AAMAL ABBAS HUSSAIN

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EDUCATION

PhD in Asymptotic Covergence and Performance of Multi-Agent Q-Learning Dynamics
Imperial College London (Safe and Trusted AI CDT)   2019 - 2024

We analyse multi-agent reinforcement learning in network polymatrix games. We extend the current literature by lifting the requirement of pure cooperation (potential games) or competition (zero-sum games). We determine conditions for convergence of Independent Q-Learning to various equilibrium solutions as well as characterising their complex behaviour (i.e. limit cycles and chaos).

AAMAS 2024 (*A. Hussain, D. Leonte, F. Belardinelli, G. Piliouras*)
- On the Stability of Learning in Network Games with Many Players

AAAI 2024 (*A. Hussain, F. Belardinelli*)
- Stability of Multi-Agent Learning in Competitive Networks: Delaying the Onset of Chaos

ICML 2023 (*A. Hussain, F. Belardinelli, D. Paccagnan*)
- The Impact of Exploration on Convergence and Performance of Multi-Agent Q-Learning Dynamics

ICML 2023 Workshop on New Frontiers in Learning, Control, and Dynamical Systems
(*A. Hussain, F. Belardinelli, D. Paccagnan*)
- Stability of Multi-Agent Learning: Convergence in Network Games with Many Players

IJCAI 2023 (*A. Hussain, F. Belardinelli, G. Piliouras*)
- Beyond Strict Competition: Approximate Convergence of Multi-Agent Q-Learning Dynamics

AAMAS 2023 (*A. Hussain, F. Belardinelli, G. Piliouras*)
- Asymptotic Convergence and Performance of Multi-Agent Q-Learning Dynamics.

AAMAS 2022 Workshop on Adaptive and Learning Agents (*A. Hussain, F. Belardinelli*)
- Equilibria and Convergence of Fictitious Play on Network Aggregative Games

MSc Robotics and Computation | Distinction   September 2018 - September 2019
University College London
- **Dissertation:** An Extension of Obstacle Avoidance Technologies to 3D (supervised by Simon Julier and Stephen Hailes)
- **Technologies:** Python, Julia, ROS, PyTorch, Tensorflow, C++

BSc Physics | Upper Second Class Honours   October 2015 - July 2018
Imperial College London
- **Technologies:** Python, MATLAB, R

WORK EXPERIENCE

Junior Researcher: Data Science   January 2024 - Present
PhysicsX
- Contributed to the design and development of internal research libraries in Python.
- Initiated a research stream which improves the state-of-the-art in stochastic surface reconstruction.
- Independently developed diagnostic tools using Dash within the company's codebase which enabled human readable analysis of training and evaluation of large deep learning models.
- **Technologies:** Git, Python

INVITED TALKS

Alan Turing Institute (July 2021 - Present)
Recurring series of tutorials on Dynamic of Online Learning in Games

Fields Institute - Symposium on Machine Learning & Dynamical Systems (2022)
Poster Session on PhD research