Krishn V. Kher

Ph.D Student

zetakrh@gmail.com (+91) 8297640309 Hyderabad, India
Website KrishnKher 0009-0000-9391-292X

PUBLICATIONS

[1] Journal Articles

- N. Balachandran, S. Bhattacharya, **K. Kher**, R. Mathew, and B. Sankarnarayanan, "On hierarchically closed fractional intersecting families," *The Electronic Journal of Combinatorics*, vol. 30, no. 4, Dec. 2023. DOI: 10.37236/11651.

Conference Proceedings

- **K. V. Kher**, I. Joshi, B. C. Mukkavalli, L. Zhang, and M. V. P. Rao, "Automatic diagnosis of quantum software bug fix motifs," in *The 35th International Conference on Software Engineering and Knowledge Engineering, SEKE 2023, KSIR Virtual Conference Center, USA, July 1-10, 2023*, 2023. DOI: 10.18293/SEKE2023-196.

[2] Ongoing

Constant-sized Compressible Memory in Energy Space

Advisor: Prof. Vineeth N. Balasubramainan

- Exploring the limits of associative memories as differentiable, stochastic content storage-retrieval systems.
- Proposing a differentiable search strategy in appropriately defined energy spaces.
- Theory to be tested over Hopfield Nets, Predictive Coding Networks, etc.
- Potential application: high-dimensional objects like images can be efficiently operated with when augmenting foundational models with external memory.

Leveraging Optimal Transport for Generative Causal Inference

Advisor: Prof. Sakethanath Jagarlapudi

- Expounding OT-based methods as an efficient tool to sample from counterfactual distributions, given observed data.
- This generation is amazingly realistic even for HD-data like images and seems to emphasize the strict notion of Pearlian causality, as compared to legacy works.
- This also enables us to perform counterfactual generation under translations – a novel setting.
- Also exploring its connections to other utilities like fairness, domain adaptation, etc.

Causal Generative Modelling with Multimodal LLM Feedback

Advisor: Prof. Vineeth N. Balasubramainan

- Proposing a novel solution to utilize LLM feedback, rich in semantic information to guide causal generation.
- Particularly useful when human-labeled/annotated data is scarce.

Network Function Virtualization: Effects of Introducing Parallelism in Service Function Chains

Advisors: Prof. BheemArjuna Reddy Tamma, Prof. C. Siva Ram Murthy

- Literature survey of several state-of-the-art solutions for reducing latency using parallelism while deploying SFCs.
- Proposing a solution for applying parallelism in multicast networks to reduce latency & packet deposition with theoretically sound backing – a novel use case.
- Potentially suited for 5G/6G URLLC applications.

ACADEMIC COMPETENCE

Institute Silver Medallist, IIT Hyderabad
For securing the highest CGPA for B.Tech in the department (1/30). 2023

Prime Minister's Research Fellow
Via direct entry channel. 2023 - 2028

Amrita InCTF Nationals Team Rank 54
Cybersecurity contest. 2022

CodeForces max rank: Expert
Max rating: **1789**. 2022

[1] First authorship.
[2] Exact titles omitted to preserve anonymity for submissions.

EDUCATION

Ph.D @ Department of CSE

Indian Institute of Technology, Hyderabad

Jan. 2023 – present CGPA: 9.0/10

Guide: Prof. Vineeth N. Balasubramanian
RI/Thesis title: On the Role of Memory, Logic & Computation in Learning[1]

B. Tech in CSE & ES

Indian Institute of Technology, Hyderabad

Aug. 2019-May 2023 CGPA: 9.5/10

- Relevant coursework.

WORK EXPERIENCE

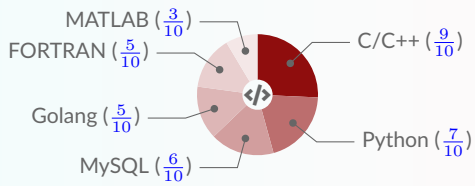
Software Engineering Intern

Microsoft

May'22 – July'22 Hyderabad, India [Online]

- Worked with the **Edge PDF Accessibility** Team ( ) to improve Scanned PDF Accessibility – specifically *Optical Character Recognition* (**OCR**) feature in the Edge PDF Reader, which would help users copy/find & select text in scanned PDFs.
- Worked with a number of tools and the Chromium open source browser software.
- Migrated existing code to the latest PDF-related stacks & brought it to a near-ready state for an official feature rollout. Grateful to have received a **PPO**.

TECHNICAL SKILLS



: Anaconda CSS/HTML Git LaTeX QisKit

COMMUNITY CONNECT

Trainings

Online

- **Amazon AI-ML Summer School**, selected for & attended the same. July 2021
- **Nvidia Deep Learning** training program (partial).
- Ethical Hacking @ **Udemy** (ongoing).
- Attended CoLT & FSTTCS. 2023

Offered

O(n/ff)line

- **ICML** sub-reviewer for 1× paper. 2024 - …
- **Institute** TAship for Introduction to Programming [Nov' 20 - Jan' 21], [Aug'23 - Dec'23]. Taught, clarified doubts, graded & designed exams.
- **PMRF** TAship, held NPTEL live sessions for the MOO -Cs, DL4CV [Aug'23 - Oct'23], ToC [Jan'24 - Apr'24].
- **NSS** member, contributed to CID, etc. 20 (19 - 23)
- **Infero**/**Kludge** *Sci-Tech* core; conducted sessions & prepared (algo./CTF) challenges. 20 (21 - 22)

[1] Tentative

ICPC Regionals Team Rank 23
Asia 2020, Kanpur-Mathura. 2021

Google Kickstart Rank 234
(Round G) Out of 9,500+ participants. 2021

Academic Excellence Award, IIT Hyderabad
Awarded to a department topper for the resp. academic years. 2019, 2021

JEE Advanced Rank 1593
Out of ∼ 1.6 lakh participants. 2019

JEE Mains Rank 2183
Out of ∼ 8.8 lakh participants. 2019

Qualified for Indian National Mathematical Olympiad
Olympiad organized officially by India (HBCSE). 2017 - 2018

SELECTED PROJECTS

Pothole Detection
IIT Hyderabad

- Developed a solution to detect potholes on roads for automobiles.
- The idea was based on analyzing road images obtained by laser beam and detecting any gaps/fissures in the image (used MATLAB here).

Compiler Design
IIT Hyderabad

- Built a compiler for a programming language design that we had proposed (called Michelin) up to the Semantic Analysis stage (mainly using OCaml).

DDDoS
IIT Hyderabad

- Explored some modern methods of preventing DDoS attacks in SDN (used Ryu).

Built a database!
IIT Hyderabad

- Designed and built a relational database for a scientific research paper inquiry website (using one of aminer.org's datasets) and retrieved information efficiently using *PostgreSQL* queries.

REFEREES

Available upon request.

SELECTED PROJECTS

Our-UDP-FTP
IIT Hyderabad

- Built a miniature tool implementing File-Transfer protocol over the User Datagram protocol.

Image Captioning
IIT Hyderabad

- Studied some existing Deep Learning-based architectures for the Image Captioning problem and also tested a novel architecture proposed by us for the same.

QEC
IIT Hyderabad

- Explored the efficiency and accuracy boost observed when using a variable allocation strategy for qubits (in a quantum noise model) for Grover's Search algorithm, as an attempt towards quantum error correction.
- Received an *offer* to join a stealth-mode start-up working on software for error correction in quantum communication channels.

AAMS
IIT Hyderabad

- Member of a small team that developed an **Academic Admissions Management System** software for IIT-H.
- Initial development to facilitate easy handling of M. Tech admissions via the CoAP portal at IIT Hyderabad.