# 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 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 reasoning
- 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.