

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

## INDUSTRIAL EXPERIENCE

*Lead Research Scientist in Motion Planning and Prediction* May 2023 – present  
Five, UK

- Leading the Motion Planning and Prediction applied research team, providing technical guidance, establishing collaborations within Five, Bosch and academia, and line managing the team
- Leading and performing research on a large variety of topics in both planning (handling interactivity, robustifying planners to handle distribution shifts and OOD data, handling occlusions) and prediction (goal recognition, interactive prediction) as well as how best to integrate the two components
- Exploring state-of-the-art solutions, such as deep learning (Graph Neural Networks, Transformers), imitation learning, multi-agent reinforcement learning including population-based methods; combining with classical methods such as Monte Carlo Tree Search, particle filtering, Expectation-Maximization, Bayesian inference and counterfactual reasoning
- Guiding the engineering team on how to apply our algorithms and bring various machine learning methods to the stack that is deployed in the real world

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

- Leading research in Interactive Prediction and Planning, with the focus on multi-agent planner for negotiating with other traffic participants and taking safe decision by minimising risk.
- Leading research in Hierarchical Planning, in particular on combining sampling-based planners with low-level trajectory generation methods.
- Research in Prediction, especially on Goal Recognition and integrating Prediction with Planning.
- 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  
Five, UK

May 2018 – May 2020

- Designed and lead the development of the planner for the vehicle stack for decision making in complex situations, e.g. merging in roundabouts and overtaking in high traffic scenarios.
- Designed and developed a driving simulator that has been used extensively for research in interactive planning or prediction, robust planning and integrating prediction with planning.
- Organising and leading the Motion Planning and Prediction reading group as well as being an active presenter.

Software Developer on STAC project  
University of Edinburgh, UK

Sep 2014 – Mar 2015 & Aug – Dec 2016

- 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  
IBM, Hursley, UK

Jul 2011 – Aug 2012

- Developed product features and fixed issues in a large remote team spread across the globe.
- Designed and developed an alpha version of the WebSphere Application Server Liberty profile 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, MALib, Chainer, Deeplearning4j, ROS

*Document preparation*: L<sup>A</sup>T<sub>E</sub>X

## TEACHING EXPERIENCE

*Teaching Assistant for Reasoning and Agents - level 2*  
University of Edinburgh

Jan – May 2015 & 2016

- 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*  
University of Edinburgh

Jan – May 2014 & 2015

- 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*  
University of Bradford

Sep 2012 – Apr 2013

## OTHER INTERESTS

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