

# Haseeb Shah

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## Education

### University of Alberta

M.Sc. COMPUTER SCIENCE (THESIS-BASED)

**Supervisor:** Martha White

**CGPA:** 4.00/4.00

**Teaching Assistant:** Intermediate Machine Learning (CMPUT367),  
Introduction to Computer Science (CMPUT101)

Edmonton, Canada

Jan. 2021 - Dec. 2022 (Planned)

### National University of Sciences and Technology, Islamabad, Pakistan

BACHELORS OF ENGINEERING IN SOFTWARE ENGINEERING

**Supervisor:** Faisal Shafait

**Teaching Assistant:** Data Structures & Algorithms,  
Computer Networks

**Thesis:** An Open-World Extension for Knowledge Graph Completion Models

Islamabad, Pakistan

Sep. 2015 - Jul. 2019

## Research Papers [\[Google Scholar\]](#)

### Online Real-Time Recurrent Learning Using Sparse Connections and Selective Learning

Pre-print [under review]

K. JAVED, **H. SHAH**, R. SUTTON, M. WHITE

[Paper](#) - [Code](#)

C++ | Python | Pytorch | MySQL

We show that by either decomposing the network into independent modules or learning a recurrent network incrementally, we can make RTRL scale linearly with the number of parameters. Unlike prior scalable gradient estimation algorithms, our algorithms do not add noise or bias to the gradient estimate.

### Relation Specific Transformations for Open World Knowledge Graph Completion

COLING-20 [workshop]

**H. SHAH**, J. VILLMOW, A. ULGES

[Paper](#) - [Code](#)

Python | Pytorch

We propose relation-specific transformations for open-world link prediction. Additionally, we propose an approach for clustering relations to reduce the training time and memory footprint.

### An Open-World Extension for Knowledge Graph Completion Models

AAAI-19 [conference - oral]

**H. SHAH**, J. VILLMOW, A. ULGES, U. SCHWANECKE, F. SHAFIT

[Paper](#) - [Code](#)

Python | Pytorch

We propose a novel method that enables any existing link prediction models to predict facts about open-world entities. We demonstrate that this approach is more robust, portable, and performs better than the published state-of-the-art on most datasets. We also introduce a new dataset that overcomes the shortcomings of previous ones.

### Distillation Techniques for Pseudo-rehearsal Based Incremental Learning

Pre-print

**H. SHAH**, K. JAVED, F. SHAFIT

[Paper](#) - [Code](#)

Python | Pytorch

We demonstrate that existing methods to combat catastrophic forgetting using Generative Adversarial Networks are biased and propose an approach to mitigate this bias.

## Public Talks

### Online Feature Decorrelation

Tea Time Talks - AMII - 2022

**H. SHAH**, K. JAVED, R. SUTTON, M. WHITE

[Talk](#) - [Slides](#) - [Code](#)

C++ | MySQL

A significant proportion of the representations learned by the current generate & test methods consist of highly redundant features. This talk demonstrates how the feature ranking criteria utilized by these methods are highly ineffective in addressing this problem. It presents a new approach for decorrelating features in an online setting. I demonstrate that this decorrelator can effectively eliminate redundant features and produce a statistically significant performance improvement in the low-capacity function approximation setting.

## Ongoing Research

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### Dropout Utility Estimator for Generate and Test

In progress

**H. SHAH**, K. JAVED, R. SUTTON, M. WHITE

[Code](#)

C++ | Libtorch | Python | Pytorch | MySQL

We propose dropout utility estimator, a novel and unbiased tester for ranking and evaluating features when constructing standard neural networks incrementally using the generate & test algorithms. We demonstrate its effectiveness by performing a thorough empirical evaluation in the online supervised learning setting.

### Utility Propagation for Generate and Test

In progress

K. JAVED, **H. SHAH**, R. SUTTON, M. WHITE

C++ | MySQL

We propose utility propagation, a novel tester for computing the utilities of features via propagation of utility from output towards the input. We empirically demonstrate that in the linear setting, the proposed tester performs significantly better when compared to the other existing testers.

## Work Experience

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### Learning and Visual Systems Group (LAVIS), Hochschule RheinMain

Wiesbaden, Germany

RESEARCH ASSISTANT

Jan. 2020 - Dec. 2020

- Ported the original code from Tensorflow to Pytorch for semantic code search
- Tested various novel ideas for semantic code search such as tree transformers and abstract syntax trees.
- Proposed and implemented various new ideas for open-world link prediction.

### DCube Tech.

Islamabad, Pakistan

JR. MACHINE LEARNING ENGINEER

May. 2020 - Aug 2020

- Worked on constructing knowledge graphs from the raw documents of legal cases for the Supreme Court of Pakistan.
- Performed some statistical analysis for hospitals in Australia.

### Learning and Visual Systems Group (LAVIS), Hochschule RheinMain

Wiesbaden, Germany

RESEARCH INTERN

Jun. 2018 - Sep. 2018

- Constructed a new dataset for open-world link prediction.
- Implemented the code for open-world link prediction in Pytorch and compared various ideas with the baselines.

### TUKL-NUST Research and Development Center, NUST

Islamabad, Pakistan

RESEARCH ASSISTANT

Jun. 2017 - Dec. 2017

- Improved state of the art in the retrieval of visually similar fashion images and deployed the model to the cloud.
- Worked on mitigating the issue of catastrophic forgetting through the use of Generative Adversarial Networks.

## Reviewing

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2022 **NeurIPS**: Deep Reinforcement Learning Workshop

2021 **ICLR**: Workshop on Self-Supervised Learning and Reinforcement Learning

## Honors & Awards

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2019 **AAAI**: Student travel award for Honolulu, Hawaii

2018 **DAAD**: Fully funded summer research exchange to Germany

2016 **ACM**: 1st place winner of the ACM Design competition