SAVYA KHOSLA

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EDUCATION

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN, MS in Computer Science **Aug 2022 - May 2024 (Expected)**

- CGPA: 4.0 / 4.0
- Thesis advisor: Professor Derek Hoiem

DELHI TECHNOLOGICAL UNIVERSITY, B.Tech. in Computer Engineering **Aug 2017 - July 2021**

- CGPA: 9.40 / 10.0
- Advised by Professor Anil Singh Parihar
- Recipient of Research Excellence Award and INR 50,000 for noteworthy contributions to the field of machine learning

RESEARCH EXPERIENCE

ALLEN INSTITUTE OF AI, Research Intern on PRIOR **May 2023 - Present**

- Working on multimodal video representation learning with special focus on long videos
- Contributing to the development of Unified-IO-2, a unified model for performing a wide range of AI tasks

ALLEN INSTITUTE OF AI, Research Collaborator **Oct 2022 - May 2023**

- Contributed to Unified-IO-2, a large-scale model for tasks involving image, text, audio, video, and action modalities
- Implemented data curation and processing pipelines for various 3D, video, audio, speech, and image manipulation tasks

NATIONAL UNIVERSITY OF SINGAPORE, Research Assistant **Apr 2022 - Aug 2022**

- Advised by Professor Kenji Kawaguchi and Alex Lamb
- Spearheaded the development of an active learning algorithm that utilizes EMA divergence to select informative data points
- Explored the domains of adversarial learning, epistemic neural networks, and physics-informed neural networks

MILA - QUEBEC AI INSTITUTE, Visiting Research Intern **Apr 2021 - Nov 2021**

- Advised by Professor Yoshua Bengio
- Active Learning:
  - Proposed 3 heteroskedastic data distributions to demonstrate catastrophic failure of uncertainty-based active learning algorithms
  - Investigated the performance of 5 state-of-the-art active learning techniques under the presence of heteroskedasticity
- Adversarial Learning:
  - Worked on an algorithm that improved adversarial robustness of deep networks without sacrificing much accuracy on clean data
  - Implemented adversarial attacks (FGSM, PGD, Carlini & Wagner) and tested the robustness of adversarial training baselines

DELHI TECHNOLOGICAL UNIVERSITY, Undergraduate Researcher **Apr 2021 - Nov 2021**

- Advised by Professor Anil Singh Parihar
- Object Recognition:
  - Worked on improving object recognition systems in the presence of adversaries like occlusion and blurriness
  - Employed the paradigm of learning using privileged information to improve robustness against adversaries
- Malware Classification:
  - Developed deep learning models for malware detection and classification
  - Leveraged ensembling and self-supervised learning to propose convolution-based SOTA malware classification model

INDUSTRY EXPERIENCE

GOOGLE, Software Engineer **Aug 2021 - Mar 2022**

- Worked in the Google Search team on improving the search infrastructure for web ranking
- Developed machine learning and deep learning models for improving multimodal document understanding

GOOGLE, Software Engineering Intern **May 2020 - Jul 2020**

- Initiated the development of MuRIL - a BERT-based multilingual language model for Indian languages
- Reported an average improvement of 9.5% and 27.8% over the baseline for the 2 datasets in consideration
- Experimented with 17 Indian dialects and performed several ablation experiments in zero-shot and few-shot settings

CADENCE DESIGN SYSTEMS, Python Developer Intern **Dec 2018 - Jan 2019**

- Developed a unified functionality interface for two version control systems - Perforce and ClearCase
- Wrote a script for fetching revisions of a file from the two version-control systems using a single shell command

TEACHING EXPERIENCE

CS 225: DATA STRUCTURES & ALGORITHMS WITH C++, Teaching Assistant **Aug 2022 - May 2023**

- Fall 2022 and Spring 2023: Co-instructed by Professor Carl Evans and Professor Brad Solomon
- Taught a lab of 150+ students in Fall 2022 and 80+ students in Spring 2023
- Additional responsibilities encompassed conducting office hours, grading projects, and mentoring students in their final projects

PUBLICATIONS

1. Savya Khosla, Chew Kin Whye, Jordan T. Ash, Cyril Zhang, Kenji Kawaguchi, and Alex Lamb. Neural active learning on heteroskedastic distributions, In *26th European Conference on Artificial Intelligence (ECAI)*, 2023.
2. Savya Khosla, Alex Lamb, Jordan Ash, Cyril Zhang, and Kenji Kawaguchi. Catastrophic failures of neural active learning on heteroskedastic distributions. In *NeurIPS 2021 Workshop on Distribution Shifts: Connecting Methods and Applications*, 2021.
3. Alex Lamb, Vikas Verma, Kenji Kawaguchi, Alexander Matyasko, Savya Khosla, Juho Kannala, and Yoshua Bengio. Interpolated adversarial training: Achieving robust neural networks without sacrificing too much accuracy. *Neural Networks*, 154:218–233, 2022.
4. Anil Singh Parihar, Shashank Kumar, and Savya Khosla. S-DCNN: stacked deep convolutional neural networks for malware classification. *Multimedia Tools and Applications*, 81:30997–31015, 2022.
5. Shashank Kumar, Savya Khosla, Shivangi Meena, Anil Singh Parihar. AE-DCNN: Autoencoder Enhanced Deep Convolutional Neural Network For Malware Classification. In *2021 International Conference on Intelligent Technologies (CONIT)*, 2021.
6. 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, and Partha Talukdar. MuRIL: Multilingual Representations for Indian Languages. *arXiv*, 2021.

PROJECTS

OCCLUDED FACIAL EXPRESSION RECOGNITION **[Link]**

- A framework for recognizing facial expressions in occluded images using 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

IMAGE CAPTIONING **[Link]**

- 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

TEXT TO IMAGE **[Link]**

- A generative model for synthesizing photo-realistic images given textual descriptions using Conditional GANs
- Technical stack used: Conditional Generative Adversarial Networks (used the StackGAN architecture), TensorFlow, Python

AGROAI **[Link]**

- 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)

COURSES & CERTIFICATIONS

GRADUATE COURSES

- CS 588: Autonomous Vehicle System Engineering by Professor David Alexander Forsyth
- CS 543: Computer Vision by Professor Svetlana Lazebnik
- CS 445: Computational Photography by Professor Derek Hoiem
- CS 444: Deep Learning for Computer Vision by Professor Svetlana Lazebnik

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 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

SKILLS

LANGUAGES & FRAMEWORKS

• C • C++ • Python • TensorFlow • Keras • PyTorch • JAX • Flax • Git • OpenCV • Scikit-Learn

OTHERS

• Machine Learning • Multimodal Neural Learning • Active Learning • Adversarial Learning • Competitive Programming