

MODELLING AND ANALYZING THE SPREAD OF CORONA VIRUS AND IT'S VARIANTS IN THE COUNTRIES OF WEST AFRICA

Musah Mohammed Duolewera and David Gilbert

Brunel University London, UK

Abstract: Since December 2019, the COVID-19 pandemic has wreaked havoc on people all across the planet. In the fight against infectious illnesses, mathematical models have become indispensable instruments for predicting the course of outbreaks and supporting the decision-making process. Nevertheless, there are comparatively few published publications in the literature on the use of mathematical modelling to COVID-19 research because to a number of issues, such as complicated and poorly stated models, reliance on commercial datasets, and insufficient model validation.

The objective of this work is to assess and model the dynamics of COVID-19, with a particular emphasis on the components of connection related to geography and transportation. The continuous Petri net method used in this study allows basic SIR models to be extended to include travel connections represented as graphs, population stratification, and spatiogeographic data. This allows for the development of trustworthy stratified pandemic metapopulation models. Through the use of various detection thresholds, the research attempts to illustrate the various effects on West African countries.

Several models were created using the PetriNets framework's Snoopy tools, continuous Petri nets, and colour continuous Petri nets. These models looked at the application and removal of containment strategies, moving from one to several sites. The study developed a novel method for displaying the geographic organization of link networks using Petri nets and Snoopy, and road networks were utilized to represent the pandemic's spread.

One of the most prominent models produced for this project was a network of roads that covered fifteen West African nations. After analysis, it was discovered that these models' behaviour agreed with current discoveries. The spread of the disease was effectively stopped by lockdowns and other containment measures, but it was pointed out that the severity of the outbreak needed to be taken into account when determining the proper level of compliance. By utilizing Snoopy and Petri nets to model pandemics, this research contributes to current efforts and gives policymakers useful information for putting containment plans into place. The results emphasize how crucial it is to follow mitigation strategies in order to lessen the effects of COVID-19.

Keywords: Epidemic, Endemic, Pandemic, Petri nets and Covid-19

[Accepted for: [International Conference on Clinical Microbiology, Virology and Infectious Diseases, Montreal, Canada, April 2024](#)]

