Triaging of COVID-19 Patients from Audio-Visual Cues

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The COVID-19 pandemic has placed unprecedented stress on hospital capacity. Increased emergency department (ED) patient volumes and admission rates have led to a scarcity in beds. Bed-sparing protocols that identify COVID-19 patients stable for discharge from the ED or early hospital discharge have proven elusive given this population’s propensity to rapidly deteriorate up to one week after illness onset. Consequently, a significant number of stable patients are unnecessarily admitted to the hospital while some discharged patients decompensate at home and subsequently require emergency transport to the ED. In order to conserve hospital beds, there is an urgent need for improved methods for assessing clinical stability of COVID-19 patients. In this talk, we will describe our project’s immediate goal to develop audiovisual tools to reproduce common physical exam findings. These will be subsequently used to predict clinical decompensation from patient videos captured using consumer grade smartphones. These tools will be tested on COVID-19 and other pulmonary patient populations. We will start collecting patient data at UIC and UC hospitals in January 2021 and are developing explainable artificial intelligence and machine learning algorithms for predicting impending deterioration from health-relevant audiovisual features and provide explanations in terms of the clinical details within the electronic health record. Once validated on our patient data, the tools will provide clinical assessments of COVID-19 patients both at the bedside and across telemedicine platforms during virtual follow-ups. The techniques and algorithms developed in this project are likely to be applicable to other high-risk patient populations and emerging platforms, such as telemedicine.

Narendra Ahuja is a Research Professor of Electrical and Computer Engineering at the University of Illinois at Urbana-Champaign. His research is in Artificial Intelligence fields of computer vision, pattern recognition, machine learning, and image processing and their applications, including problems in developing societies. He has co-authored more than 400 papers in journals and conferences and supervised the research of more than 50 PhD, 15 MS, 100 undergraduates, and 10 Postdoctoral Scholars. He received his Ph.D. from the University of Maryland, College Park, in 1979. He is a fellow of the Institute of Electrical and Electronics Engineers, the American Association for Artificial Intelligence, the International Association for Pattern Recognition, the Association for Computing Machinery, the American Association for the Advancement of Science, and the International Society for Optical Engineering.