Application for Doctoral Consortium at the International Conference on Computational Creativity 2017

PhD student: Matej Martinc
PhD topic: Creative Software Blending

PhD area: Computational Creativity
Candidature start: October 2016
Institution: Jožef Stefan International Postgraduate school
Supervisory team: Prof. Dr. Nada Lavrač, Dr. Senja Pollak

CV

Education

- **Jožef Stefan International Postgraduate School (2016 –)**
  PhD student in the third-level study programme Information and Communication Technologies
- **Faculty of Computer and Information Science, University of Ljubljana (2011 – 2015)**
  Bachelor's degree in Computer and Information Sciences
- **Faculty of Arts, University of Ljubljana (2005 – 2011)**
  Master's Degree, Philosophy and Sociology of Culture
- **Faculty of Social And Political Science, University of Antwerp** (2007 – 2008)
  Erasmus student exchange

Background

- Background in Computer Science, focus on Natural Language Processing, Machine Learning and Data Mining
- Background in humanities (Philosophy and Sociology of culture)

Experience

- **Jožef Stefan Institute**: Young researcher (February 2016 –)
- **Universidad Politecnica de Cartagena**: Web development (October 2015 – January 2016)
- **Celtra D.O.O.**: Front-end developer (July 2014 – September 2014)
- **Programski Atelje A&Z D.O.O.**: Full-stack developer (February 2014 – May 2014)
- **Radio Študent**: Freelance writer (2011)

Publications

- Matej Martinc, Matic Perovšek, Nada Lavrač and Senja Pollak. "POS tagger and lemmatizer evaluation: A TextFlows open science approach" *9th Jožef Stefan International Postgraduate School Students' Conference + Young researchers day (2017)*

- Klemenčič, Manja, Martin Žnidaršič, Anže Vavpetič, and Matej Martinc. "Erasmus students' involvement in quality enhancement of Erasmus+ mobility through digital ethnography and ErasmusShouts." *Studies in Higher Education* (2017): 1-8.

Creative Software Blending (Abstract)

For the last couple of years, a lot of effort in the fields of Data Mining, Machine Learning and Natural Language Processing has been put into development of infrastructures that would enable its users to increase the scientific output in these fields. These infrastructures were built to simplify and speed up scientific research and also support and increase interdisciplinary research by enabling researchers from other fields that are not familiar with this type of research, faster and easier integration. One of the biggest challenges in implementation and use of these infrastructures has been integration of different components into functioning workflows. Combining different tools and technologies in a common infrastructure has many times been proven to be quite a difficult task because of incompatibility problems and badly defined ontologies.

In our research we would like to tackle the issue of combining tools from different, yet connected research fields of Text Mining, Machine Learning and Natural Language Processing. This blending of software would be done inside the ClowdFlows platform (Kranjc, 2012), which is a cloud-based web application for composition, execution and sharing of interactive Data Mining workflows. ClowdFlows already contains components for specific and well defined tasks from all the above mentioned fields. In the first step, ontology with well-defined rules and relations would need to be created in order to combine software components in a meaningful way. After that, a system for creative blending of software components would be created that would be able to automatically combine different software components in functioning workflows.

The proposed system for creative software blending can be positioned nicely in the field of Computational Creativity because of its capability to generate valuable artefacts (workflows in this case) in a creative way. For the system to be recognized as creative, its produced artefacts should be novel and of good quality (Ritchie, 2007) and the human interference in the production and evaluation of these artefacts should be minimal. The system should also satisfy three criteria proposed for attributing creative autonomy to a system: autonomous evaluation, autonomous change and non-randomness (Toivonen & Gross, 2015). In order to satisfy these criteria and since ClowdFlows contains a large set of manually built workflows that could be used as a training set, we propose a combination of evolutionary algorithm and classification model technique. The evolutionary algorithm that would operate directly on representations of workflows would generate new workflow candidates, according to constraints defined by ontology rules. A binary classification model trained on the set of workflows would be used in the fitness function used for evaluating the fitness of the generated workflow candidates. We will also look into the possibility of transferring the conceptual blending model proposed by Fauconnier et al. (2003) to our software blending problem.

The proposed implementation would enable the system to be able to generate new creative workflows and even make random changes in their current rules for generation, which would make the system capable of transformational creativity according to Boden (2007). Its capability to innovate at a process level for exploratory purposes would hopefully also make the system H-creative (Boden, 2007), enabling it to become an active participant in scientific discovery and new method development.

References

Boden, M. A. (2007). Creativity in a nutshell. *Think 5.15*, 83-96.

Fauconnier, G., & Turner, M. (2003). Conceptual blending, form and meaning. *Recherches en communication 19(19)*, 57-86.

Kranjc, J. P. (2012). Clowdflows: a cloud based scientific workflow platform . *Joint European Conference on Machine Learning and Knowledge Discovery in Databases*. Berlin.

Ritchie, G. (2007). Some empirical criteria for attributing creativity to a computer program. *Minds and Machines 17.1*, 67-99.

Toivonen, H., & Gross, O. (2015). Data mining and machine learning in computational creativity. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery 5.6*, 265-275.

Recommendation letter

I am writing this recommendation letter at the request of Matej Martinc, who is applying for a Doctoral Consortium at the International Conference on Computational Creativity 2017. I have been Matej's PhD supervisor since October 2016 and he has been working under my supervision for more than a year.

During this time Matej Martinc has showed himself as a promising young specialist and researcher. His research specialization is Computational Creativity and his thesis deals with an implementation of a system for creative software blending, capable of creative generation of workflows in visual programming platforms. For the seminar in the Computational creativity class thought by me, he also developed a method for the improvement of the conceptual blending method. This method, although still in the early stages of development, showed some very promising results.

As his supervisor I have had an opportunity to observe the student's participation and overall progress. I would rate the student's overall performance as excellent because he has got only excellent marks and has achieved marked results in different academic and student fields. He has also always proved to be scientifically competent and friendly as a person.

Matej Martinc would benefit greatly from attending the International Conference on Computational Creativity 2017 since this would give him the opportunity to deepen his already respectable knowledge of the field of Computational Creativity and get some very helpful feedback on his current research.

I am convinced that he will become a great asset and contributor to the field of Computational Creativity in the future therefore I strongly recommend his acceptance to the Doctoral Consortium workshop.

Sincerely,

Prof. Nada Lavrač
Head
Department of Knowledge Technologies
Jožef Stefan Institute
Ljubljana, Slovenia