

# SAVYA KHOSLA

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## EDUCATION

### University of Illinois Urbana-Champaign

*Ph.D. in Computer Science*

- Advisors: Prof. Derek Hoiem and Prof. Alex Schwing

**Urbana, IL**

*Starting Aug 2024*

### University of Illinois Urbana-Champaign

*MS in Computer Science (CGPA: 4.0 / 4.0)*

- Advisor: Prof. Derek Hoiem

**Urbana, IL**

*Aug 2022 - May 2024*

### Delhi Technological University

*B.Tech. in Computer Engineering (CGPA: 9.40 / 10.0)*

- Advisor: Prof. Anil Singh Parihar
- Awards: Received Commendable Research Award and INR 50,000 for noteworthy contributions to machine learning research

**New Delhi, DL**

*Aug 2017 - July 2021*

## RESEARCH EXPERIENCE

### Adobe

*Research Scientist Intern*

- Working towards building a multimodal encoder

**San Jose, CA**

*May 2024 - Aug 2024*

### University of Illinois Urbana-Champaign

*Research Assistant (Guide: Prof. Derek Hoiem)*

- Worked towards an efficient way of representing videos that can be used for various downstream tasks
- Focussing on the task of spatio-temporal localization of small entities (objects or events) in long videos

**Urbana, IL**

*Jan 2023 - May 2024*

### Allen Institute for AI

*Research Intern*

- Worked on a memory-augmented multimodal encoder for understanding videos ranging from a few seconds to tens of minutes
- Contributed to Unified-IO 2, an instruction-following model that can parse and generate multimodal data and perform 120+ tasks

**Seattle, WA**

*Oct 2022 - Dec 2023*

### National University of Singapore

*Research Assistant (Guide: Prof. Kenji Kawaguchi)*

- Developed robust active learning algorithm for handling heteroskedastic noise, resulting in 10% accuracy boost over baselines
- Demonstrated 15% accuracy improvement in other state-of-the-art algorithms by incorporating a simple self-supervised approach

**Remote**

*Apr 2022 - Aug 2022*

### Mila - Quebec AI Institute

*Research Intern (Guide: Prof. Yoshua Bengio)*

- Demonstrated catastrophic failure of uncertainty-based active learning algorithms by proposing 3 heteroskedastic data distributions
- Proposed adversarial training method that gives 48% reduction in error rate on clean data while preserving adversarial robustness

**Montreal, QC**

*Apr 2021 - Nov 2021*

### Delhi Technological University

*Undergraduate Researcher (Guide: Prof. Anil Singh Parihar)*

- Worked on improving object recognition systems in the presence of adversaries like occlusion and blurriness
- Used image-based representation of malware binaries and leveraged ensembling to develop SOTA model for malware classification

**New Delhi, DL**

*Apr 2021 - Nov 2021*

## INDUSTRY EXPERIENCE

### Google

*Software Engineer*

- Improved Google Search's web ranking infrastructure using deep learning for better multimodal document understanding
- Enhanced precision and recall in salient entity extraction from webpages by transitioning from traditional ML methods to LLMs

**Bangalore, KA**

*Aug 2021 - Mar 2022*

### Google

*Software Engineering Intern*

- Initiated the development of MuRIL, a BERT-based multilingual language model for 17 Indian dialects
- Achieved 10.42% F1 improvement in sentiment analysis and 9.87% in named entity recognition for Indian languages

**Bangalore, KA**

*May 2020 - Jul 2020*

### Cadence Design Systems

*Python Developer Intern*

- Streamlined complex multi-step process of fetching file revisions from 2 version control systems to a single bash command

**Noida, UP**

*Dec 2018 - Jan 2019*

## TEACHING EXPERIENCE

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### CS 445: Computational Photography

Teaching Assistant (Instructor: Prof. Derek Hoiem)

Urbana, IL

Aug 2023 - Dec 2023

### CS 225: Data Structures and Algorithms with C++

Teaching Assistant (Instructor: Prof. Carl Evans and Prof. Brad Solomon)

Urbana, IL

Aug 2022 - May 2023

## PUBLICATIONS & PREPRINTS

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(† denotes alphabetical order, \* denotes equal contribution)

- Unified-IO 2: Scaling Autoregressive Multimodal Models with Vision, Language, Audio, and Action** [Link](#)  
Jiasen Lu\*, Christopher Clark\*, Sangho Lee\*, Zichen Zhang\*, [Savya Khosla](#), Ryan Marten, Derek Hoiem, Aniruddha Kembhavi  
*Conference on Computer Vision and Pattern Recognition (CVPR)*, 2024
- Survey on Memory-Augmented Neural Networks: Cognitive Insights to AI Applications** [Link](#)  
[Savya Khosla](#)\*, Zhen Zhu\*, Yifan He\*  
*arXiv:2312.06141 [cs.AI]*, 2023
- Understanding and Improving Neural Active Learning on Heteroskedastic Distributions** [Link](#)  
[Savya Khosla](#), Chew Kin Whye, Jordan T. Ash, Cyril Zhang, Kenji Kawaguchi, Alex Lamb  
*European Conference on Artificial Intelligence (ECAI)*, 372:1248-1255, 2023
- Interpolated Adversarial Training: Achieving Robust Neural Networks Without Sacrificing Too Much Accuracy** [Link](#)  
Alex Lamb, Vikas Verma, Kenji Kawaguchi, Alexander Matyasko, [Savya Khosla](#), Juho Kannala, Yoshua Bengio  
*Neural Networks*, 154:218–233, 2022
- S-DCNN: Stacked Deep Convolutional Neural Networks for Malware Classification** [Link](#)  
Anil Singh Parihar\*, Shashank Kumar\*, [Savya Khosla](#)\*  
*Multimedia Tools and Applications*, 81:30997–31015, 2022
- Catastrophic Failures of Neural Active Learning on Heteroskedastic Distributions** [Link](#)  
[Savya Khosla](#), Alex Lamb, Jordan Ash, Cyril Zhang, Kenji Kawaguchi  
*NeurIPS 2021 Workshop on Distribution Shifts: Connecting Methods and Applications*, 2021
- AE-DCNN: Autoencoder Enhanced Deep Convolutional Neural Network For Malware Classification** [Link](#)  
Shashank Kumar\*, [Savya Khosla](#)\*, Shivangi Meena, Anil Singh Parihar  
*International Conference on Intelligent Technologies (CONIT)*, 2021
- MuRIL: Multilingual Representations for Indian Languages** [Link](#)  
Simran Khanuja, Diksha Bansal†, Sarvesh Mehtani†, [Savya Khosla](#)†, Atreyee Dey, Balaji Gopalan, Dilip Kumar Margam, Pooja Aggarwal, Rajiv Teja Nagipogu, Shachi Dave, Shruti Gupta, Subhash Chandra Bose Gali, Vish Subramanian, Partha Talukdar  
*arXiv:2103.10730 [cs.CL]*, 2021  
Media Coverage: [Economic Times](#), [Indian Express](#), [Google AI Blog](#)

## PROJECTS

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### Occluded Facial Expression Recognition

- An occluded facial expression recognition framework that leverages non-occluded images as privileged information
- The technique rendered an average gain of 3.90% over the baseline for 3 standard benchmarking datasets
- Technical stack used: Learning Using Privileged Information, Convolutional Neural Networks, TensorFlow

[Link](#)

### Image Captioning

- A CNN and RNN-based model for generating a textual description of an image based on the objects and actions in it
- Technical stack used: Convolutional Neural Networks, Recurrent Neural Networks, Beam Search Algorithm, Keras, Python

[Link](#)

### Text to Image

- A conditional GAN for synthesizing 256x256 dimensional photo-realistic images given textual descriptions
- Technical stack used: Conditional Generative Adversarial Networks (used the StackGAN architecture), TensorFlow, Python

[Link](#)

### AgroAI

- A group project to build an unbiased platform for farmers to predict the quality and price of the crops
- Presented this project in Google's Explore ML Bootcamp
- Technical stack used: React, NodeJS, Mongo, Flask (Python)

[Link](#)

## SKILLS

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**Languages:** Python, C++, C, JavaScript, Bash

**Frameworks:** PyTorch, TensorFlow, JAX, Flax, OpenCV, GradIO

**Tools:** Git, Visual Studio, Google Cloud Platform

**Others:** Data Structures, Algorithms, Machine Learning, Computer Vision, NLP, Multimodal Learning, Data Handling

## COURSES & CERTIFICATIONS

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### Graduate Courses

- CS 598: Vision by Prof. Svetlana Lazebnik
- CS 588: Autonomous Vehicle System Engineering by Prof. David Alexander Forsyth
- CS 543: Computer Vision by Prof. Svetlana Lazebnik
- CS 445: Computational Photography by Prof. Derek Hoiem
- CS 444: Deep Learning for Computer Vision by Prof. Svetlana Lazebnik
- CS 410: Text Information System by Prof. ChengXiang Zhai

### Relevant Undergraduate Courses

- CO 201: Data Structures
- CO 202: Database Management System
- CO 203: Object-Oriented Programming
- CO 206: Algorithm Design and Analysis
- CO 304: Artificial Intelligence
- CO 404: Data Warehousing and Data Mining
- CO 407: Distributed Systems
- CO 414: Big Data Analytics
- CO 423: Swarm and Evolutionary Computing
- IT 420: Computer Vision

### Online Courses & Certifications

- Deep Learning Specialization by Andrew Ng
  - Neural Networks and Deep Learning
  - Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization
  - Structuring Machine Learning Projects
  - Convolutional Neural Networks
  - Sequence Models
- Machine Learning by Stanford University (CS229 Lectures by Andrew Ng)
- Introduction to TensorFlow for Artificial Intelligence, Machine Learning, and Deep Learning by deeplearning.ai
- C++ Bootcamp by Coding Blocks
- Competitive Programming Bootcamp by Coding Blocks
- Machine Learning Master Course by Coding Blocks