

Warfarin dosing prediction in Brazilian patients using Algorithms based on Regression and Neural Network Models

Jennifer Eliana Montoya Neyra, Paulo Caleb J. L. Santos, Júlia Maria Pavan Soler

Laboratory of Genetics and Molecular Cardiology, Faculdade de Medicina FMUSP, Heart Institute (InCor), University of São Paulo.

Abstract

To analyze the performance of warfarin dosing prediction through Multiple Linear Regression (MLR) and MultiLayer Perceptron (MLP) algorithms in Brazilian patients from the Heart Institute (InCor-USP), were used demographic, genetic and clinical informations of 749 individuals with a maintenance doses in a stable state of warfarin. In addition, International Normalized Ratio (INR) values, between 2 and 3, were used to monitor how well the blood-thinning medication is working to prevent blood clots. The dataset was partitioned in 599 individuals to the training group and 150 individuals to the test group. From the available characteristics, 16 variables corresponding to the IWPC algorithm were evaluated and the result compared with the set of all 74 variables analyzed under the MLR and MLP algorithms. The mean absolute error (MAE) was used to assess the accuracy of the models, which is a metric widely used in warfarin prediction studies. The results show for 74 variables that the MLP had a better performance (MAE = 7.87 mg/week, SD = 10.06) compared to the MLR using the same variables (MAE = 8.49 mg/week, SD = 11.13), and also showed better results that using the variables proposed by the IWPC for both the MLR (MAE = 7.99 mg/week, SD = 10.86) and MLP (MAE = 8.44 mg/week, SD = 11.06) models. The performance of the MLP and MLR models tested in this study showed the well-known tendency of the MLP model to obtain better results when are analyzed a greater number of characteristics. This allows us to consider this type of neural network as a good candidate for the prediction of warfarin maintenance doses, taking into account that at present about of 600 variables have been related to anticoagulant therapy.

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