Applying the logistic regression model to predict the carotid artery stenosis using the sequential color Doppler ultrasound image processing

Early detection of stenosis in carotid artery is essential because it directly affects patients’ clinical management and is prognostic value. Therefore, estimating of mechanical properties of artery in normal and atherosclerosis are important as far as the medical treatment is concern. We applied a logistic regression model to predict the carotid artery stenosis in a group of patients based on the quantitative features extracted from the processing of the conventional color Doppler ultrasound images. Our database includes 182 patients’ records consisting 10 quantitative features. The database is then randomly divided into the training and validation samples including 98 and 32 patients' records respectively. The training and validation samples are used to construct the logistic regression model and to validate its performance. Finally, important criteria such as sensitivity, specificity, accuracy and receiver operating characteristic curve (ROC) analysis for this method are evaluated. Our results show that the logistic regression model is able to classify correctly 28 out of 32 cases presented in the validation sample. The output of this method showed a high positive predictive value of 49.0%.

Keywords: Carotid artery stenosis, Logistic regression analysis, ROC curve