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A UNIFIED VIEW OF EPIDEMIOLOGICAL AND ARTIFICIAL INTELLIGENCE BASED MODELLING TO APPLY EMPIRICAL EVIDENCES IN RATIONAL PUBLIC HEALTH POLICY MEASURES

With the continued increase of COVID-19 variants of concern artificial intelligence based modelling could prevent the complete lockdown due to possible third wave of COVID-19 by adopting suitable public health measures. Policy making in these highly uncertain, complex, and rapidly changing environment have been extremely challenging. Epidemiological models (EPM) can be very helpful to understand the transmission dynamics of infectious diseases. However, the success of EPM depends on the optimal values of the parameters, which are typically adjusted manually by the domain expert through time-consuming, laborious, and burdensome trial and error procedures. In recent year, the availability of greater volumes and sources of data and advances in digital capabilities have empowered Machine Learning (ML) in predictive analytics including COVID-19 disease prediction. However, ML based black box models lack interpretability and explainability and therefore the paucity of transparency and accountability of ML based predictive models can have severe consequences in trust sensitive healthcare environments which urges evidence based rational policy making practices.

This study is unique of its kind which addresses the synergy between epidemiological and ML Based Modelling to leverage both genus of modelling techniques to bridge the gap between empirical evidence and public policy measures for infectious disease modelling: ML helps to estimate parameter of EPM; and EPM accelerates the convergence and increases the explainability of ML based predictive models and thus form a mutualism type symbiotic relationship. The proposed indelible model is inherently very generic in nature which could make significant contributions for other infectious disease modeling and improve preparedness and response for the future pandemic. This research envisages moving one step ahead, toward advances in fundamental computational tools development for epidemiological research.

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