

# USMAN ANWAR

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🏠 <https://uzman-anwar.github.io/>

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## OBJECTIVE

Seeking a Ph.D. position to research theoretical and practical aspects of deep learning and reinforcement learning with an aim towards making AI safer. Have been awarded Vitalik Buterin Ph.D. Fellowship by Future Of Life Institute.

## EDUCATION

**Information Technology University, Lahore** September 2019 – August 2021  
MS Data Science (CGPA: 3.87, Rank: 2nd, Dean's Honours List)  
Thesis Paper: Inverse Constrained Reinforcement Learning (*published at ICML*)

**University of Engineering and Technology, Lahore** August 2015 – May 2019  
BS Electrical Engineering (CGPA: 3.52)  
Undergraduate Thesis/FYP: Single Channel Acoustic Source Separation And Speech Enhancement

**Government College University, Lahore** August 2013 – May 2015  
Associate's Degree Pre-Engineering (Grade: A+)

## WORK EXPERIENCE

**Senior Machine Learning Engineer** February 2020 – Present  
Scientific Computing Department  
NetSol Technologies, Lahore

**Research Assistant & Graduate Student Fellow** July 2019 – June 2020  
Center of Artificial Intelligence and Computational Science  
Information Technology University, Lahore  
Research Advisor: Dr. Ali Ahmed

**Research Intern** July – September 2018  
Internet of Things Laboratory  
Khwarizmi Institute of Computer Science, Lahore  
Research Advisor: Dr. Ubaid Ullah Fayyaz

**Junior Data Scientist** June – August 2017  
ADDO AI, Lahore

## TEACHING EXPERIENCE

**Teaching Assistant - Discrete Mathematics** September 2019 – January 2020  
Department Of Computer Science  
Information Technology University, Lahore

## CONFERENCE PUBLICATIONS

\* denotes equal contribution

U. Anwar\*, S. Malik\*, A. Aghasi, and A. Ahmed. Inverse constrained reinforcement learning. In *Proceedings of the 38th International Conference on Machine Learning (ICML)*, 2021. URL <https://arxiv.org/abs/2011.09999>

## WORKSHOP PUBLICATIONS

D. Papadimitriou, U. Anwar, and D. Brown. Bayesian inverse constrained reinforcement learning. In *NeurIPS 2021 Workshop on Safe and Robust Control of Uncertain Systems*, 2021. (*Ongoing Work*)

S. Malik\*, U. Anwar\*, A. Ahmed, and A. Aghasi. Learning to solve differential equations across initial conditions. In *ICLR 2020 Workshop on Integration of Deep Neural Models and Differential Equations*, 2020. URL [arxiv.org/abs/2003.12159](https://arxiv.org/abs/2003.12159)

## RESEARCH PROJECTS

**Reward Hacking In Learned Reward Models** December 2021 – Current  
Senior Collaborators: Dr. David Kruger  
The project focuses on developing a better understanding of reward hacking in reward model learned from preferences or demonstrations and developing strategies to mitigate such reward hacking behaviours.

**Learning Constraints in the Context of Reinforcement Learning** August 2020 – Current  
Senior Collaborators: Dr. Ali Ahmed & Dr. Daniel Brown  
The project explores the idea of using demonstrations from experts to solve the problem of reward misalignment in reinforcement learning.

## Label Informed Imputation

June 2021 – Current

Senior Collaborators: Dr. Ali Ahmed & Dr. Alireza Aghasi

The project explores improving imputation performance by utilizing the labels present in classification and regression tasks. This can allow accurate imputation in otherwise impossible scenarios.

## Acoustic Source Separation Using Deep Learning

September 2018 – May 2019

Undergraduate Senior Project • Advisor: Dr. Ubaid Ullah Fayyaz • Website: <https://acoustic-source-separation.github.io/>

Implemented Deep Clustering Algorithm (Hershey et al. 2015) in tensorflow and demonstrated its efficacy for the purposes of single channel speech separation from two speaker mixture. As a novel contribution, we showed that this technique could also be used to separate noise from mixtures and used for purposes of speech enhancement.

## SELECTED INDUSTRIAL PROJECTS

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### Explainable Decision Making

Implemented and customized various methods for explaining and interpreting decisions made by machine learning systems. These included, but not limited to, gradient based saliency maps, SHAP and LIME. Further, an empirical study was conducted to understand what method works best under what circumstances. The findings were used to make a plethora of already developed machine learning systems explainable.

### Calibrated Classifier Learning With Imbalanced Data

Lead the development of a machine learning based classifier learned from imbalanced data. By training the classifier under focal loss, a calibrated classifier was achieved (Mukhoti et al. 2020) allowing the use of softmax probabilities as uncertainty estimate.

### Zero Shot Recommendation Engine

Developed a novel propriety method for providing zero shot recommendations to first time customers based only on their partial profile data.

## SELECTED COURSE PROJECTS

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### Paper Discovery System Via Topic Modelling

December 2019

Course: Information Systems

Demonstrated that using Embedded Topic Model (Dieng et al. 2018), unlabelled papers from NeurIPS could be categorized into semantically meaningful topics (e.g. reinforcement learning, neuroscience *etc.*). The topics could be used for downstream tasks such as article recommendation.

### Imitation Learning On Atari Games

June 2020

Course: Deep Learning • Website: <https://uzman-anwar.github.io/projects/2020/06/28/DL-Project/>

Used Generative Adversarial Imitation Learning (Ho et al. 2016) to train a Reinforcement Learning agent from demonstrations of expert behaviour on two Atari games; *Pong* and *Breakout*.

## SKILLS

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• Python (Numpy, Scipy, Matplotlib) • Pytorch • Tensorflow • C • SQL • NoSQL

## AWARDS & HONOURS

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- *Vitalik Buterin PhD Fellowship* by Future Of Life Institute. Award provides complete funding for 5 years.
- *Free Registration Award* at virtual MLSS 2021 Taipei.
- *Graduate Student Fellowship* for being the top student in ITU, Lahore MSDS Program.
- *Merit Scholarship*, ITU, Lahore.
- *Honourable Mention* in International Kangaroo Mathematics Contest, 2009.

## LEADERSHIP ACTIVITIES

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### Managing Director & Co-Founder Spectra Magazine

April 2017 – May 2020

Spectra Magazine is a student-powered online magazine aiming to enhance public understanding of science and shape the narrative of science journalism in Pakistan. Under my leadership, we published more than 215 articles and mentored more than 50 high school and undergraduate students in science writing, editing and design. Read more about us at [www.spectramagazine.org/about](http://www.spectramagazine.org/about).

## MENTORING

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Abdul Rehman & Arslan Malik for Privacy Preserving Recommendation System (Ongoing)

## NON-DEGREE STUDIES

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Eastern European Machine Learning School (July 2021)