Jan Peters | Hochschulstraße 10 | 64289 Darmstadt

Edith Elkind

elkind@cs.ox.ac.uk,

Subject: Nomination of the PhD thesis "Learning Hierarchical Policies from Human Ratings" of Dr. Christian Daniel for the 2016 Victor Lesser Distinguished Dissertation Award.

Dear committee members,

I would like to bring to your attention the outstanding doctoral thesis of Dr. Christian Daniel, which was defended on 15. April 2016. Christian joined my lab as a PhD student in April 2012 – already with a strong research record from his work with Prof. Aude Billard at EPFL and Prof. Dieter Fellner at the Fraunhofer. Naturally, he turned out to be a highly independent PhD student who made three major contributions to the fields reinforcement learning mainly by himself: (1) a new framework on learning hierarchical policies for autonomous agents by reinforcement which is likely to change of how we think about policy search, (2) a new way to actively refine rewards based on agent-teacher interaction, and (3) a new method to infer options (i.e., temporally extended sub-policies) in reinforcement learning. Each of these theoretical contributions and algorithms has resulted in real-world applications of learning methods for autonomous that have been used on real robots learning difficult tasks.

Prof. Jan Peters, Ph.D.

Hochschulstraße 10
64289 Darmstadt

Telefon: +49 6151 16 - 7351
Fax: +49 6151 16 - 7374
mail@jan-peters.net

Datum
28. Februar 2017

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Impressively, in his thesis, Dr. Daniel presents applications on a variety of robot systems ranging from complex, highly dextrous robot arms up to fully anthropomorphic humanoid robots. Very few methods in the field of learning for autonomous agents ever scale into the high-dimensional domain of interesting robot systems; among these approaches, the ones from Dr. Daniel's thesis stick out as they are currently the only ones that can learn such complex tasks by trial and error learning with such a small number of interactions with the environment. His reinforcement learning approaches can be considered the first to achieve human speed at learning skills for anthropomorphic agents.

Each of these his thesis contributions had been accepted both into a major conference and a major journal even before he defended his PhD. Each of these paper has received at least one best paper award ? and one was additionally finalist for several additional awards. In addition to his own seminal first author papers, his contributions have help several other students in my lab to obtain substantial high impact research results and publications in highly competitive venues. The results from this thesis have been published in AAAI, an AAMAS workshop, Autonomous Robot, ECML, Frontiers in Computational Neuroscience, IROS, ICRA, Journal of Machine Learning Research, Machine Learning and NIPS. As a result, both the award list and the publication list of Dr. Christian Daniel are pretty amazing for doing a PhD in just four years.

Summing up, I can only recommend this excellent thesis for the 2016 Victor Lesser Award. Its outstanding theoretical contributions and learning algorithms have resulted in an unprecedented success on real robot systems on complex tasks and impressive publications. It is hard for me to imagine a more deserving PhD thesis.

Best wishes,

Jan Peters