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Automated Pipeline for Continual Data Gathering and Retraining of the Machine Learning-Based COVID-19 Spread Models

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Abstract

INTRODUCTION: The development of epidemiological curve models is one of the key factors in the combat of epidemiological diseases such as COVID-19.
OBJECTIVES: The goal of this paper is to develop a system for automatic training and testing of AI-based regressive models of epidemiological curves using public data, which involves automating the data acquisition and speeding up the training of the models.
METHODS: The research applies Multilayer Perceptron (MLP) for the creation of models, implemented within a system for automatic data fetching and training, and evaluated using the coefficient of determination (R^2). Training time is lowered through the application of data filtering and simplifying the model selection.
RESULTS: The developed system can train high precision models rapidly, allowing for quick model delivery All trained models achieve scores which are higher than 0.95.
CONCLUSION: The results show that the development of a quick COVID-19 spread modeling system is possible.

Keywords: Artificial Intelligence, Bio-engineering, Bio-inspired systems, Bio-inspired models, COVID-19, Epidemiology Curves, Machine Learning, Multilayer Perceptron

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1. Introduction

Coronavirus Disease 2019 (COVID-19) is a contagious disease, which results as an infection by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1]. After the first case was recorded over a year ago, COVID-19 has spread worldwide and has been declared a Public Health Emergency of International Concern in January 2020 by World Health Organization (WHO), with its status being raised to a pandemic in March 2020 [2]. Since then, many efforts have been made to combat the spread of COVID-19 across the world. Governments have issued restrictions on public activities, mandatory testing, and lockdowns [3]. Researchers across the world have attempted to assist in the combat against this disease in various ways – either through the development of spread models [4], vaccine development [5,6] or through the modeling of various influences the pandemic may have on society [7,8]. One of the tools that have shown high usability was artificial intelligence models – either for spread prediction [9] or for patient diagnosis [10]. Some examples of the research in modeling the COVID-19 spread follow.