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Spotlight on Special Topics

MACHINE-LEARNING CHARACTERIZATION OF SUBTLE HEMODYNAMIC INSTABILITY DIFFERENTIATES COVID-19 VERSUS SEASONAL INFLUENZA IN HOSPITALIZED PATIENTS

Poster Contributions
Saturday, May 15, 2021, 12:15 p.m.-1:00 p.m.

Session Title: Spotlight on Special Topics: COVID 2
Abstract Category: 61. Spotlight on Special Topics: Coronavirus Disease (COVID-19)

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Background: A surge in current second wave of COVID-19 concurrent with annual seasonal influenza is expected to create unique challenges for triaging and healthcare resource utilization. This study investigates the subtle differences in vital signs as an effective screening tool for differentiating hemodynamic presentations in patients with COVID-19 and influenza.

Methods: We developed a supervised machine learning pipeline to distinguish the two viral infections using dataset from the hospital/emergency room encounters of 3,883 patients who had confirmed diagnoses of influenza A/B, COVID-19 or negative test results. The models were externally validated on 15,697 encounters in 3,125 patients available on TrinetX database that contains data from different healthcare organizations.

Results: The models achieved an area under the receiver operating characteristic curve (AUC) of ≥ 97% using our multiclass classifier. The influenza vs. COVID-19-model had an AUC of 98%, and 92% on the internal and external test sets, respectively. Body temperature, followed by heart rate and oxygen saturation (Fig. 1) were the most predictive for discriminating the patient subgroups.

Conclusion: Our study illustrates the potential of machine-learning models for accurately distinguishing the hemodynamic presentations of the two viral infections. This may have utility as a frontline diagnostic tool to aid healthcare workers in triaging patients as two viral infections start cocirculating in the communities.

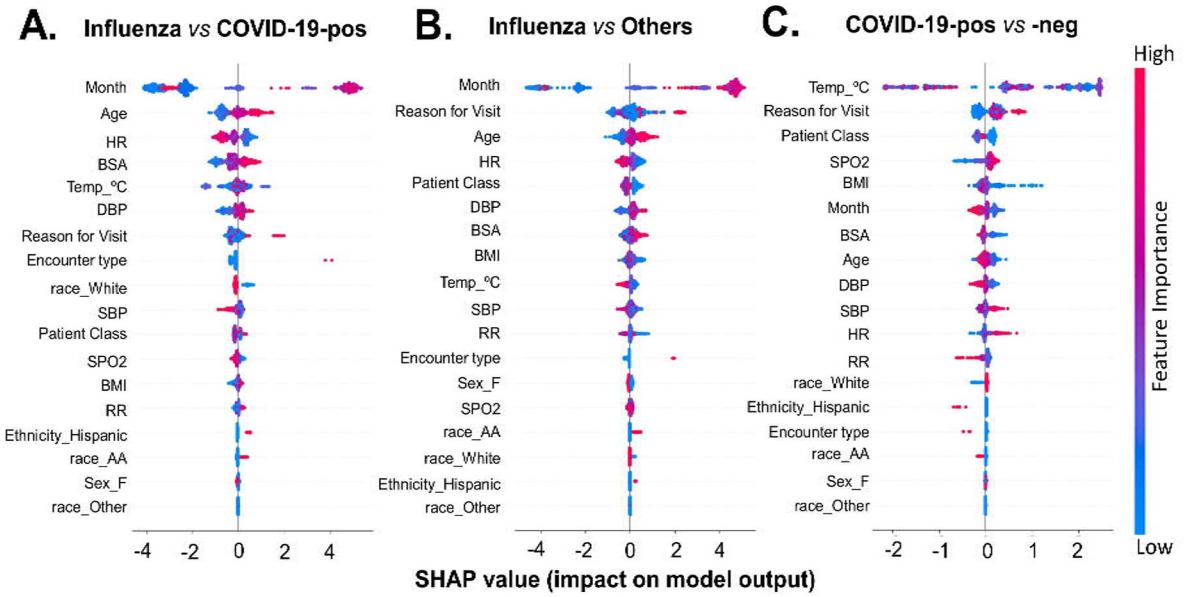

Figure 1. Shapley Additive Explanations (SHAP) summary plot depicting the relative importance, impact and contribution of different features on the output of (A) Influenza vs COVID-19-positive, (B) Influenza vs Other and (C) COVID-19-positive vs COVID-19-negative predictive models.