Workshop Proposal for ECAI 2012 Conference

"JIMSE: **J**oint workshops on **I**ntelligent **M**ethods for **S**oftware System **E**ngineering"

Brief description of the workshop topics and content

The proposed workshop aims at bringing together worldwide stakeholders and their related communities to discuss current research trends on the use of intelligent techniques for effective and efficient design of software systems. To amplify the impact of the workshop, three different communities sharing the above-mentioned aim will join for the organization of a large event. These include:

1. The Trustworthy Eternal Systems via Evolving Software, Data and Knowledge (**EternalS**) community, who has been developing in conjunction with the homonymous European Coordination Action (https://www.eternals.eu/). This aims at coordinating and supporting communities for creating conditions of mutual awareness and cross-fertilization among broad ICT areas such as: Learning Systems for Knowledge Management and Representation, Software Systems, Networked Systems and Secure Systems.

2. Artificial Intelligence Techniques in Software Engineering (**ISEW**) community, who has been developing through different workshops (see the past venues below). The community focuses on Intelligent techniques for addressing, studying, analyzing and understanding critical software development issues, such as software quality and reliability, software cost estimation, software requirements, specifications engineering and software project management.

3. The Knowledge Engineering and Software Engineering (**KESE**) community, who aims at studying techniques and tools for the fields of knowledge engineering and software engineering. They focus on declarative software engineering techniques established in many areas, such as knowledge systems, logic programming, constraint programming, and lately in the context of the Semantic Web and business rules.

The above communities are fully centered on the scope and aims of ECAI since their research focuses on traditional AI technologies such as: (i) fuzzy logic, artificial neural networks, genetic algorithms; (ii) statistical machine learning (supervised, unsupervised, semi-supervised learning) and domain adaptation; and (iii) specific intelligent approaches for text mining & retrieval, graph mining and ranking algorithms. These are applied to extract patterns and identify relations regarding the different phases and needs of software development and analysis as well as designing effective security policy or networking systems. In particular, the topics of the workshop involves the application (but not limited to) the following approaches:

Machine Learning **in**	Software Requirements	**Knowledge systems:** Information Extraction, Information Retrieval, Data Mining, Semantic Web, Speech Processing, Image Processing, Human Computer Interaction.
Kernel methods	Software Architecture	
Text Mining & Retrieval	Software Methodologies	
Probabilistic Reasoning	Software Algorithms	**Software Systems:** modeling languages, feature description languages, software product lines, feature-oriented programming, delta-oriented programming, architectural models of diversity, formal methods, software evolution, component-based systems.
Model Learning	Software Design	
Expert Systems	Software Performance Engineering	
Neural Networks	Software Quality & Reliability	
Data Mining	Object-Oriented Analysis and Design	**Networked Systems**: connector theory, models@runtime, protocol learning, protocol synthesis, runtime verification & validation model-based monitoring, interoperable security, privacy & trust.
Evolutionary algorithms	Software Maintenance & Testing	
Ranking Algorithms	Software Metrics	
Regression models	Software Project Management	**Secure Systems**: Requirement engineering, risk assessments, software architectures, modeling techniques, model-based security techniques and software engineering processes for secure and evolvable systems. Secure programming, verification and testing
Statistical methods	Software Cost Estimation	
	Open Source Software	
	Software Repository Management	

Brief discussion of why the topic is of particular interest at this time:

Software Engineering is a knowledge-intensive activity, requiring extensive knowledge of the application domain and of the target software itself [Eds. Du Zhang , Jeffrey Tsai, "Machine Learning applications in Software Engineering", (University of Illinois, Chicago, USA), Series on Software Engineering and Knowledge Engineering , Vol. 16, 2005]. Organizations at this time collect data regarding software development striving to extract knowledge from them regarding their processes and products [Peter Hearty, Norman E. Fenton, David Marquez, Martin Neil: Predicting Project Velocity in XP Using a Learning Dynamic Bayesian Network Model. IEEE Trans. Software Eng. 35(1): 124-137 (2009)]. Software data, such as the size of programs, the effort required for their completion, the tools, packages and methodologies utilized and the source code itself contain a wealth of information about a project's status, progress and evolution. Such data in most cases are highly skewed; they contain a high percentage of missing values and "noise". Additionally the fact that software engineering data are characterized by fuzziness and uncertainty renders the analysis of them a task related to intelligent techniques [Witten and E. Frank. Data Mining: Practical machine learning tools and techniques, 2nd Edition. Morgan Kaufmann, San Francisco, 2005.]. Certain studies adopt Intelligent techniques in estimation issues regarding Software Engineering [Adriano L.I. Oliveira, Petronio L. Braga, Ricardo M.F. Lima, Márcio L. Cornélio, GA-based method for feature selection and parameters optimization for machine learning regression applied to software effort estimation, Information and Software Technology, Volume 52, Issue 11, November 2010, Pages 1155-1166], [S. Bibi, G. Tsoumakas, I. Stamelos, I. Vlahavas, Regression via Classification applied on Software Defect Estimation, Expert Systems with Applications Journal of Elsevier], to deal with the above issues.

  More than two decades of research have led to many significant theoretical results, but few demonstrations of practical utility. This is partially due to the lack of data regarding Software Engineering activities. The growth of Open source Software during the last years has provided free and continuing access to publicly available software engineering data [Peter Hearty, Norman E. Fenton, David Marquez, Martin Neil: Predicting Project Velocity in XP Using a Learning Dynamic Bayesian Network Model. IEEE Trans. Software Eng. 35(1): 124-137 (2009)] enabling research on modeling software development and estimating various aspects of it. Though the problem of obtaining software engineering data is partially solved, still important issues remain to be addressed including the representation and use of domain knowledge and the representation of the design and implementation history of a software system. If solutions to these issues are found, and applications in practical situations are successful, the implications for the practice of Software Engineering will be immediate, and radically different software development paradigms will become possible.

Additionally, recent interdisciplinary research in machine learning and networking systems has shown that statistically learning can produce large improvement in both connecting devices [8] and modeling their logic (behavior) [9]. Moreover, the role of AI and machine learning in software for security systems is greatly promising as shown for example in [11].

Finally, knowledge-based approaches seem to be very promising to improve fast prototyping of new product lines as they can automatize formal verification processes of workflows [10].

List of previous or related workshops:

EternalS organization for the first 2 years of activity:
- Workshop on Machine Learning for software construction (http://www.cs.uni-potsdam.de/isola2011/?id=home2), organized at the 5th International Symposium On Leveraging Applications of Formal Methods.
- EternalS'11, first international workshop on eternal systems (https://www.eternals.eu/workshop-2011/), organized within the FET11 conference in Budapest.

- EternalS Special Track (http://fmco.liacs.nl/fmco11.html), organized at the Software Technologies Concertation on Formal Methods for Components and Objects.
- EternalS Special Track (http://isola-conference.org/isola2010/tracks.html#A15), organized at the 4th International Symposium On Leveraging Applications of Formal Methods.

ISEW

- ISEW workshop (http://sweng.csd.auth.gr/~isew11/) organized at ECML-PKDD 2011.
- AISEW 2010 workshop (http://sweng.csd.auth.gr/~aisew2010/), organized by the same committee as a part of the AIAI 2010 conference held in Larnaca, Cyprus.
- AISEW 2009 workshop, http://sweng.csd.auth.gr/~aisew2009/, organized as a part of the AIAI 2009 conference held in Thessaloniki.
- AISEW 2008 workshop, http://sweng.csd.auth.gr/wb/media/aisew2008/index.htm, organized also by the same committee and held within the ECAI 2008 conference (European Conference on Artificial Intelligence).

KESE

Series of (seven) workshops on Knowledge Engineering and Software Engineering, organized from 2005 to 2011 (http://ai.ia.agh.edu.pl/wiki/kese:start).

Names and institutions of the Workshop Organizing Committee:

Workshop Chairs:

- Dr. Ioannis Stamelos, Assistant Professor
Institution: Department of Informatics, Aristotle University of Thessaloniki, Software Engineering Group, Greece.

- Dr. Stamatia Bibi, Scientific Collaborator
Institution: Department of Informatics, Aristotle University of Thessaloniki, Software Engineering Group, Greece.

- Dr. Alessandro Moschitti, Assistant Professor
Institution: Department of Computer Science and Information Engineering, Trento, Italy.
Head of iKernels Group (http://projects.disi.unitn.it/iKernels/) and coordinator of EternalS

Organizer from KESE?????

Steering Committees:

Someone may go in the steering committee?

Suggested names and institutions of the Program Committee:

In this section, we present the program committee that participated in previous organizations.

Andreas Andreou (University of Cyprus, Cyprus)
Lefteris Angelis (Aristotle University of Thessaloniki, Greece)
Nick Bassiliades (Aristotle University of Thessaloniki, Greece)
Joachim Baumeister (University of Würzburg, Germany)
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Bernhard Steffen, TU Dortmund, Germany
Massimo Tivoli, University of L'Aquila, Italy
Daniel Varro, Budapest University of Technology and Economics
Gerhard Weikum, Max-Planck-Institut für Informatik, Germany
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Contact details for the Workshop chairs (==KESE==????):

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Desired workshop length (half day, one day, two day), and an estimate of the audience size:
The desired workshop length is one day. The estimated number of participants is a minimum of 30-40 people to a maximum of 50-60, coming both from the Artificial Intelligence and Software Engineering domain. The first EternalS workshop reached 31 participants whereas the previous KESE and ISEW workshops attracted at least 20 participants. EternalS coordination Action will provide a number of

scholarship for workshop attendance, mainly reserved to students and financial support for invited speakers.

Schedule for organizing the workshop and a preliminary agenda:
Regarding the organization of the workshop, we will apply the standard steps: preparation and issues of the Call for Papers, peer review process, paper selection process, advertising and organization of the workshop day. For the latter, we are going to accept long and short papers included in the program as oral or poster presentation. Out of the accepted papers, about the seven best will be orally presented whereas all the others will be presented and discussed during a poster session. The oral sessions will include talks of 15 minutes each followed by 10 minutes of discussion. Additionally, we are going to invite one or two internationally recognized speakers. A sketch of our schedule will be:

8:30-8:45	Opening Remarks - Introduction to the topic
8:45-10:25	Session I (presentation of 4 papers)
10:25-11:55	Coffee Break
11:55-13:00	Invited Speakers + questions/answering session
13:00-14:30	Lunch Break
14:30-15:45	Session II (presentation of 3 papers)
15:45-16:15	Coffee Break
16:15-17:15	Poster Session
17:15-18:00	Panel Discussion

During the final session of the workshop, attendees will be asked to fill a questionnaire regarding future trends regarding AI applications to SE and practical implications. This task will be carried out by the experts from the EternalS coordination action (CA). They are responsible within the CA to write the roadmap that EternalS is designing for the European community. The roadmap will be an input to the European Community for the definition of the Work Programme of 2013.

References

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Open source project data: www.sourceforge.org

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