



WESTERN SYDNEY
UNIVERSITY

School of Computer, Data and Mathematical Sciences

HDR Seminar 14

Program

24 November 2021

4:00pm - 4:15pm	Briefing: A/Prof Dongmo Zhang Topic: Policy update and announcements
4:15pm - 4:35pm	Invited Speech Topic: Prepare entries for “Visualise Your Thesis Competition” Speaker: Matthew Spencer- Project Officer, HDR, Graduate Research School
4:35pm - 4:55pm	Conference Presentation Topic: Air quality data pre-processing: A novel algorithm to impute missing values in univariate time series Speaker: Lakmini Wijesekara (PhD candidate 18570263) Supervisory panel: Dr. Liwan Liyanage, Dr. Michael O’connor
4:55pm - 5:25pm	Invited Speech Topic: Warm-Start MCTS in AlphaZero-like Deep Reinforcement Learning Speaker: Dr Hui Wang, Université Paris Dauphine-PSL, France
5:25pm	Closing

Venue: Online Zoom

Zoom ID: 886 7872 4041

Next Event: End of Year HDR Wrap-up – 8th December 9:30 am –2:30 pm

Warm-Start MCTS in AlphaZero-like Deep Reinforcement Learning

Speaker: Dr. Hui Wang

Abstract:

AlphaZero has achieved impressive performance in deep reinforcement learning by utilizing an architecture that combines search and training of a neural network in self-play. Many researchers are looking for ways to reproduce and improve results for other games/tasks. However, the architecture is designed to learn from scratch, tabula rasa, accepting a cold-start problem in self-play. We propose a novel approach to deal with this cold-start problem by employing simple search enhancements at the beginning phase of self-play training (with an I' switch threshold), namely Rollout, Rapid Action Value Estimate~(RAVE) and dynamically weighted combinations of these with the neural network. Our experiments indicate that most of these enhancements improve the performance of their baseline player in three different (small) board games, with especially RAVE based variants playing strongly. We further present results with an adaptive switch method. Experiments show that this approach works better than the fixed I', especially for ``deep," tactical, games (Othello and Connect Four). We conclude that AlphaZero-like deep reinforcement learning benefits from adaptive rollout based warm-start, as Rapid Action Value Estimate did for rollout-based reinforcement learning 15 years ago.

Biography:

Hui Wang currently is a postdoc researcher at Paris Dauphine University-PSL. He obtained his PhD at Leiden University, the Netherlands in September 2021. Before his PhD, he did his Bachelor and Master degrees at Southwest University in 2015 and 2017 respectively in China. His research interests include general game playing, MCTS, deep reinforcement learning, especially AlphaZero-like self-play frameworks, as well as applying searching and learning techniques to master complex combinatorial optimization problems. Hui served as a committee member for several conferences such as PPSN2020 and BNAIC(2020, 2021) and as a reviewer for several Journals including KBS, ToG and AIR.

Air quality data pre-processing: Novel algorithm to impute missing values in univariate time series

Speaker: Lakmini Wijesekara (PhD candidate 18570263)

Abstract:

Missing values are ubiquitous in air pollution data as the data is being collected through sensors. Pre-processing these data plays a vital role in obtaining accurate results in the downstream analyses. This task becomes even more challenging as time is an implicit variable that cannot be ignored. Existing methods that deal with missing data in time series perform reasonably well in situations where the percentage of missing values is relatively low and the gap size is small. However, the need for the development of robust methods, particularly for large gaps, is still persistent. This paper proposes a novel algorithm (FBReg) to impute univariate air pollution variables by applying a bi-directional method based on regularized regression models. The performance of the method is evaluated against two baseline models, Mean imputation and Last observation carried forward (LOCF), as well as two well-established methods, AutoARIMA (Auto-Regressive Integrated Moving Average) and Kalman Smoothing. The proposed algorithm outperforms the considered methods and exhibits consistent performance with exponentially distributed missing values under the MCAR (Missing Completely at Random) mechanism, as well as with large gaps.