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Web-based Simulation Activities of the Technical School of Computer Science in the Universidad Autónoma of Madrid

by Manuel Alfonseca, Rosa Carro, Juan de Lara, Alfonso Ortega, Estrella Pulido, Pilar Rodríguez, Carlos Santa Cruz.

The Technical School of Computer Science (Escuela Técnica Superior de Informática) in the Universidad Autónoma of Madrid (Spain) dedicates a significant part of its resources to the subject matter of computer simulation. Our academic activities include two courses on computer simulation.

Our academic activities include two courses on computer simulation: Computer Simulation and Modeling is a 75-hour optional course taught during the fourth year of graduate studies. Digital Continuous Simulation is a first-year course for postgraduate students, given once every two years as a part of the syllabus for doctoral studies.

Three research groups have simulation as one of their main areas of investigation:

- A group working on continuous simulation designed the OOCSMP continuous simulation language. Conceived in 1997 as an object oriented extension to the standard CSMP language, OOCSMP is specially suitable when the models can be represented as similar entities that interact. A compiler (C-OOL) produces C++ code or Java applets from the simulation models and simplifies the generation of simulation based web courses. See *www.ii.uam.es/~jlara/investigacion*. Designed with an educational objective, the language and compiler have special features such as flexible forms of output displays, easy and controllable modification of user interfaces, and inclusion of multimedia elements synchronized to the execution. To simplify the generation of simulation based courses, there is a Simulation Course Description Language (SODA) with two levels. At level 1, models defined in OOCSMP can be treated as hypermedia elements. Level 2 allows several SODA level 1 pages to form a course, a presentation or an article. At this level, one can add interface details that are common to all the pages. which makes Level 1 pages easy to reuse.
- A group working on the application of Theoretical Computer Science uses Lindenmayer Systems and Cellular Automata to represent and simulate complex systems such as the growth of plants and the evolution of ecosystems. The approach provides a symbolic (non-numerical) description of the behavior of some processes. much closer to the human way of thinking, and therefore easier to understand.
- Finally. we are developing a general tool to develop adaptive and learning environments for the Web. The tool, TANGOW, takes into account student profiles and behavior as well as teaching strategies. HTML pages are dynamically generated from general information about the type of media elements associated to each task and their layout. Simulations are an important form of media element. Others can be texts. images. videos, animations and applets. Actual media elements are selected “on the fly,” depending on student's profile and learning process. TANGOW is written in Java and is accessible through the Internet by means of any standard Web browser. The cost of course maintenance is kept low by storing and reusing tasks, rules and multimedia elements in databases, allowing designers to change, add, and reuse course components easily.