

Category : **Emergency room**

A227 - Implementation of machine learning algorithm in the emergency department for the prediction of hospital admission

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Introduction:

In the Emergency Department (ED) rapid triage and timely interventions are critical for high risk patients. One of the main ED priorities is to quickly identify those who will need hospital admission. This study evaluates the performance of a simple logistic model on its ability to predict whether a patient visiting the ED will subsequently be admitted to the hospital or not, based on initial ED patients' data retrieved from the Biochemistry and Hematology Laboratories. Our aim is to find an algorithm using ML techniques to assist clinical decision-making in the emergency setting.

Methods:

A total of 3,204 ED visits were analyzed during the study period (14 March-4 May 2019). The anonymous data set under investigation contained the following variables: serum levels of Urea, Creatinine, Lactate Dehydrogenase, Creatine Kinase, C-Reactive Protein, Complete Blood Count with differential, Hemoglobin, Platelet count, Activated Partial Thromboplastin Time, D-Dimer, International Normalized Ratio, age, gender, triage disposition to ED unit, ambulance utilization and admission to hospital. All raw data was retrieved from a standard Hospital Information System (HIS) and a Laboratory Information System (LIS). The analysis was performed using the Waikato Environment for Knowledge Analysis (WEKA) software. In our analysis we evaluated the simple logistic classifier for building linear logistic regression model using the LogitBoost algorithm.

Results:

The simple logistic classifier weighted average results achieved an F-measure of 0.696, a Precision value of 0.703, a Recall value of 0.712 and an Area under Receiver Operating Characteristic curve (AUC ROC) of 0.755.

Conclusion:

We present an inexpensive clinical decision support tool derived from readily available ED patient data. This tool intends to aid the emergency physician regarding hospital admission decisions, as the development of machine learning models represents a rapidly evolving field in healthcare.

References:

1. Landwehr N et al. Machine Learning 59:161-205;2005