Non-deterministic Matrices and their Applications for Non-classical Logics

Non-deterministic Matrices and their Applications for Non-classical Logics

Results in Brief

Logical approach to solving problems

European researchers have studied non-deterministic matrices in a new research field that is moving towards a foundational logical theory. This theory has potential applications such as research into information and knowledge systems.

DIGITAL ECONOMY

© Thinkstock

The principle of truth functionality is a basic principle in many-valued logic in general, and in classical logic in particular. According to this principle, the truth-value of a complex formula is uniquely determined by the truth-values of its sub-formulas.

However, real-world information is inescapably incomplete, uncertain or inconsistent, which is in conflict with this principle. One solution is to extend the usual algebraic deterministic semantics of logical systems by importing the idea of non-deterministic computations from computer science.

Such an approach has led to the introduction of non-deterministic multi-valued matrices (Nmatrices). Studying and extending this idea was the aim of the 'Non-deterministic matrices and their applications for non-classical logics' (NDMANCL) project, funded by the EU.

The project has been successful in helping with the development of the semantic framework of a new logical formalism, based on Nmatrices and their applications. Furthermore, its theoretical results have included refining and enlarging the framework by introducing new useful modifications. These enable Nmatrices to capture much wider classes of logics.

As a result of NDMANCL, a foundational methodology has been developed for providing modular non-deterministic semantics for non-classical logics. In addition, the project has explored the application of Nmatrices in proof theory, automated deduction and fuzzy logic, which is reasoning under uncertainty.

Nmatrices have proved to be a powerful tool, the use of which maintains all the advantages of ordinary propositional many-valued matrices but is applicable to a much wider range of logics. Now complete, the project has contributed to the recognition and adoption of the non-deterministic semantic paradigm by the scientific community.

Discover other articles in the same domain of application

A robot evokes an emotional response in the autism community

7 June 2019

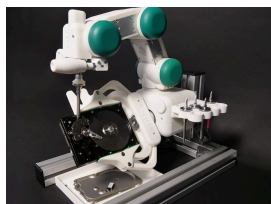### Browser-based multilingual translation without the cloud

28 October 2022

Reservoir computing for multitasking sensors

27 March 2019

Intelligent robots can learn to recycle hazardous hardware

25 October 2021

Project Information

NDMANCL

Grant agreement ID: 252314

Project closed

Start date	**End date**
1 April 2011	31 March 2013

Funded under
Specific programme "People" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

Total cost
€ 163 781,20

EU contribution
€ 163 781,20

Coordinated by
TECHNISCHE UNIVERSITAET WIEN
Austria

Last update: 12 December 2013