Shyamgopal Karthik

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| Website | Github |

EDUCATION

International Max Planck Research School for Intelligent Systems (IMPRS-IS) *2021-Present*
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 — 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 leading 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.

PUBLICATIONS

KG-SP: Knowledge Guidied Simple Primitives for Open World Compositional Zero-Shot Learning *CVPR 2022*
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*

Bring Generalization to Deep Multi-View Detection *Arxiv*
Jeet Vora, Swetanjal Dutta, Kanishk Jain, *Shyamgopal Karthik*, 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.

Shadow Removal in Images *github*

Technologies: Python, scikit-image

- Image processing module to perform shadow detection and removal of three forms: documents-only, interactive shadow detection, and automatic shadow removal.

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

Panorama Stitching *github*

Technologies: Computer Vision, Digital Image Processing

- Implemented a pipeline to obtain feature matching between various input images to obtain homography estimations between them.
- Using these, we stitch together all other images around a fixed image to get the panorama and then use image blending techniques to get rid of the image boundaries.

PROGRAMMING PROJECTS

Linux Shell *github*

Technologies: Operating Systems, Unix System Calls, C

- Built a Bash like shell environment which interacts with the kernel using appropriate system calls.
- This is used to perform various user-defined and inbuilt tasks based on predefined commands.
- The shell also supports piping, input-output redirection, and foreground-background processes.

Distributed Solvers *github*

Technologies: Java, RMI, MPI

- Implemented Gaussian Elimination and Conjugate Gradient based solvers in MPI.
- Implemented Shortest Path Computation in a Graph using Java RMI.

TECHNICAL STRENGTHS

Languages	C/C++, Python, MATLAB, Java, HTML, CSS, Javascript
ML/DL/CV	PyTorch, Keras, OpenCV, scikit-learn, scikit-image, 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.

WORKSHOPS, CONFERENCES AND SUMMER SCHOOLS ATTENDED

Presented my work on visual object tracking at WACV 2020 in Aspen, Colorado and R&DShowcase, IIIT-H

Completed the 2 week long CVIT summer schools on Advances in Computer Vision and Machine Learning.

Attended Google Research India's 3 day long AI Summer School.

Attended ECCV 2020, NeurIPS 2020 and ICLR 2021 virtual conferences.

PAST ACHIEVEMENTS, AWARDS AND SERVICE

Served as a reviewer for WACV 2020,WACV 2022, BMVC 2020, BMVC 2021, CVPR 2022, ECCV 2022 and, CoLLAS 2022.

Recognized as Outstanding Reviewer at CVPR 2022 and BMVC 2021.

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

Included in Deans Merit List IIIT-Hyderabad '19 for academic excellence.

Received the Huawei Scholarship of Excellence for the year 2020-21.

Honourable Mention in Indian National Olympiad for Informatics(2016).