Mihai Sorin Dobre

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EDUCATION

PhD, Informatics   2013 – 2018
Low-resource learning in complex games
University of Edinburgh, UK
Supervisors: Alex Lascarides, Subramanian Ramamoorthy

BSc (Hons) Robotics with Artificial Intelligence (1st class)   2009 – 2013
University of Bradford, UK
Final year project: Modelling a Hide and Seek Game under Uncertainty

RESEARCH INTERESTS

- *Machine Learning:* (Multi-agent) Reinforcement Learning, Imitation learning, Deep Learning, Bayesian Methods, Planning and Decision Making
- Multi-agent Systems and Game Theory
- Uncertainty and Risk Quantification

INDUSTRIAL EXPERIENCE

Lead Research Scientist in Motion Planning and Prediction   May 2023 – present
Five AI/Bosch, UK

- Leading the Motion Planning and Prediction applied research team, providing technical guidance, establishing collaborations within Five AI, Bosch and academia, and line managing the team
- Researching a variety of topics in planning (e.g. multi-agent interactions, robustifying planners to handle distribution shifts and OOD data), and topics related to integrating planning with prediction
- Exploring state-of-the art techniques, such as Deep Learning (Graph Neural Networks, Transformers), Imitation Learning, Multi-agent Reinforcement Learning (including population-based methods); combining with classical approaches such as Iterative Best Response, Bayesian inference and Counterfactual simulation
- Guiding the engineering team on how to apply our algorithms and bring various machine learning methods to the vehicle stack deployed in the real world

Senior Research Scientist in Motion Planning and Prediction   May 2020 – May 2023
Five AI, UK

- Lead the Interactive Prediction and Planning team; we explored multiple directions for handling interactions, such as a classical integration between a Monte Carlo Tree Search ego planner and sampling of prediction for other agents, or a multi-agent algorithm to simultaneously model interactions between all agents
- Researched prediction solutions, such as NNs with Bayesian inference for Goal Recognition
- Collaborated with other research teams to develop algorithms for handling occlusions, by combining an optimisation-based planner with various belief modelling techniques, e.g. particle filtering
- Developed an evaluation framework and metrics for assessing the performance of the prediction and planning components, comparing it with other implementations and informing future development by highlighting current limitations.

Research Scientist in Motion Planning and Prediction   May 2018 – May 2020
Five AI, UK

- Designed and developed a high-level planner for the vehicle stack for decision making in complex situations, such as merging in roundabouts and overtaking in high traffic scenarios.
- Designed and developed an efficient multi-agent driving simulator that is being used extensively to conduct research in reinforcement learning, interactive planning or prediction, robust planning and integrating prediction with planning.
- Organised the Motion Planning and Prediction reading group, and actively participated in other company-wide reading groups.

Software Developer on STAC project   Sep 2014 – Mar 2015 & Aug – Dec 2016
University of Edinburgh, UK

- Collaborated with Toulouse and Heriot-Watt Universities on developing a rule-based agent for the Settlers of Catan game and applying machine learning methods to learn negotiations (e.g. Deep Q-learning, Random Forest).
- Developed an evaluation system for running competitions and assessing the models. Collected the data and analysing the results. Maintaining the Java source code.

Software Developer on WebSphere Application Server   Jul 2011 – Aug 2012
IBM, Hursley, UK

- Developed product features and fixed issues in a large remote team spread across the globe.
- Designed and developed an alpha version of a WebSphere Application Server plug-in that can be deployed in the cloud using IBM Workload Deployer.
- Independently worked to create a testing framework and adapted the product's build infrastructure to support the new tests. Simultaneously wrote the documentation for it.

PUBLICATIONS

- Morris Antonello, Mihai Dobre, Stefano V. Albrecht, John Redford, and Subramanian Ramamoorthy. Flash: Fast and light motion prediction for autonomous driving with bayesian inverse planning and learned motion profiles. *CoRR*, abs/2203.08251, 2022
- Josiah Hanna, Arrasy M Rahman, Elliot Fosong, Francisco Eiras, Mihai Dobre, John Redford, Subramanian Ramamoorthy, and Stefano Albrecht. Interpretable goal recognition in the presence of occluded factors for autonomous vehicles. In *IEEE International Conference on Intelligent Robots and Systems (IROS)*, Prague, Czech Republic, 2021
- Stefano V. Albrecht, Cillian Brewitt, John Wilhelm, Balint Gyevnar, Francisco Eiras, Mihai Dobre, and Subramanian Ramamoorthy. Interpretable goal-based prediction and planning for autonomous driving. In *IEEE International Conference on Robotics and Automation (ICRA)*, Xi'an, China, 2021
- Cillian Brewitt, Stefano V. Albrecht, John Wilhelm, Francisco Eiras, Mihai Dobre, and Subramanian Ramamoorthy. Autonomous driving with interpretable goal recognition and monte carlo tree search. In *Interaction and Decision-Making in Autonomous-Driving Workshop (RSS)*, Oregon, USA, 2020
- Mihai Dobre and Alex Lascarides. POMCP with human preferences in settlers of catan. In *Proceedings of the Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE)*, Edmonton, Canada, 2018
- Joachim Fainberg, Ben Krause, Mihai Dobre, Marco Damonte, Emmanuel Kahembwe, Daniel Duma, Bonnie L. Webber, and Federico Fancellu. Talking to myself: self-dialogues as data for conversational agents. *CoRR*, abs/1809.06641, 2018
- Ben Krause, Marco Damonte, Mihai Dobre, Daniel Duma, Joachim Fainberg, Federico Fancellu, Emmanuel Kahembwe, Jianpeng Cheng, and Bonnie L. Webber. Edina: Building an open domain socialbot with self-dialogues. *CoRR*, abs/1709.09816, 2017

- Mihai Dobre and Alex Lascarides. Combining a mixture of experts with transfer learning in complex games. In *AAAI Spring Symposium*, Palo Alto, California USA, 2017
- Simon Keizer, Markus Guhe, Heriberto Cuayahuitl, Ioannis Efstathiou, Klaus-Peter Engelbrecht, Mihai Dobre, Alex Lascarides, and Oliver Lemon. Evaluating persuasion strategies and deep reinforcement learning methods for negotiation dialogue agents. In *EACL*, Valencia, Spain, 2017
- Mihai Dobre and Alex Lascarides. Exploiting action categories in learning complex games. In *IEEE SAI Intelligent Systems Conference (IntelliSys)*, London, UK, 2017
- Mihai Dobre and Alex Lascarides. Online learning and mining human play in complex games. In *Proceedings of the IEEE Conference on Computational Intelligence in Games (CIG)*, Tainan, Taiwan, 2015

AWARDS

- Best Student Paper Award for "Exploiting action categories in learning complex games"
- Best Overall Performance Award received for BSc degree (2013)

PREVIOUS PROJECTS

- *Amazon Alexa Challenge 2017:* implemented a socialbot that is able to converse on popular topics. I was part of team Edina from University of Edinburgh.
- *Strategic Conversation (STAC):* developed state-of-the-art models that combine linguistic theory, agent interaction and decision making.

COMPUTING SKILLS

Languages: Python (base language and scientific computing), C++, Java, SQL
Scripting languages: Unix Shell
Version control: Git, SVN
Libraries and Frameworks: TensorFlow, Torch, RLLib, Deeplearning4j, ROS
Document preparation: LaTeX

TEACHING EXPERIENCE

Teaching Assistant for Reasoning and Agents - level 2   Jan – May 2015 & 2016
University of Edinburgh

- Developed courseworks on Situation Calculus and Planning in Prolog. Lectured over 100 students on the materials relevant to the coursework.
- Prepared materials and tutored groups of students. Provided help during labs with coursework development in Haskell and Prolog.

Tutor for Reinforcement Learning - Master level   Jan – May 2014 & 2015
University of Edinburgh

- Tutored groups of over 15 students and provided guidance on the curriculum as well as suggestions on relevant reading materials.
- Prepared Matlab scripts and visual demonstration of various tabular algorithms, e.g. Dynamic Programming, SARSA, Q-learning.

Demonstrator for Software Development - level 1   Sep 2012 – Apr 2013
University of Bradford

- Worked with senior lecturers to deliver the laboratory sessions' materials for 120 students.

OTHER INTERESTS

Tennis: competed on the ITF World Pro Circuits, on Romanian and British Tour, and University team levels.