Akkapaka Saikiran

MSc CS Student, ETH Zürich

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Education

ETH Zürich (Eidgenössische Technische Hochschule) *2022–2024*
Computer Science MSc, *majoring* in Visual and Interactive Computing *CPI: 5.39 / 6.00*

Indian Institute of Technology Bombay *2018–2022*
B.Tech. with *Honours* in Computer Science and Engineering *CPI: 9.15 / 10.00*

Research Interests

Machine Learning, Computer Vision and Graphics, Interpretable AI, Quantum Computing

Internships and Research Experience

Diffusion Models for Anonymization *Winter 2023*
Egonym AG *Research Engineer Internship*
- Working on **photorealistic anonymization** that can safeguard **visual privacy** in a data-driven world
- Benchmarking the literature on the generation and editing of high-quality faces
- Building a pipeline based on **diffusion models** for high-fidelity and controllable anonymization

Self-supervised Learning of Multimodal Representations | [Report] *Autumn 2021*
Prof. Preethi Jyothi and Prof. Ganesh Ramakrishnan, IITB *Bachelor's Thesis*
- Explored self-supervised pre-training strategies to learn joint audio-video-text representations
- Experimented with **contrastive** losses and extended them to three modalities using mixup
- Performed controlled studies on a tri-modal **synthetic dataset** to compare various techniques

Bing Ads Classification using Multimodal Learning | [Presentation] *Summer 2021*
Microsoft India R&D *Data Science Internship*
- Worked on improving Microsoft's Bing Ads classification module using **vision-language** models
- Experimented with recent models that combine word embeddings and object detection features
- Designed & finetuned a multimodal pipeline and benchmarked it against in-house baselines

Sketch-based Modeling | [Report] *Spring 2021*
Prof. Parag Chaudhuri, IITB *Research Project*
- Surveyed various approaches of generating **3D models** from user-drawn 2D or 3D sketches
- Worked on devising a novel system to generate smoothly-connected **Bézier patches** to fit sketches
- Created a dataset of **parametric surfaces** to facilitate learning of patch-stroke associations

Analysis of Vector Addition Systems | [Report] *Summer 2020*
Prof. Alain Finkel, ENS Paris-Saclay *Research Internship*
- Studied Vector Addition Systems by building an understanding of **Karp-Miller Graphs**
- Worked on the non-trivial problem of devising an algorithm to construct the **semi-linear bases** for projections of reachability sets of Vector Addition Systems, rewriting definitions and **formal proofs**

Selected Academic Projects

Fooling Neural Networks | *Fairness and Explainability in ML* | [Code] *Autumn 2021*
- Implemented **adversarial attacks** on neural networks by optimizing on images to maximize the likelihood of false predictions, following Szegedy et al.'s *Intriguing properties of neural networks*
- Optimized using gradient descent instead of L-BFGS to study incremental properties of attacks
- Performed analysis on the **transferability** of these attacks and the **ease of fooling** across classes

FMX Modeling and Animation | *Computer Graphics* | [Code] [Movie] *Autumn 2020*
- Modeled a bike, a rider, and a track in **OpenGL** and rendered it using shading and texturing
- Animated the above scene to create a **short movie** of an FMX rider performing stunts

Image Segmentation | *Medical Image Computing* | [Code] *Spring 2020*
- Segmented **medical images** (skin cancer, retinal vessels) using deep neural networks
- Built on top of the **U-Net architecture**, augmenting it with **residual connections** and recurrence

Hospital Management System | *Database Systems* | [Code] *Spring 2021*
- Developed a patient-centric hospital management system as a Flask **web app** which provides functionalities such as book/cancel appointments, buy medicines, pay bills, add prescription, etc.
- Added **secure access** to patients' details & history and an interface to view disease analytics

Foreshadow (L1TF) Attack | *Computer Architecture* | [Report] *Autumn 2020*
- Explored and imitated Foreshadow, a **speculative execution attack** on Intel's processors which allows attackers to steal sensitive information from personal computers or third-party clouds
- Presented a proof-of-concept by simulating SGX's **abort page semantics** to showcase an attack

Bandits and MDPs | *Foundations of Intelligent and Learning Agents* | [Code, Code] *Autumn 2020*
- Compared many algorithms for sampling the arms of **multi-armed bandits**, devising a variation of **Thompson Sampling** which outperforms other methods given a permutation of the true means
- Implemented **planning algorithms** for Markov Decision Processes and used them to solve mazes

Selected Coursework

Visual Computing	Shape Modeling and Geometry Processing, Math Foundations of CG and CV, Advanced Methods in CG, Computer Graphics, Computer Vision
Machine Learning	Reliable and Trustworthy AI, Fair and Explainable ML, Intelligent and Learning Agents, Medical Image Computing, Introduction to Machine Learning
Miscellaneous	Quantum Information Processing, Big Data, Database Systems, Operating Systems, Computer Architecture, Cloud Computing, Compilers

Technical Skills

Programming	C/C++, Python, MATLAB, HTML/CSS, Javascript, Java
Tools & Libraries	PyTorch, TensorFlow, GDB, Git, OpenGL, PostgreSQL, Spark, NodeJS

Positions of Responsibility

- **Teaching Assistant**
  - Logic for CS (CS228) | Prof. S. Krishna, Prof. Ashutosh Gupta *Jan 2022 - Apr 2022*
  - Operating Systems (CS333, CS347) | Prof. Mythili Vutukuru *Aug 2021 - Dec 2021*
  - Calculus (MA109) | Prof. Ravi Raghunathan *Nov 2020 - Jan 2020*
  - Logic for CS (CS228M) | Prof. S. Krishna *Jul 2020 - Dec 2020*
  - English Language Improvement Training (ELIT) | SMP, IITB *Summer 2019, Spring 2020*
  - Took weekly tutorial sessions, prepared questions for assignments, and graded students
- **Winter in Data Science Mentor** | *Analytics Club, IITB* *Winter 2021*
  Guided juniors towards understanding, implementing, and documenting **neural networks visualization tools** like saliency map approaches, occlusion sensitivity maps, and **GradCAM**

Academic Achievements

- Secured All India Rank 304 in IIT JEE Mains 2018 *2018*
- Secured All India Rank 665 in IIT JEE Advanced 2018 *2018*
- Awarded the Kishore Vaigyanik Protsahan Yojana (KVPY) fellowship (twice) *2016 & 2017*
- Received the prestigious National Talent Search Examination (NTSE) scholarship *2016*

Extra-curricular Activities

- Represented IIT Bombay at the 34th **Inter IIT Aquatics Meet**, held at IIT Guwahati *2018*
- Swam continuously for **12 hours** covering **17** kms at **Swimathon**, IITB's swim marathon *2019*
- Attended **Vijyoshi**, an annual national science camp, as a KVPY scholar *2017*
- Bagged trophies in **mridangam** competitions at many music societies in Mumbai *2016-2018*
- Represented Mumbai in swimming at the **national level** of the KVS Sports Meets *2013-2015*