

Bioinformatics

An XML-based framework for Biocomplexity model sharing on the Internet

Omar El-Gayar, Dakota State University, Madison, South Dakota; Kanchana Tandekar, Dakota State University, Madison, South Dakota.

Wednesday, August 11 – 2:20 – 2:40 p.m. Embassy 1

ABSTRACT Model management (MM) emerged around the mid-seventies in the context of managing models in decision support systems (DSS). Recognizing that some of the problems encountered in data management were analogous to those encountered with mathematical models, the seminal work on MM was greatly influenced by the work on data management and the notion of treating models (like data) as organizational resources that need to be managed. In effect, MM seeks to facilitate the reuse, maintenance, verification, and validation of models in DSS. With the advent of the Internet and the World Wide Web potentially facilitating data, and model sharing, comes the need for data and model representations that lends itself easily to exchange over diverse operating platforms. In that regard, eXtensible Markup Language (XML) is poised to play a major role in facilitating the exchange of models and data. XML is a relatively new approach to markup that emphasizes the importance of the content information by making it possible for designers to create and manage their own sets of tags (Laurent, 1998). Accordingly, XML facilitates searching for specific content-based information, e.g., for supporting model selection and composition, as well as moving models across applications and systems, i.e., model exchange in a distributed environment. In this research we propose a framework for model sharing on the Internet. At the core of the proposed framework is the ability to represent models in XML thereby maintaining cross-platform independence. Other key characteristics include: • An underlying coherent conceptual framework for modeling based on a single modeling system, irrespective of the modeling paradigm, e.g., optimization, simulation, etc. • Sufficient generality to encompass many modeling paradigms, e.g., optimization models and solving simultaneous systems. • Independence of model representation and solution. • Independence of model structure and the data needed to describe specific model instances. To realize the aforementioned characteristics, we adopted the structured modeling framework, proposed by Arthur Geoffrion in the early-mid eighties. Insofar, we are able to represent Level 1 and 2 of the structured modeling language using XML schema and develop corresponding XML documents representing model schemas and elemental detail tables representing model instances. Future work include developing a prototype implementation for the proposed framework.