ABSTRACT

The current work aims to design a computational framework based on artificial neural networks (ANNs) and the

optimization procedures of global and local search approach to solve the nonlinear dynamics of the spread of

COVID-19, i.e., the SEIR-NDC model. The combination of the Genetic algorithm (GA) and active-set approach

(ASA), i.e., GA-ASA, works as a global-local search scheme to solve the SEIR-NDC model. An error-based fitness

function is optimized through the hybrid combination of the GA-ASA by using the differential SEIR-NDC model

and its initial conditions. The numerical performances of the SEIR-NDC nonlinear model are presented through

the procedures of ANNs along with GA-ASA by taking ten neurons. The correctness of the designed scheme is

observed by comparing the obtained results based on the SEIR-NDC model and the reference Adams method. The

absolute error performances are performed in suitable ranges for each dynamic of the SEIR-NDC model. The

statistical analysis is provided to authenticate the reliability of the proposed scheme. Moreover, performance

indices graphs and convergence measures are provided to authenticate the exactness and constancy of the

proposed stochastic scheme.