UNIVERSITY of GUELPH

COLLEGE of ENGINEERING AND PHYSICAL SCIENCES

SCHOOL OF COMPUTER SCIENCE

PhD Defence

Monday May 3, 2021 at 9am on Zoom

A Meta-Ontology Framework for Parameters of Animal Disease Spread Simulation Models

Le Nguyen

Chair: Dr. Joe Sawada
Advisory Member: Dr. Deborah Stacey
Advisory Member: Dr. Fei Song
Non-Advisory Member: Dr. Judi McCuaig
External Examiner: Dr. Laura E. Brown [Michigan Tech University]

ABSTRACT:
Over the past decade, many complex simulation models have been developed. However, the formal semantics of the many parameters used by these models and their relationship to documented domain knowledge are often overlooked. Therefore, one of the limitations of these simulation models is their lack of formal semantics and definition of the parameters. This can lead to issues such as problems with updating these models as more or different knowledge enters the domain, complexity with running comparisons of models that claim to be simulating the same domain, and overall complexity for users when they come to setting the parameters in these simulations. In this research, we propose a new approach for parameter semantics and relationship to the documented domain knowledge.

An ontology has been developed as a formal semantic model for the parameters. This work reports on a novel ontological organization that separates domain knowledge from knowledge about parameters in different comparable simulation models and formalizes a relationship between parameters by linking to the domain knowledge part of the ontological structure. This offers several advantages such as allowing explicit domain knowledge representation and provenance, allowing for the assessment of parameters with respect to domain knowledge, and assisting in the transformation of sets of parameters for comparison tasks between models. The ontology allows views about parameters to be captured. This is important because it establishes a neutral view point which allows the certainty assessment of parameter semantics to documented domain knowledge. This work also acknowledges the limitations in ontology creation. It is a time consuming process that requires a lot of effort, and collaboration of a number of experts in different domains. While this work uses the domain of animal disease spread, the principles of ontological representation of model parameters is applicable to a wide range of domains.