

# Sahil Verma

SECOND YEAR GRADUATE STUDENT · COMPUTER SCIENCE AND ENGINEERING, UNIVERSITY OF WASHINGTON

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## Education

### University of Washington

Seattle, USA

PH.D., COMPUTER SCIENCE AND ENGINEERING

2019 –

- GPA at the end of second year: **3.8/4.0**

### University of Washington

Seattle, USA

MASTERS OF SCIENCE, COMPUTER ENGINEERING

2019 - 2021

- Cumulative Grade Point/ CPI at the end of 4<sup>th</sup> semester: **3.8/4.0**

### IITK (Indian Institute of Technology, Kanpur)

Kanpur, India

BACHELOR OF TECHNOLOGY, ELECTRICAL ENGINEERING

2015 - 2019

- Cumulative Grade Point/ CPI at the end of 8<sup>th</sup> semester: **8.1/10.0**

### DELHI PUBLIC SCHOOL, BOKARO

Bokaro Steel City, India

ICSE

2015, 2013

- 12<sup>th</sup> GRADE | Aggregate **96.0%**
- 10<sup>th</sup> GRADE | Aggregate **95.2%**

## Honors & Awards

2020	<b>Awarded Nvidia Titan RTX GPU</b> , For the Best Paper Award at ML-RSA Workshop	USA
2020	<b>Best Paper Award</b> , ML-RSA @ NeurIPS 2020	USA
2018	<b>Awarded \$1500 by ACM SIGPLAN</b> , Attending PLMW, PLDI	USA
2017	<b>Awarded \$1800 by Google India</b> , Attending FSE	Germany
2015	<b>All India Rank 663</b> , IIT-JEE Advanced	India
2015	<b>0.1 Percentile</b> , IIT-JEE Mains	India
2015	<b>KVPY Fellow   All India Rank 205</b> , IISc Bangalore and Government of India	Bangalore, India
2015	<b>Top 1%</b> , National Standard Examinations in Chemistry	India
2015	<b>Top 1%</b> , National Standard Examinations in Biology	India

## Patents

### Amortized Generation of Sequential Counterfactual Explanations for Black-box Models

Arthur AI, Washington D.C.

PROVISIONAL PATENT

November, 2020

- Filed a provisional patent for our algorithm which is deployed at Arthur AI as their default algorithm for generating counterfactual explanations.

## Publications

### Counterfactual Explanations for Machine Learning: A Review PAPER

Arthur AI

RESEARCH INTERN

Jun 2020 –

- Paper won **best paper award** at ML-RSA workshop, NeurIPS 2020.
- We reviewed about 40 papers in counterfactual explainability and evaluated them on desirable properties of a counterfactual.
- We proposed 15 future research directions in this area.

### Generating Fast Counterfactual Explanations for Black-box Models Using Reinforcement Learning PAPER

Arthur AI

RESEARCH INTERN

Jun 2020 –

- Paper accepted at XAI workshop, AAAI 2021.
- We proposed a novel approach to generate counterfactual explanations which satisfies all desirable properties.
- Our approach is the first to work with black-box model and generate multiple counterfactuals after training once.

## Facets of Fairness in Search and Recommendations PAPER

RESEARCH PROJECT, PROF. CHIRAG SHAH

Univeristy of Washington

Jan 2020 - Jan 2020

- Paper accepted at Bias, ECIR 2020.
- We collected 25 definitions of fairness in ranking from literature
- We categorized the definitions in 5 major recommendations settings.

## Fairness Definitions Explained PAPER

RESEARCH PROJECT, PROF. JULIA RUBIN

Univeristy of British Columbia

August 2017 - Jan 2018

- Paper accepted at Fairware, ICSE 2018.
- We examined the similarities and differences across all definitions in fairness literature.

## NAP: Noise-Based Sensitivity Analysis for Programs PAPER

RESEARCH PROJECT, PROF. MICHAEL CARBIN

Massachusetts Institute of  
Technology

May 2018 - August 2018

- Paper accepted at WAX, 2019.
- We proposed a Noise-based sensitivity analyzer which provides an analysis of each operator and variable in a program.
- We validated NAP's sensitivities by using them to generate mixed-precision approximate programs for a neural network and scientific computing benchmarks.

## Synergistic Debug-Repair for Heap Manipulations PAPER

RESEARCH PROJECT, PROF. SUBHAJIT ROY

IIT Kanpur

May 2016 - Feb 2017

- Paper accepted at ESEC/FSE, 2017.
- Developed interaction of live execution of heap programs and instantaneous memory state graphical representation with the program repair engine.
- Developed features like hot-patching (runtime repair and insertion of newcode).
- Proposed the idea of synergistic debug and repair of programs in the tool named Wolverine.

## Service

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### Reviewed a paper for ACM EAAMO, 2021

PAPER REVIEWED

July 2021

### Student volunteer for top-tier conference, FSE 2017

STUDENT VOLUNTEER

September 2017

## Current Projects

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### Fairness in Machine Learning PREPRINT

RESEARCH PROJECT, PROF. MICHAEL ERNST & PROF. RENE JUST

Univeristy of Washington

Sep 2019 - Present

- Developed a novel algorithm to identify biased datapoints in a dataset.
- Empirically shows that our techniques leads to zero discrimination levels for all benchmarks.
- Empirically shown to beat many popular previous techniques.

### ShapeFlow: Dynamic Shape Interpreter for TensorFlow PREPRINT

RESEARCH PROJECT, PROF. ZHENDONG SU

ETH Zurich

May 2019 - Sep 2019

- Designed an algorithm to detect shape incompatibility bugs in Tensorflow code.
- We beat vanilla Tensorflow by more than 400X in time performance.
- To the best of our knowledge, we are the first to build a tool for bug detection in Tensorflow.

### Bug localization PREPRINT

RESEARCH PROJECT, PROF. SUBHAJIT ROY

IIT Kanpur

May 2018 - May 2019

- Developed a novel algorithm for bug localization for heap programs.
- Integrated the bug localization with program repair in the tool Wolverine.
- Achieved an average speed up of about 225X in repair timings in Wolverine.