Jayakumar Subramanian

Ph.D. Student · McGill University

350 Rue Prince Arthur (Ouest), Apt. 412, Montréal, QC H2X 3R4, Canada

☐ (+1) 514-560-7895, (+91) 98204 47917 | ✉ jayakumar.subramanian@gmail.com | 🏠 jsubramanian | 🐙 jk-cim | 🔗 jayakumar

Education

PhD in Electrical & Computer Engineering, McGill University   *Montreal, Canada*

THESIS: REINFORCEMENT LEARNING FOR PARTIALLY OBSERVED AND MULTI-AGENT SYSTEMS   *Jan. 2016 - present*

- Thesis Supervisor: Prof. Aditya Mahajan
- GPA: **4.0/4.0**

Bachelors and Masters of Technology (Dual Degree) in Aerospace Engineering, Indian Institute of Technology (IIT) Bombay   *Mumbai, India*

THESIS: HIGH RESOLUTION SCHEMES USING WEIGHTED LEAST SQUARES FORMULATION   *Jul. 2001 - Jun. 2006*

- Thesis Supervisor: Prof. J.C. Mandal
- CGPA: **9.78/10**

Areas of Interest

- (Deep) RL in partially observed systems, large population systems and mean-field multi-agent systems, offline RL using real-world data.
- Recommender systems and knowledge representation

Experience

McGill University   *Montreal, Canada*

RESEARCH ASSISTANT   *Jan. 2016 - Present*

- Worked on multi-agent reinforcement learning, specifically in mean-field teams and stationary mean-field systems.
- Developed custom environments in Open AI gym format for multi-agent problems.
- Worked with several deep RL algorithms, including REINFORCE, A2C, TRPO, PPO, DQN, DDQN, NAFDQN.
- Worked on using model based ideas in improving efficiency of RL.

Microsoft Research Montreal   *Montreal, Canada*

RESEARCH INTERN   *May. 2019 - Aug. 2019*

- Performed data extraction and curation for analysis from electronic health records.
- Built an offline reinforcement learning framework to learn from real-world data.
- Analyzed various phenomena in specific diseases in healthcare domain using RL.

Venture Capital (Equanimity Investments - USD 15 Mn fund)   *Mumbai, India*

TECHNOLOGY ADVISOR   *Feb. 2018 - present*

- Evaluated investments in fintech and analytics.
- Advised on 7 transactions, leading to a USD 1 Mn Series A investment in a fintech company.

Recursive Dynamics and a venture funded startup: BrandIdea   *Mumbai, India*

LEAD DATA SCIENTIST   *Jan. 2015 - Sep. 2015*

- Designed and implemented large scale recommender systems for demand estimation, sales automation and staffing in multiple countries.
- Applied RL to support developing marketing strategies.

Investment Banking (Standard Chartered, Alpen Capital, Epsilon Capital, Value Partners)   *Mumbai, India*

MANAGER; ASSISTANT VICE PRESIDENT; VICE PRESIDENT - INVESTMENT BANKING   *Jun. 2006 - Sep. 2015*

- Full cycle investment banking experience from origination to closure.
- Consummated deals collectively worth over USD 50 Mn.

Awards and Honors

2016-18	**McGill Engineering Doctoral Award (MEDA)**, awarded by the Faculty of Engineering, based on the excellence of a student's academic and research record.	*McGill*
2016	**Arthur Allan McAlear Fellowship**, awarded by the Faculty of Engineering, based on academic merit, given to outstanding doctoral students in the Department of Electrical & Computer Engineering.	*McGill*
2016	**Max Stern Recruitment Fellowship**, awarded by the University, to outstanding applicants seeking first admission to graduate studies at McGill during the following academic year.	*McGill*
2006	**Institute Silver Medal**, awarded by the University, to the student with the highest CGPA in each Department.	*IIT Bombay*

Publications

AI/ML: Conferences

Under preparation	"Decentralized actor decentralized critic for multi-agent cooperative environments", **Subramanian, J.**; Seraj, R. and Mahajan, A.
RLDM 2019	"Approximate information state for partially observed systems", **Subramanian, J.** and Mahajan, A.
RLDM 2019	"Reinforcement learning for mean-field teams", **Subramanian, J.** , Seraj, R. and Mahajan, A.
AAMAS 2019	"Reinforcement learning in stationary mean-field games", **Subramanian, J.** and Mahajan, A.

AI/ML: Workshops

DGMS 2019	"Mean-field games between teams", **Subramanian, J.** , Kumar, A and Mahajan, A.
ALA 2019	"Reinforcement learning for mean-field teams", **Subramanian, J.** , Seraj, R. and Mahajan, A.
PAL 2018	"A policy gradient algorithm to compute boundedly rational stationary mean field equilibria", **Subramanian, J.** and Mahajan, A.

Control theory: Conferences

CDC 2019	"Approximate information state for partially observed systems", **Subramanian, J.** and Mahajan, A.
CDC 2018	"Renewal Monte Carlo: Renewal theory based reinforcement learning", **Subramanian, J.** and Mahajan, A.
CDC 2018	"On controllability of leader-follower dynamics over a directed graph", **Subramanian, J.**, Mahajan, A. and Paranjape, A.A.
ACC 2017	"Stochastic approximation based methods for computing the optimal thresholds in remote-state estimation with packet drops", Chakravorty, J., **Subramanian, J.** and Mahajan, A.

Journals

TAC 2019 (submitted)	"Renewal Monte Carlo: Renewal theory based reinforcement learning", **Subramanian, J.** and Mahajan, A.
ANM 2008	"On the link between weighted least-squares and limiters used in higher-order reconstructions for finite volume computations of hyperbolic equations", Mandal, J. C., and **Subramanian, J.**
IJNMF 2008	"High resolution finite volume computations using a novel weighted least-squares formulation", Mandal, J. C., Rao, S., and **Subramanian, J.**

Talks and seminars

2019	**Multi-agent reinforcement learning: Stationary Mean Field Games** • Facebook AI Research, Feb 2019, Montreal, Canada • Google Brain, Feb 2019, Montreal, Canada • Information Theory and Applications Workshop, Feb 2019, San Diego, California
2018	**Renewal Monte Carlo: Renewal theory based reinforcement learning** 8th Meeting On Systems And Control Theory, May 9, 2018.
2017	**Renewal theory based Reinforcement Learning for Markov processes with controlled restarts** Optimization Days (JOPT2017, HEC Montréal), May 10, 2017.
2017	**Stochastic approximation based approaches for remote estimation with packet drops** GERAD Student Day, April 11, 2017.

Posters

MAIS 2019	"Approximate dynamic programming and reinforcement learning for partially observed systems", **Subramanian, J.**, Mahajan, A., Montreal AI Symposium
REPARTI 2019	"Approximate information state for partially observed systems", **Subramanian, J.**, Mahajan, A., Colloque REPARTI Workshop
MAIS 2017	"A new policy based RL algorithm with reduced bias and variance", **Subramanian, J.**, Mahajan, A., Montreal AI Symposium

Patent

| 2014 | "Graph Based Ontology Modelling System", Subramanian, J., filed in India in August, 2014 |

Software skills

Programming Knowledge

Languages, AI/ML Libraries, Databases

• Currently coding in: Python, Julia
• Coded in the past: Javascript, Lisp (Scheme), Java, Scala, Objective C, MATLAB, C++, Fortran
• ML Libraries: Tensorflow, pyTorch, Chainer, RLlib (Ray), Scikit-Learn
• Databases: Neo4j (Graph database), MongoDB (document-oriented database), PostgreSQL (Relational database)