KARUSH SURI

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RESEARCH INTERESTS

Karush is a graduate student at the University of Toronto completing his M.A.Sc in Electrical and Computer Engineering. His research focuses on developing novel intelligent algorithms for reinforcement learning, deep learning, planning and robotic control.

EDUCATION

University of Toronto 2019 - Present
Master of Applied Science (M.A.Sc) *Toronto, Canada*

- Department: Electrical & Computer Engineering
- Thesis: Deep Hierarchical Reinforcement Learning (defense in August 2021)
- Advisors: Prof. Yuri A. Lawryshyn & Prof. Konstantinos N. Plataniotis
- GPA: 3.93/4

Amity University 2015 - 2019
Bachelor of Technology (B.Tech) *Delhi, India*

- Department: Electronics & Communication Engineering
- Thesis: Application of Deep Learning & Game Theory for Sign Language Recognition using Wearable Sensors (link)
- Advisor: Prof. Rinki Gupta
- GPA: 8.78/10

SCHOLARSHIPS & AWARDS

University of Toronto, Canada
Electrical & Computer Engineering Fellowship *2020-2021*
Edward S. Rogers Graduate Scholarship *2019-2020*

Amity University, India
Best in Technical Innovation Award (class of 2015-2019) *2019*
Most Frugal Innovation Award *2018*
100% Curriculum Merit Scholarship *2015*

Others
Young Achievers Award *2015*

RESEARCH APPOINTMENTS

RBC Capital Markets 2019 - Present
Thesis Researcher *Toronto, Canada*

- Proposed Energy-based MIXer (EMIX) networks for surprise minimization in multi-agent StarCraft II.
- Proposed ESAC combining ES and SAC using AMT for sample efficient and scalable reinforcement learning.
- Developed soft winner selection strategies, hindsight crossovers and energy-based mixer models for multi-agent value factorization.

University of Toronto 2019 - Present
Graduate Research Assistant- Reinforcement Learning *Toronto, Canada*

- Affiliated with the Center for Management of Technology & Entrepreneurship (CMTE)
- Developing joint policy optimization algorithms for continuous control and multi-agent reinforcement learning.
- Developed Hierarchical Reinforcement Learning methods for cooperation and competition with Multi-Agent Learning using CapsNet and ConvNet.
- Improved policy gradient algorithms in conjunction with evolution-based methods.

Amity University 2017 - 2019
Undergraduate Research Assistant- Deep Learning *Delhi, India*

- Affiliated with the Signal Processing & Deep Learning Lab
- Project entitled "Indian Sign Language to Spoken Language Translator using data from Wearable Multisensor Armbands" Funded by the Department of Science and Technology, Government of India, SERB file number ECR/2016/000637.
- Constructed novel CapsNets and ConvNets for non-cooperative games, Master-Slave DNNs and LSTM-RNNs for transfer-learning and dual-stage SVMs for classification and regression tasks.

PUBLICATIONS

- Karush Suri, Xiao Qi Shi, Konstantinos N. Plataniotis, Yuri A. Lawryshyn, "*Energy-based Surprise Minimization for Multi-agent Value Factorization*", 20^{th} International Conference on Autonomous Agents and Multiagent Systems (AAMAS) 2021, Deep Reinforcement Learning Workshop, 34^{th} Conference on Neural Information Processing Systems (NeurIPS) 2020. (website) (arXiv)
- Karush Suri, Xiao Qi Shi, Konstantinos N. Plataniotis, Yuri A. Lawryshyn, "*Maximum Mutation Reinforcement Learning for Scalable Control*", Deep Reinforcement Learning Workshop, 34^{th} Conference on Neural Information Processing Systems (NeurIPS) 2020. (website) (arXiv)
- Karush Suri, Rinki Gupta, "*Continuous Sign Language Recognition from Wearable IMUs using Deep Capsule Networks and Game Theory*", Computers And Electrical Engineering, Elsevier, Vol. 78, 2019. (arXiv) (code)
- Karush Suri, Rinki Gupta, "*Transfer Learning for sEMG-based Hand Gesture Classification using Deep Learning in a Master- Slave Architecture*", 3^{rd} International Conference on Communication and Computational Intelligence (IC3I) 2018, IEEE. (arXiv) (code)

TECHNICAL REVIEWS

- Karush Suri, "*On Variational Generalization Bounds for Unsupervised Visual Recognition*", Technical Report, 2020. (link) (code)
- Karush Suri, "*On Cooperation in Multi-Agent Reinforcement Learning*", Technical Report, 2020. (link) (code)
- Karush Suri, Shashank Saurav, "*Attentive Hierarchical Reinforcement Learning for Stock Order Executions*" Technical Report, 2020. (link) (code)

TEACHING ASSISTANTSHIPS

- ECE1512H *Digital Image Processing and Applications*, University of Toronto (Winter 2021)
- CSC104H *Computational Thinking*, University of Toronto (Winter 2021)
- CSC2209H *Computer Networks*, University of Toronto (Fall 2020)

· CSC458H *Computer Networking Systems*, University of Toronto (Fall 2020)
· CSC258H *Computer Organization*, University of Toronto (Winter 2020)
· MATH *Integral Calculus*, Sai Kripa Orphanage (Summer 2016)
· MATH *Numerical Differentiation*, Sai Kripa Orphanage (Summer 2016)
· MATH *Linear Algebra*, Sai Kripa Orphanage (Summer 2016)

INDUSTRY EXPERIENCE

EdAuthority 2019-2020
Content Management Intern- Data Science *Delhi, India*

· Drafted, Edited and Published articles on modern-day trends and advancements in Data Science.
· Backend website management and development of marketing solutions for digital platform.

Airtel 2018
Network Management Intern *Delhi, India*

· Project entitled "Fundamentals of Network Communication".
· Conducted Fault Management and Throughput Handling as a part of the Radio Network Team.

Reliance Jio 2017
Summer Engineering Intern *Delhi, India*

· Project entitled "Excel Data Processing Automator using Python Programming".
· Devised novel automated algorithms for creation, updating and deletion of spreadsheets consisting of Throughput and Connectivity Loss data.

Sony 2016
Summer Engineering Intern *Delhi, India*

· Project entitled "LCD Television Systems and BRAVIA Engine Applications".
· Conducted circuit assessment and analysis of BRAVIA engine systems along with their maintenance.

ORGANIZATIONAL WORK & SERVICES

Elevate 2019
Event Volunteer *Toronto, Canada*

· Event Volunteer at the Elevate Toronto Tech Festival.
· Worked in a team of 10+ members to manage and assist industry professionals at the Meridian Hall.

IEEE Signal Processing & Integrated Networks (SPIN) 2017-2019
Lead Organizer *Delhi, India*

· Head of the stage team at 6^{th} SPIN.
· Member of the coordinating committee at 5^{th} SPIN.
· Member of the volunteering committee at 4^{th} SPIN.

TECHNICAL SKILLS

Languages- Python, Lua, MATLAB, HTML, SQL, C, C++, Assembly, Markdown, LaTeX.
Frameworks- PyTorch, Tensorflow, torch7, Keras, Numpy, Flask, scikit-learn, Matplotlib.
Platforms- Amazon Web Services, Google Cloud Platform, Git.