Testing and Validation Stochastic Models in Epidemiology

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Abstract : This study outlines approaches for testing and validating stochastic models used in epidemiology, focusing on the integration and functional testing of simulation code. It details methods for combining simple functions into comprehensive simulations, distinguishing between deterministic and stochastic components, and applying tests to ensure robustness. Techniques include isolating stochastic elements, utilizing large sample sizes for validation, and handling special cases. Practical examples are provided using R code to demonstrate integration testing, handling of incorrect inputs, and special cases. The study emphasizes the importance of both functional and defensive programming to enhance code reliability and user-friendliness.

Keywords : computational epidemiology, epidemiology, public health, infectious disease modeling, statistical analysis, health data analysis, disease transmission dynamics, predictive modeling in health, population health modeling, quantitative public health, random sampling simulations, randomized numerical analysis, simulation-based analysis, variance-based simulations, algorithmic disease simulation, computational public health strategies, epidemiological surveillance, disease pattern analysis, epidemic risk assessment, population-based health strategies, preventive healthcare models, infection dynamics in populations, contagion spread prediction models, survival analysis techniques, epidemiological data mining, host-pathogen interaction models, risk assessment algorithms for disease spread, decision-support systems in epidemiology, macro-level health impact simulations, socioeconomic determinants in disease spread, data-driven decision making in public health, quantitative impact assessment of health policies, biostatistical methods in population health, probability-driven health outcome predictions

Conference Title : ICMSSC 2025 : International Conference on Mathematics, Statistics and Scientific Computing

Conference Location : New York, United States

Conference Dates : January 30-31, 2025