Shyamgopal Karthik

(+49) 15227009343 | shyamgopalkart@gmail.com
Google Scholar| Website | Github |

EDUCATION

International Max Planck Research School for Intelligent Systems (IMPRS-IS) *Oct 2021-April 2025 (Expected)*
Ph.D in Computer Science

International Institute of Information Technology, Hyderabad *2016-2021*
B.Tech. (Honors) + M.S. by Research in Computer Science and Engineering *Cumulative GPA: 8.44/10* | *MS Thesis*

WORK EXPERIENCE

Research Intern — Snap Research April '24 - August '24
Technologies: Python, Computer Vision, Large Language Models Generative Models, Image Generation, RLHF

- Worked with Dr. Jian Ren and Dr. Anil Kag in the Creative Vision group at Snap Research.
- Improved text-to-image models (e.g. SDXL, SD3) by over 10% on quantitative benchmarks using Direct Preference Optimization.
- Work on novel preference objective and optimization strategy led to a publication and patent filing.

PhD Candidate — University of Tübingen Oct '21 - Present
Technologies: Python, Deep Learning, Computer Vision, Optimization Methods, Semi-Supervised Learning

- Work with Prof. Zeynep Akata and Dr. Massimiliano Mancini in the Explainable Machine Learning group.
- Work focuses on enhancing compositionality of vision-language models in various multimodal settings.

Research Intern — NAVER LABS Europe Jan '21 - Jul '21
Technologies: Python, Deep Learning, Computer Vision, Optimization Methods, Semi-Supervised Learning

- Worked with Dr. Boris Chidlovskii and Dr. Jerome Revaud in the 3D vision group at NAVER LABS Europe.
- Work on self-supervised methods for learning from noisy labels in class-imbalanced settings led to a publication and a patent filing.

Research Assistant — Center for Visual Information Technology, IIIT-Hyderabad May '18 - Dec '20
Technologies: Deep Learning, Computer Vision, Optimization Methods, Python, Matlab, PyTorch, OpenCV, ffmpeg

- Worked broadly on developing various pipelines related to accurately tracking objects in videos.
- Worked on on Hierarchy-Aware Classification leading to a publication at ICLR 2021.
- Proposed an unsupervised algorithm for person re-identification in videos and used it to obtain state-of-the-art results on the popular Multi-Object Tracking benchmarks.
- Developed novel analyses to highlight and understand the failure cases and limitations of various single-object tracking models.

Software Development Intern — Hewlett Packard Enterprise May '17 - Jul '17
Technologies: node.js, Angular.js, Bash Scripting

- Worked on an internal tool to monitor and test security vulnerabilities on servers.

PUBLICATIONS

Scalable Ranked Preference Optimization for Text-to-Image Generation *Arxiv*
Shyamgopal Karthik, Huseyin Coskun, Zeynep Akata, Sergey Tulyakov, Jian Ren, Anil Kag *Paper*

ReNO: Enhancing One-step Text-to-Image Models through Reward-based Noise Optimization *NeurIPS 2024*
Luca Eyring*, *Shyamgopal Karthik**, Karsten Roth, Alexey Dosovitskiy, Zeynep Akata *Paper* | *Code*

EgoCVR: An Egocentric Benchmark for Fine-Grained Composed Video Retrieval *ECCV 2024*
Thomas Hummel*, *Shyamgopal Karthik**, Mariana-Iuliana Georgescu, Zeynep Akata *Paper* | *Code*

Vision-by-Language for Training-Free Compositional Image Retrieval *ICLR 2024*
*Shyamgopal Karthik**, Karsten Roth*, Massimiliano Mancini, Zeynep Akata *Paper* | *Code*

If at First You Don't Succeed, Try, Try Again:
Faithful Diffusion-based Text-to-Image Generation by Selection *ICCV-W 2023*
*Shyamgopal Karthik**, Karsten Roth*, Massimiliano Mancini, Zeynep Akata *Paper* | *Code*

Test-Time Amendment with a Coarse Classifier for Fine-Grained Classification *NeurIPS 2023*
Kanishk Jain, *Shyamgopal Karthik*, Vineet Gandhi *Paper* | *Code*

BayesCap: Bayesian Identity Cap for Calibrated Uncertainty in Frozen Neural Networks *ECCV 2022*
Uddeshya Upadhyay*, *Shyamgopal Karthik**, Yanbei Chen, Massimiliano Mancini, Zeynep Akata *Paper* | *Code*

KG-SP: Knowledge Guidied Simple Primitives for Open World Compositional Zero-Shot Learning *CVPR 2022*
Shyamgopal Karthik, Massimiliano Mancini, Zeynep Akata *Paper* | *Code*

Revisiting Visual Product for Compositional Zero-Shot Learning *NeurIPS-W 2021*
Shyamgopal Karthik, Massimiliano Mancini, Zeynep Akata *Paper* | *Code*

No Cost Likelihood Manipulation at Test Time for Making Better Mistakes in Deep Networks *ICLR 2021*
Shyamgopal Karthik, Ameya Prabhu, Puneet K. Dokania, Vineet Gandhi *Paper* | *Code*

Learning from Long-Tailed Data with Noisy Labels *ICCV-W 2021*
Shyamgopal Karthik, Jerome Revaud, Boris Chidlovskii *Paper* |*Slides*

Simple Unsupervised Multi-Object Tracking *Arxiv*
Shyamgopal Karthik, Ameya Prabhu, Vineet Gandhi *Paper*

ViNet: Pushing the limits of Visual Modality for Audio-Visual Saliency Prediction *IROS 2021*
Samyak Jain, Pradeep Yarlagadda, Shreyank Jyoti, *Shyamgopal Karthik* , Ramanathan Subramanian, Vineet Gandhi *Paper* | *Code*

Exploring 3 R's of Long-term Tracking: Re-detection, Recovery and Reliability *WACV 2020*
Shyamgopal Karthik, Abhinav Moudgil, Vineet Gandhi *Paper* | *Slides*

RELEVANT TEACHING EXPERIENCE

Statistical Methods in AI — Teaching Assistant, IIIT-Hyderabad Jan '20 - May '20
· Handled assignment setting and evaluations for the course.

Computer Programming — Teaching Assistant, IIIT-Hyderabad Aug '19 - Dec '19
· Handled assignment and examination evaluations, and examination invigilation for the course.
· Took weekly labs explaining various concepts of C programming language and clarifying doubts.

Discrete Structures — Teaching Assistant, IIIT-Hyderabad Aug '18 - Dec '18
· Handled regular tutorial sessions, problem settings, and examination evaluations for the course.

MACHINE LEARNING AND COMPUTER VISION PROJECTS

Min-Cost Flow Networks for Multi-Object Tracking *github*
Technologies: Python, networkx, tensorflow
· Implemented a min cost flow network model within the tracking-by-detection paradigm to track pedestrians in a video.
· Achieved state of the art results after extensive hyperparameter searching using parallelized grid searching.

Pegasos SVM Solver *github*
Technologies: Python, Optimization Methods,C++, MPI
· Implemented a solver to train a Support Vector Machine for a classification task from scratch.
· Extended the implementation to support kernelized SVMs as well as multi-class classification.
· Parallelized the implementation on MPI achieving significant speedups.

GrabCut: Graph Cut Based Image Segmentation *github*
Technologies: Python,networkx, scikit-learn
· Implemented graph cuts for interactive image segmentation using Gaussian Mixture Models to estimate probabilities.
· Used Gaussian Mixture Models to model the foreground and background probabilities

TECHNICAL STRENGTHS

Languages	C/C++, Python, MATLAB, Java, HTML, CSS, Javascript
ML/DL/CV	PyTorch, Keras, OpenCV, scikit-learn, ffmpeg
Software, Libraries & Tools	Git, LaTeX, OpenMP, MPI, SQL, Bash

RELEVANT COURSES COMPLETED

Core Science: Distributed Systems, Database Systems, Operating Systems, Introduction to Parallel and Scientific Computing, Computer Graphics, Computer Networks, Algorithms Analysis and Design, Data Structures, Linux Tools and Scripting.

ML/AI Courses: Statistical Methods in AI, Computer Vision, Artificial Intelligence, Optimization Methods, Mobile Robotics, Machine Learning for Natural Science.

Other Courses: Digital Image Processing, Digital Signal Analysis, Linear Algebra, Probability Theory, Discrete Mathematics.

PAST ACHIEVEMENTS, AWARDS AND SERVICE

Served as a reviewer for CVPR 2022-24, ECCV 2022-24, ICCV 2023, NeurIPS 2023-24, WACV 2020-23 BMVC 2020-23

Recognized as **Outstanding Reviewer** at BMVC 2021, CVPR 2022 and, ECCV 2022

Won the essay competition at International Computer Vision Summer School 2023

Qualified for ACM-ICPC Asia Amritapuri Onsite Regionals in 2019.

Honourable Mention in Indian National Olympiad for Informatics and participated in Asia Pacific Informatics Olympiad (2016).