Muhammad Zaheer

3-05 RLAI - Computing Science Centre
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muhammadzaheer.github.io/

Research Interests

I am broadly interested in **reinforcement learning** as an approach to building autonomous agents. I am currently working on the problem of sample-efficient reinforcement learning with a focus on **model-based RL** techniques.

Publications

- Y. Pan, **M. Zaheer**, A. White, A. Patterson, M. White. "Organizing Experience: A Deeper Look at Replay Mechanisms for Sample-based Planning in Continuous State Domains." In: Proceedings of the Twenty-Seventh International Joint Conference on Artificial Intelligence (IJCAI). 2018, pp. 4794-4800. PDF: https://goo.gl/A1VsmH
- Y. Wan*, **M. Zaheer***, M. White, RS. Sutton. "Model-based Reinforcement Learning with Non-linear Expectation Models and Stochastic Environments." In: ICML Workshop on Prediction and Generative Modeling in Reinforcement Learning (PGMRL). 2018. PDF: https://goo.gl/9XNwva

Education

2017 – present **M.Sc. Computer Science**, *University of Alberta*, Edmonton, AB.
- **CGPA**: 4.00/4.00
- **Supervisors**: Martha White and Erik Talvitie

2012 – 2017 **B.S. Computer Science**, *National University of Sciences and Technology (NUST)*, Islamabad, Pakistan.
- **Rank**: 1/70; **CGPA**: 4.00/4.00 (Cohort's CGPA Statistics - $\mu : 3.24 \quad \sigma : 0.33$)
- **President's Gold Medal for Academics**
- **Rector's Gold Medal for Undergraduate Thesis Project**

Experiences

May 2018 – Present **Graduate Research Assistant**, *Reinforcement Learning and Artificial Intelligence Lab (RLAI), University of Alberta*.
Supervisors: Martha White and Erik Talvitie
I am focusing on the problem of developing efficient planning algorithms which make use of an approximate model while being robust to the model's imperfections.

Jul 2015 – Sep 2015 **Summer@EPFL Research Intern**, *Distributed Information Systems Laboratory (LSIR), École Polytechnique Fédérale de Lausanne (EPFL), Switzerland*.
Supervisor: Karl Aberer
I Investigated anomaly detection techniques for wireless mobile sensors in the OpenSense Project, an air quality monitoring project which consists of wireless sensors deployed on metro buses of the local public transport network in Lausanne. I implemented an algorithm for tracking faulty sensors by exploiting spatial and temporal correlations.

Jul 2016 – May 2017 **Research Assistant**, *Computer Vision group , NUST*.
Supervisor: Faisal Shafait
I worked on real-time detection and recognition of unconstrained license plates from a surveillance feed. While generally considered a solved problem, the lack of standardization for license plates in Pakistan has resulted in license plates with unconstrained fonts and styles, which are challenging not only to recognize but also to distinguish from regular text using traditional methods. I treated this problem as a particular case of text in the wild and built a deep learning based vehicle search engine as my Undergraduate Thesis project. The project won the **Best Adjudged Industry Project** award in NUST-SEECS Open House 2017 (awarded to only one student project in the graduating cohort).

Feb 2016 – May 2016 **Software Development Intern**, *PLUMgrid Inc.*
Supervisor: Affan Syed
I developed a prototype framework using extended Berkeley Packet Filter (eBPF) to stitch VNF functions deployed in Docker containers on a commodity Linux server. I also conducted a workshop on OpenStack as part of OpenStack Pakistan's initiative, jointly organized by PLUMgrid and Ministry of Information Technology, Pakistan. VMWare later acquired PLUMgrid in December 2016.

Awards and Honors

Feb 2015 – May 2015 **US Dept. of State Global Undergraduate Exchange Scholarship**.
Under this program, I spent an exchange semester at Augustana University in the United States, delivered presentations on Pakistan's traditions and history, and performed 20 hours of volunteer work by mentoring a high school student at Edison Middle School, Sioux Falls.
Value: 32,000 CAD. **Acceptance Rate** $\approx$ 3%

2012 – 2016 **Canadian Merit Scholarship for Undergraduate Study**.
Awarded to only 1 undergraduate student from each EECS cohort (1/300 students). Selection criteria involves academic record and extra-curricular activities.
Value: 4,000 CAD.

Jul 2015 **Summer@EPFL Award**.
Funded research internship program by Swiss Federal Institute of Technology (EPFL), Lausanne, Switzerland.
Value: 8,000 CAD. **Acceptance Rate** $\approx$ 5%

Jan 2014 **Travel Award for ITCSC-INC Winter School on Theoretical Computer Science (The Chinese University of Hong Kong)**.
Value: 2,000 CAD.

Jan 2014 **Best Adjudged Industry Project, SEECS OpenHouse 2017**.
Value: 300 CAD.

Teaching Experience

Sep 2017 - April 2018 **Graduate Teaching Assistant**, *Department of CS*, University of Alberta, Edmonton.
CMPUT 175, Introduction to the Foundation of Computation - II

Sep 2016 - Dec 2016 **Undergraduate Teaching Assistant**, *School of EECS*, NUST, Islamabad.
CS-370, Artificial Intelligence

Technical Skills

Experienced **Python, PyTorch, TensorFlow, Bash**.

Dabbled **C, C++, Java, Javascript, MATLAB**.