

Khurram Javed

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EDUCATION

University of Alberta

P.h.D. Computing Science

Edmonton, Canada

Sept. 2021 – Now

Supervisor

Rich Sutton **CGPA** 4.0

Expected graduation January 2024

Developing scalable algorithms for online real-time agent-state construction for reinforcement learning.

University of Alberta

M.Sc Computing Science

Edmonton, Canada

Sept. 2018 – Sept 2020

Supervisor Martha White

Thesis Learning Online-Aware Representations using Neural Networks

National University of Sciences and Technology (NUST)

Bachelors of Engineering in Software Engineering

Islamabad, Pakistan

Aug 2014 – July 2018

- **CGPA** – 4.0/4.0
- **President’s Gold Medal** (Awarded for graduating with the highest distinction)
- **Rector’s Gold Medal** (Awarded to one final year thesis)

International Mathematical Olympiad Training Camps

Abdus Salam School of Mathematical Sciences

Lahore, Pakistan

2012 – 2014

- **Honorable Mention** at **55th International Mathematical Olympiad**, Cape Town, South Africa. Missed bronze medal by 2 points. [Result](#)
- **Bronze Medal** at **XXVI Asian Pacific Mathematical Olympiad**. [Result](#)

PUBLICATIONS AND PRE-PRINTS ([GOOGLE SCHOLAR](#))

Scalable Real-Time Recurrent Learning Using Columnar-Constructive Networks

JMLR (2023)

K.Javed, H.Shah, R.Sutton, and M.White

[Paper/Code](#)

We show that by either constraining the network architecture of an RNN or learning an RNN incrementally, we can do unbiased gradient-based learning using only $O(n)$ operations and memory per step. We evaluate our algorithms by doing policy evaluation for expert atari agents using TD(λ) and show that our algorithms significantly outperform the best-tuned T-BPTT baseline in the strong function approximation setting.

Learning Causal Models Online

Pre-print

K.Javed, M.White, and Y.Bengio

[Paper/Code](#)

We propose a method for learning models that do not rely on spurious correlations. Our work builds on IRM (M Arjovsky, 2019) except unlike IRM, it can be implemented online to (1) detect spurious features for a set of given features and (2) learn non-spurious features from sensory data.

Meta-Learning Representations for Continual Learning

NeurIPS 19

K.Javed and M.White

[Paper/Code/Talk/Poster](#)

We propose OML, an objective for learning representations by using catastrophic interference as a training signal. Resultant representations are naturally sparse, accelerate future learning and are robust to forgetting under online updates in continual learning

Simultaneous Prediction Intervals for Patient-Specific Survival Curves

IJCAI 19

S. Sokota, R. D’Orazio, **K. Javed**, H. Haider and R. Greiner

[Paper/Code](#)

We propose a simple drop-in procedure for approximating the Bayesian credible regions of patient-specific survival functions that can be applied to many ISD models.

Revisiting Distillation and Incremental Classifier Learning

ACCV 18

K. Javed, F.Shafait

[Paper/Code/Poster](#)

We isolate the truly effective existing ideas for incremental classifier learning from those that only work under certain conditions. Moreover, we propose a dynamic threshold moving algorithm that can successfully remove bias from an incrementally learned classifier when learning by knowledge distillation.

Real-Time Document Localization in Natural Images by Recursive Application of a CNN (Oral)

ICDAR 17

K. Javed, F.Shafait

[Paper/Code/Slides](#)

We propose a computationally efficient document segmentation algorithm that recursively uses convolutional neural networks to precisely localize a document in a natural image in real-time.

ENGINEERING SKILLS

I have experience writing optimized multi-threaded code in C++ and Cuda. Prior to using C++/Cuda, I used PyTorch and Tensorflow for multiple projects, and have written code that can effectively use tens of GPUs spread across multiple nodes using Open-MPI. My C++ implementation of LSTMs is 50-100x faster for small recurrent networks compared to PyTorch or LibTorch. Finally, I have experience implementing sparse and dynamically changing neural networks in C++ and Cuda. Implementing dynamic networks efficiently in Python-based frameworks is challenging. A large part of my code is publicly available on my [github](#) profile.

WORK EXPERIENCE

University of Alberta, Edmonton, Canada

Oct 2020 — Sept 2021

Research Assistant advised by Martha White

I worked on algorithms for scalable state construction using generate and test.

Quebec Artificial Intelligence Institute (MILA), Montreal, Canada

Feb 2020 — June 2020

Visiting Student advised by Yoshua Bengio

I worked on meta-learning top-down modulation schemes for attention and plasticity, explored the role of causal models in systematic generalization and proposed a method for learning causal models online.

Hi-Silicon, Huawei Research, Edmonton, Canada

June 2019 — Oct 2019

Research Associate

I worked at the intersection of meta-learning, reinforcement learning, and representation learning with Hengshuai Yao.

École Polytechnique Fédérale de Lausanne, Switzerland

June 2017 — Sept 2017

Research Intern at LCA3

[Slides](#)

I worked on a data-driven approach to predict end to end throughput of PLC-WiFi hybrid paths in ad-hoc networks with Sébastien Henri, Victor Kristof and Prof. Patrick Thiran.

REVIEWING

TNNLS, TMLR, T-PAMI, ICML 2022, NeurIPS 2021, ICLR 2021, ICML 2021, NeurIPS 2020, ICLR 2020, AAAI 2020, ICML 2020

OTHERS

Organized workshop on Self-Supervised Learning and Reinforcement Learning, ICLR 2021

AWARDS AND ACCOLADES

Top reviewer award for ICML 2020.

NeurIPS19 travel award.

NeurIPS18 volunteer award.

University of Alberta Recruitment Scholarship.

Travel award for KAIST EECamp, South Korea.

ICDAR 2017 Student Travel Award

Summer@EPFL award (3 – 4 % acceptance rate)

STANDARDIZED TEST SCORES

SAT: 2290/2400, SAT II: 2400/2400, GRE: 332/340, TOEFL: 119/120