عنوان مقاله:

Toward modeling Liver Fibrosis in Hepatitis Patients using soft computing techniques

محل انتشار:

اولین کنگره بین المللی هوش مصنوعی در علوم پزشکی (سال: 1402)

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خلاصه مقاله:

Background and aims: Globally ٨ percent of people have the Hepatitis B or Hepatitis C virus.Diagnosis and treatment of this disease are guided by liver biopsies where a small amount of tissueis removed by a surgeon and examined by a pathologist to determine the fibrosis stage fromF_0 (no damage) to F_4 (cirrhosis).Biopsies are costly and carry some risks for the patient. Non-invasive techniques for determiningthe fibrosis stage have been developed and evaluated. Noninvasive approaches have utilized serummarkers, imaging tests, and genetic studies. The accuracy of these non-invasive techniqueshas not achieved sufficient acceptance and so the invasive biopsy is still considered the gold standard.The current paper applies two soft computing techniques including artificial neural networks(ANN) and support vector machine (SVM) to the available dataset on ١٣٨٥ Hepatitis patients.Method: This paper investigates the ability of two different data-driven methods, artificial neuralnetworks (ANN) and support vector machine (SVM) in predicting liver fibrosis based on ١٣٨٥Hepatitis C virus patients. Artificial neural networks are biologically inspired computational modelsconstructed of many simple interconnected elements called neurons (processing elements)connected with coefficients (weights and biases) which constitute the neural structure. ANNs arecapable of recognizing underlying relationships between input and output procedures. The foundationsof Support Vector Machines (SVM) have been developed by Vapnik. SVM gained popularitydue to many promising features such as better empirical performance. SVM is an approximateimplementation of the method of structural risk minimization. This principle is based on thefact that the error rate of the learning machine on test data (i.e., the generalization error rate) isbounded by the sum of the training error rate and a term that depends on the Vapnik-Chervonenkis(VC) dimension.Results: Different scenarios are decided by implementing linear regression and ANOVA methods.The available data includes ٢٩ features. By application of stepwise regression and ANOVA,the most important features (i.e. gender, BMI, ALT٣۶, HGB, and EPI) are selected for the modelingprocedure. The results indicated the superiority of SVM over ANN in the prediction of liverfibrosis based on accuracy, specificity, and sensitivity. The accuracy, specificity, and sensitivity ofthe SVM model were ٩۴.٣%, ٩۵.۴%, and ٩٣.٨%, respectively.Conclusion: Two reliable and efficient data-driven models based on ANN and SVM were developedfor accurate classification of baseline ...

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