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Computer Games Workshop at IJCAI 2018

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The Computer Games Workshop (CGW 2018) was held in Stockholm, Sweden. It took place on July 13, 2018, in conjunction with the 27th International Conference on Artificial Intelligence (IJCAI 2018). The Computer and Games Workshop series is an international forum for researchers interested in all aspects of artificial intelligence (AI) and computer game playing. Earlier workshops took place in Montpellier, France (2012), Beijing, China (2013), Prague, Czech Republic (2014), Buenos Aires, Argentina (2015), New York, USA (2016), and Melbourne, Australia (2017).

For the seventh edition of the Computer Games Workshop, 15 papers were submitted in 2018. Each paper was sent to three reviewers. In the end, 10 contributions were accepted for presentation at the workshop and eight are to be published in Springer CCIS series.

The workshop also featured an invited talk by Marlos C. Machado titled *Revisiting the Arcade Learning Environment: Evaluation Protocols and Open Problems for General Agents*, joint work with Marc G. Bellemare, Erik Talvitie, Joel Veness, Matthew Hausknecht, and Michael Bowling.

The published papers cover a wide range of topics related to computer games. They collectively discuss abstract games such as the game of Go (two papers) and video games. Three papers deal with video games, two papers on General Game Playing and one discusses a web-based game. Here we provide a brief outline of the eight contributed papers.

"Spatial Average Pooling for Computer Go" by Tristan Cazenave. The paper addresses Deep Reinforcement Learning for Computer Go. It shows that using Spatial Average Pooling improves a value network for computer Go.

"Iterative Tree Search in General Game Playing with Incomplete Information" by Armin Chitizadeh and Michael Thielscher. In General Game Playing (GGP) with incomplete information the Lifted HyperPlay technique, which is based on model sampling, is the state-of-the-art. However, this method is known not to model opponents properly, with the effect that it generates only pure strategies and is shortsighted when valuing information. The papers addresses this limitations using fictitious play to introduce an Iterative Tree Search algorithm for incomplete-information GGP.

"TextWorld: A Learning Environment for Text-based Games" by Marc-Alexandre Côté, Ákos Kádár, Xingdi Yuan, Ben Kybartas, Tavian Barnes, Emery Fine, James Moore, Matthew Hausknecht, Layla El Asri, Mahmoud Adada, Wendy Tay, and Adam Trischler. The paper introduces TextWorld, a sandbox learning environment for the training and evaluation of Reinforcement Learning agents on text-based games. TextWorld is a Python library that handles interactive play-through of text games. It enables to cast text-based games in the Reinforcement Learning formalism and to develop a set of benchmark games, and evaluate several baseline agents on this set.

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"What's In A Game? The Effect of Game Complexity on Deep Reinforcement Learning" by Erdem Emekligil and Ethem Alpaydın. Deep Reinforcement Learning works on some games better than others. The paper proposes to evaluate the complexity of each game using a number of factors (the size of the search space, existence/absence of enemies, existence/absence of intermediate reward, and so on). Experiments are conducted on simplified Maze and Pacman environments.

"Analyzing the impact of knowledge and search in Monte Carlo Tree Search in Go". Farhad Haqiqat and Martin Müller. The paper focuses on identifying the effects of different types of knowledge on the behaviour of the Monte Carlo Tree Search algorithm, using the game of Go as a case study. Performance of each type of knowledge, and of deeper search are measured according to the move prediction rate on games played by professional players, and the playing strength of an implementation in the open source program FUEGO.

"Statistical GGP Game Decomposition" by Aline Hufschmitt, Jean-Noël Vittaut, and Nicolas Jouandeau. The paper presents a statistical approach for the decomposition of games in the GGP framework. General game players can drastically decrease game search cost if they hold a decomposed version of the game. Previous works on decomposition rely on syntactical structures, which can be missing from the game description, or on the disjunctive normal form of the rules, which is very costly to compute. The program has been tested on 597 games. Given a timeout of 1 hour and few playouts (1k), their method successfully provides an expert-like decomposition for 521 of them.

"Towards Embodied StarCraft II Winner Prediction" by Vanessa Volz, Mike Preuss, and Mathias Kirk Bonde. Realtime strategy games (and especially StarCraft II) are currently becoming the 'next big thing' in Game AI, as building human competitive bots for complex games is still not possible. However, the abundance of existing game data makes StarCraft II an ideal testbed for machine learning. The paper attempts to use this for establishing winner predictors. Such predictors can be made available to human players as a supportive AI component, but they can more importantly be used as state evaluations in order to inform strategic planning for a bot.

"MOBA-Slice: A Time Slice Based Evaluation Framework of Relative Advantage between Teams in MOBA Games" by Lijun Yu, Dawei Zhang, Xiangqun Chen, and Xing Xie. Multiplayer Online Battle Arena (MOBA) is currently one of the most popular genres of digital games around the world. It is hard for humans and algorithms to evaluate the real-time game situation or predict the game result. The paper introduces MOBA-Slice, a time slice based evaluation framework of relative advantage between teams in MOBA games. MOBA-Slice is a quantitative evaluation method based on learning, similar to the value network of ALPHAGO. MOBA-Slice is applied to Defense of the Ancients 2 (DotA2), a typical and popular MOBA game. Experiments on a large number of match replays show that the model works well on arbitrary matches.

This workshop would not have been held without the help of many persons. In particular, we would like to mention the authors and reviewers for their help. Moreover, the organizers of IJCAI 2018 contributed substantially by bringing the researchers together.

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