SKLAVAKIS DIMITRIOS

1.PERSONAL DETAILS

Family Name: **SKLAVAKIS**
First Name: **DIMITRIOS**
Date of Birth: **28/08/1970**
Country of Birth: **GREECE**
Nationality: **GREEK**
Sex: **Male**
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2. POSTGRADUATE STUDIES

2007- 2016 University of Macedonia – Department of Applied Informatics   Thessaloniki – Greece

- Ph.D. *"MATHESIS: An Intelligent Authoring Environment for Model-tracing Tutors in Mathematics"*

Abstract: The effect of the knowledge acquisition bottleneck is still limiting the widespread use of knowledge-based systems (KBS), especially in the area of model-tracing tutors, as they demand the development of deep domain expertise, tutoring and student models. The MATHESIS meta-authoring framework for model-tracing tutors, presented in this thesis, aims at maximizing knowledge reuse. This is achieved through ontological representation of both the declarative and procedural knowledge of a model-tracing tutor (MTT), as well as of the declarative and procedural authoring knowledge of the process to develop a MTT. Declarative knowledge is represented in Ontology Web Language (OWL). Procedural knowledge is represented using the concepts of atomic and composite processes of OWL-S web services description ontology. The framework provides authoring tools, integrated into the Protégé OWL ontology editor, for the development and management of the MTT's ontological representation. It also provides meta-authoring tools for the ontological representation of the authoring expertise as a set of composite authoring processes and atomic authoring statements. The latter constitute a language, ONTOMATH, for building executable authoring models that, when executed by the tools, guide non-expert authors like domain experts to the creation of new model-tracing tutors. The framework, being in an experimental stage, was used for the development of a monomial multiplication and division tutor. However, the overall design and implementation aimed at constituting the framework as a proof-of-concept system that can be used for the meta-knowledge engineering of more complex model-tracing tutors.

1997-1998 The University of Edinburgh   Edinburgh-Scotland

- M.Sc. in Artificial Intelligence (with Distinction)

Curriculum:

1. Expert Systems: Rule-based, Model-based, Qualitative & Fuzzy Reasoning
2. Knowledge Representation & Inference: Complex Problem Solving

3. Automated Reasoning: Theorem Proving, Formal Methods
4. Programming Languages for AI: PROLOG, LISP, CLIPS

M.Sc. Thesis (Distinction): "Implementing Problem-Solving Methods in CYC" – Development of a PC fault diagnosis expert system by implementing the *Systematic Diagnosis* problem solving method from the KADS expert system development methodology using the CYC ontology and inference engine.

3. PUBLICATIONS (http://users.sch.gr/dsklavakis/#publications)

Aitken, J. S. and Sklavakis, D. (1999). Integrating problem solving methods into CYC, in Th. Dean (ed.), *Proceedings IJCAI-99*, Morgan Kaufman Publishers, San Francisco, pp. 627—633

Sklavakis, D. and Refanidis, I. (2008). An Individualized Web-Based Algebra Tutor Based on Dynamic Deep Model Tracing, in Darzentas and al. (Eds.), SETN 2008,LNAI 5138, pp. 389-394, Springer, Heidelberg.

D. Sklavakis and I. Refanidis (2009). The MATHESIS Ontology: Reusable Authoring Knowledge for Reusable Intelligent Tutors. *Proceedings of the 7th International Workshop on Ontologies and Semantic Web for E-Learning* (SWEL09) in conjunction with AIED 2009, Brighton.

D. Sklavakis and I. Refanidis (2009). The MATHESIS Algebra Tutor: Web-based Expert Tutoring via Deep Model Tracing. *Interactive Event at the 14th International Conference on Artificial Intelligence in Education* (AIED2009), Brighton.

Sklavakis, D., & Refanidis, I. (2010). Ontology-Based Authoring of Intelligent Model-Tracing Math Tutors. In *Proceedings of the 14th International Conference on Artificial Intelligence* AIMSA 2010, LNAI 6304 (pp. 201-210). Berlin: Springer.

Sklavakis, D., & Refanidis, I. (2011). The MATHESIS Semantic Authoring Framework: Ontology-Driven Knowledge Engineering for ITS Authoring. In *Proceedings of the 15th International Conference on Knowledge-Based and Intelligent Information & Engineering Systems* KES 2011, LNAI 6882 (pp. 114-123). Berlin: Springer.

Sklavakis, D., & Refanidis, I. (2013). MATHESIS: An Intelligent Web-Based Algebra Tutoring School. *International Journal of Artificial Intelligence in Education* Vol. 22 (2) (pp. 191-218). Amsterdam: IOS Press.

Sklavakis, D., & Refanidis, I. (2014). The MATHESIS meta-knowledge engineering framework: Ontology-driven development of intelligent tutoring systems. *Applied Ontology* Vol. 9 (3-4) (pp. 237-265). Amsterdam: IOS Press.

4. UNIVERSITY STUDIES

1988-1993   Aristotle University of Thessaloniki   Thessaloniki-Greece

- B.Sc. in Mathematics (special interest in Computers and Mathematical Logic)

5. TITLES AND DISTINCTIONS

- 1985 High School Certificate,
  "Excellent" (20 over 20)
- 1985 Cambridge First Certificate in English,   "PASS" (C)
- 1986 Certificat de Langue Franηaise,   "BIEN"
- 1986 Greek Mathematical Society,

National Competition for First Class of Lyceum, SECOND PRIZE

- 1988 Lyceum Certificate,   "Excellent" (19,9 over 20)
- 1988 Department of Mathematics, 7th position   State Scholarship
- 1989 Department of Mathematics   State Scholarship
- 1990 Department of Mathematics   State Scholarship
- 1991 Diplôme Elementaire de Langue Française,   (323 over 480)
- 1993 BSc in Mathematics, Aristotle University of Thessaloniki ,
  "Excellent" (8,97 over 10)
- 1997 International English Language Testing System (IELTS)
  Band 8
- 1998 - Member of the International Society for Artificial Intelligence in Education
- 2002 National Exams for the Appointment of State Schools Mathematics Teachers,   8th out of 5000
- 2002 National Exams for the Appointment of State Schools Informatics Teachers,   2nd out of 2000
- 2012 Diplôme Approfondi de Langue Française (DALF C2)

6. COMPUTING EXPERTISE

- Programming Languages: BASIC, FORTRAN, PASCAL, LOGO, C, C++, JAVA, JavaScript
- AI Programming Languages: PROLOG, LISP, CLIPS production system
- Knowledge Base and Expert Systems Shell CYC
- Microsoft ACCESS Relational Data Base Management System
- Microsoft Windows, Word, Excel, Powerpoint
- Mathematics software: Maple V, Geometer's Sketchpad, GeoGebra
- Experience in Unix-Solaris and X-Windows
- LATEX Typesetting software
- Carnegie Mellon University's Cognitive Tutors Authoring Tools (CTAT) – Summer School
- Design of dynamic math web pages: HTML, MathML, JavaScript, PHP, MySql, Apache Server
- Protégé OWL, OWL-S

7. WORKING EXPERIENCE

1987-1988 Grigoriadis Bross Enterprises,   Drama-Greece

Computer Programmer - Software development

1993-1996   Polymeneris Building Enterprises,   Drama-Greece
Computer Programmer - Software development

1994-1995   Military Service   Greece

1996-1997   Educational Organization "KOSMOS" Drama-Greece
Computer Programmer - Software development

1996-1997   Institute of Professional Formation   Drama-Greece
Tutor, Department of Informatics Applications

1996- 1997   Secondary Education Tutorial School "HERACLITUS"
Teacher of Mathematics   **Drama-Greece**

1998-2001 Private Tutorial School "KOKKALIDI" Drama-Greece
Teacher of Mathematics and Informatics

1998-2000 Technical and Vocational School "PLATO" Drama-Greece
Teacher of Informatics

2001-2003 State Schools of Secondary Education   Drama-Greece
Teacher of Informatics

2003- 2013 State Schools of Secondary Education   Drama-Greece
Teacher of Mathematics

2012 – 2014   Music School of Drama   Drama-Greece
Deputy Head

2014 -   European School of Brussels III   Brussels-Belgium
Teacher of Mathematics & ICT

8. RESEARCH INTERESTS

- Artificial Intelligence in Mathematics Education
- Intelligent Tutoring Systems
- Authoring Systems
- Ontologies, Semantic Web
- Educational Technology
- Educational Software

9. RESEARCH – PhD Description

Despite Model-tracing tutors' efficiency, it is currently estimated that 1 hour of tutoring takes 200-300 hours of development . The main reason for this is the *knowledge acquisition bottleneck* : extracting the knowledge from the domain experts and encoding it into a program. Knowledge reuse appears as a necessity to overcome the knowledge acquisition bottleneck. Since expert knowledge and especially tutoring knowledge is so hard to create, re-using it is of paramount importance.

One widely used and quite promising technology for knowledge reuse is *ontological engineering*. In the case of model-tracing tutors, ontology engineering is the task of defining the cognitive model (facts, production rules) and tutoring model (user interface, model tracing and knowledge tracing) of the tutor and encode them in an ontology using specially designed environments for ontology management. This is the first research goal of the MATHESIS project. An efficient representation of all the tutor's models in an ontology will provide a search space for the problem of tutor authoring.

The second research goal is to develop the authoring tools that will help human authors search through this ontology space and therefore make their authoring faster and easier.

For the development and implementation of these research goals a bottom-up approach seems more appropriate. First, a working prototype of a model-tracing tutor will be implemented. Then, the knowledge embedded in this tutor will be used to develop an ontology. Finally, based on the ontology a suite of authoring tools will be developed. Their purpose will be to guide the search through the ontology and help human authors.

10. RESEARCH - Deliverables

[Ph.D. Thesis: "*MATHESIS: An Intelligent Authoring Environment for Model-tracing Tutors in Mathematics*"](#)

http:// users.sch.gr/dsklavakis/en/PhD_Thesis-MATHESIS.pdf

[The MATHESIS Intelligent Algebra Tutoring School (English)](#):

http://users.sch.gr/dsklavakis/mathesis/en/MATHESIS_Main_Frameset.htm

[The MATHESIS Tutor and Tutoring Processes Authoring Tools (Demo)](#):

http:// users.sch.gr/dsklavakis/en/mathesis/kes2011/01-Authorring_Tools.mp4

[The MATHESIS Authoring Processes Authoring Tools (Demo)](#):

http:// users.sch.gr/dsklavakis/en/mathesis/kes2011/02-Authoring_Processes.mp4

[The MATHESIS Ontology](#):

http:// users.sch.gr/dsklavakis/en/mathesis/mathesis_01_09_2012.owl