Machine learning and COVID-19: a tool for healthcare setting choice by primary care physicians

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Background:
Primary care physicians have a crucial role in determining the appropriate healthcare setting for their confirmed or suspect COVID-19 patients. Machine learning provides science-based tools that can be used for clinical decision-making which have already been applied to the fight against Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) both in the therapeutic and the prevention area. The aim of this study was to develop a machine learning-based tool to support primary care physicians to decide between home monitoring and hospitalization for their patients before diagnostic test results are available.
Methods:
A retrospective cohort study with data from a hospital setting was performed. Patients' medical history and clinical, laboratory and radiological findings were collected and the dataset was used to train a predictive model for COVID-19 severity. The patients were divided between confirmed and suspect cases on the basis of the positivity of the nasopharyngeal RT-

PCR test results. A splitting algorithm was recursively used to choose the predictor. A decision tree was built.

Results:

A total of 198 subjects were enrolled for the study. Out of them, 28 cases were classified as mild disease, 62 as moderate disease, 64 as severe disease, and 44 as critical disease, according to WHO guidelines. The G2 value was used to determine the contribution of each obtained value to build the decision tree. The tree was, therefore, built choosing values that maximized G2 and LogWorth. SpO2 (cut point = 92%) was chosen for the optimal first split. The correspondence between inputs and outcomes was validated.

Conclusions:

Our tool provides accurate clinical severity prediction for both confirmed and suspect COVID-19 patients. We, therefore, propose its implementation in the everyday life challenges of primary care physicians to support their clinical decision-making in providing appropriate and timely care for their patients.

Key messages:

- Primary care physicians have a crucial role in determining the appropriate healthcare setting for their confirmed or suspect COVID-19 patients.
- We propose a tool that provides an accurate clinical severity prediction for both confirmed and suspect COVID-19 patients to help choosing the appropriate healthcare setting for them.