is done to separate train and test data. The trained dataset is now passed with different Optimizing Algorithms. These steps are carried out until accurate results are obtained. The learning capacity of the algorithm depends on the input (data) given by the user. The data is well trained initially on a training dataset which consists of the various examples that fit with the required parameters to train efficiently.

Results

The model is tested using different parameters for different Optimizers. Accuracy obtained are- Deep CNN Algorithm achieved 84.44% accuracy, SGD achieved 44.8% accuracy, AdaBoost achieved 57.5% accuracy and Deep Belief Network achieved 53.71% accuracy. The Results shows that an accurate Coronary Artery Disease Prediction is obtained using the ADAM algorithm.

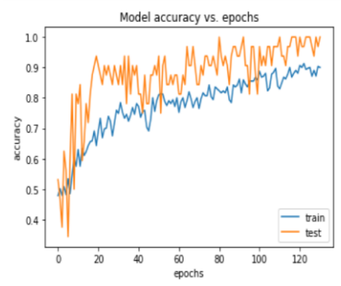
```
In [35]: accuracy = (tn+tp) / (tn+fp+tp+fn)
         accuracy
         precision = tp / (tp+fp)
         precision
         recall = tp / (tp+fn)
         recall
         f1_score = 2* ((precision*recall)/(precision+recall))
         f1_score

         print("Accuracy  : " , accuracy)
         print("Precision : " , precision)
         print("Recall    : " , recall)
         print("F1 Score  : " , f1_score)

Accuracy  : 0.8448275862068966
Precision : 0.7076923076923077
Recall    : 0.8518518518518519
F1 Score  : 0.7731092436974791
```

Overall Accuracy

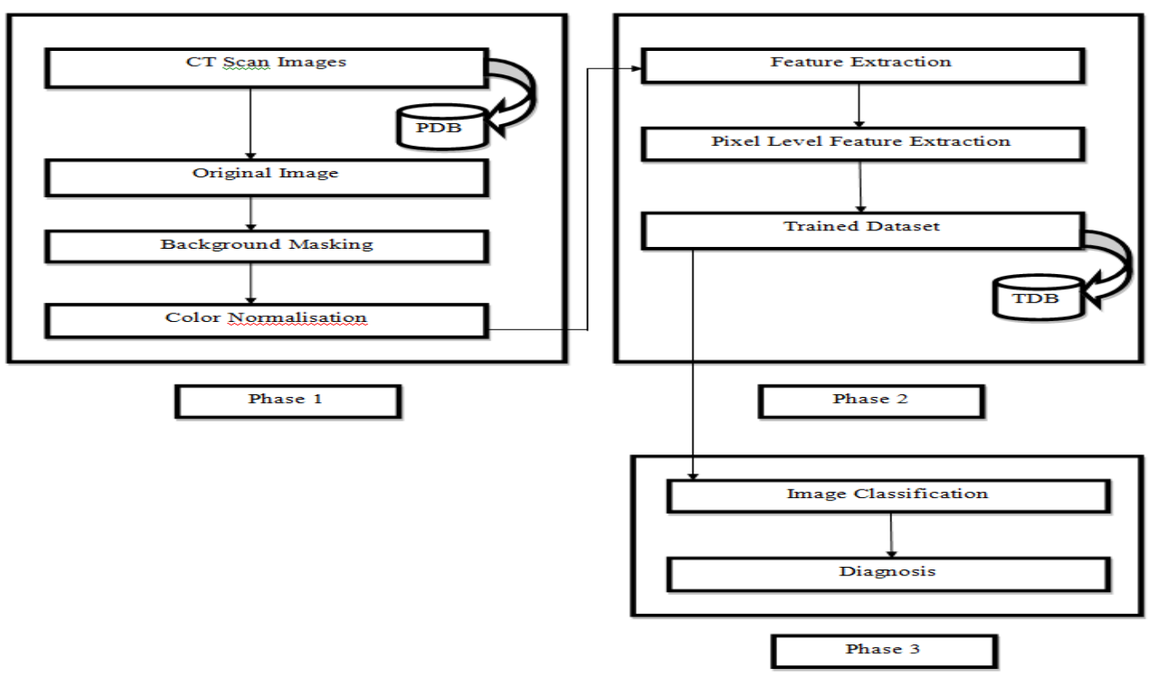
```
In [25]: # summarize history for accuracy
         plt.plot(history.history['accuracy'])
         plt.plot(history.history['val_accuracy'])
         plt.title('Model accuracy vs. epochs')
         plt.ylabel('accuracy')
         plt.xlabel('epochs')
         plt.legend(['train', 'test'], loc='lower right')
         plt.show()
```



Conclusion

It is then passed into various algorithms for achieving accuracy and the outcome is predicted based on the accuracy rate. In this approach, Optimizing algorithms are taken in the model –ADAM, AdaBoost, SGD, Deep Belief Network. With an 8GB RAM processing unit, it is time consuming and extremely impossible to train an algorithm with a huge dataset. The data set has to be uploaded into the software and desired task is selected. Jupyter notebook provides number of classifiers to solve analytical problems.

The proposed model is the precision of assumption for coronary illness using a gathering of classifiers. CT Scan images of actual patients are collected and used for training and testing. The number of coronary arteries in the field has been tested and their number is large.
Result shows that Coronary Disease Prediction is obtained using the ADAM optimizer algorithm achieves a accuracy of 84%.
In Future We can implement various upcoming Deep Learning Algorithms to improve the accuracy.



Proposed Architecture

References

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