A COVID-19 model through derivative-free approach for solving system of nonlinear equations
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Several studies have recently used various mathematical and numerical approaches to model the COVID-19 outbreak. The purpose of this paper is to investigate the performance of the proposed method on a parameterized COVID-19 regression model using a derivative-free approach. The study considers the globally infected cases from January to September 2020 to parameterize the model by solving a system of nonlinear equations. However, for fitting the data, we only considered the data from January to August and reserved the data for September for error analysis. Furthermore, preliminary results have shown that the proposed method is promising and produces an efficient regression model for the COVID-19 pandemic.

References

[1] I.M. Sulaiman, M. Malik, A.M. Awwal, P. Kumam, M. Mamat, S. Al-Ahmad, On three-term conjugate gradient method for optimization problems with applications on COVID-19 model and robotic motion control. *Adv Continuous Discrete Models*, 1-22, 2022 doi: 10.1186/s13662-021-03638-9

[2] V. Aggarwal, G. Arora, H. Emadifar, F.K. Hamasalh, M. Khademi, Numerical simulation to predict COVID-19 cases in punjab. *Comput Math Methods Med.*, (2022) 2022:7546393. doi: 10.1155/2022/7546393

[3] A. S. Halilu, M. Y. Waziri, Inexact double step length method for solving systems of nonlinear equations, *Statatistics, Optimization and Information Computing*, 8, 165–174. https: //doi.org/10.19139/soic-2310-5070-532.