

Tonmoy Saikia

COMPUTER VISION RESEARCHER · PHD

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“Helping machines understand the world better.”

Summary

A computer vision researcher with diverse experience including stereo-depth estimation, object detection, and AutoML techniques. Interested in building scalable and robust vision models and always open to exploring new challenging problems. Enjoys writing (and reading) clean code.

Experience

Torc Robotics

Remote, Germany

SENIOR MACHINE LEARNING ENGINEER

June 2023 - Present

- Designed and developed a real-time monocular 3D object detector, with long-range detection capabilities and robustness across camera views. Demonstrated significant improvement in runtime-accuracy trade-offs. Handled model conversion to TensorRT for deployment on embedded hardware. Regularly helped team members in performance debugging, model design, and improving team processes.
- Developed performance metrics based on system requirements and created pipelines for consistent performance reporting of trained and deployment models. Created model analysis notebooks to understand performance gaps better.
- Collaborated in a research project for using stable video diffusion with ControlNet to generate training data for object detection.

Algolux

Remote, Germany

COMPUTER VISION RESEARCHER

Oct 2022 - May 2023

- Developed a prototype for a class-agnostic object detector with detection capability over 300m range (even with small objects).
- Designed custom training objectives that reduced false positive rates by 20 %.
- Leveraged data augmentation techniques and developed training schedules with synthetic data to improve performance on rare objects.

Vision Lab, University of Freiburg

Freiburg, Germany

COMPUTER VISION RESEARCHER

Sept 2017 - Sept 2022

- Developed a multi-task model to predict optical flow, depth, occlusion, motion boundaries, and scene flow. The model was a runner-up entry in the robust vision challenge, CVPR, 2018.
- Developed a method to perform neural architecture search on UNet-based stereo depth models. Resultant models were more efficient compared to manual baselines.
- Developed model regularization techniques that improve the robustness of recognition models under the influence of different image corruptions. Also, studied the influence of model compression techniques on robustness.
- Supervised student research projects that lead to conference papers.

Google

Grenoble, France

RESEARCH INTERN

July 2019 - Nov 2019

- Studied the impact of hyperparameter optimization of few-shot object classification. The study showed large improvements in few-shot performance (up to 9 % in some cases).
- Integrated BOHB (a hyperparameter optimization method) into Google's compute cluster.

Evvnt

Pune, India

SOFTWARE ENGINEER

October 2013 - Sept 2014

- Wrote web-service integrations for automated event publishing.
- Resolved around 35 bugs in four weeks to improve the application's efficiency.

PromptCloud

Bangalore, India

SOFTWARE ENGINEER

October 2012 - Sept 2013

- Developed custom web-crawler plugins for various vertical search applications.
- Helped set up an Elasticsearch cluster and a keyword search API.

Skills

Computer Vision	Object detection, Stereo Depth estimation, Optical flow estimation
Machine Learning	Few-shot learning, Neural Architecture Search, Model pruning, Hyperparameter Optimization
Libraries & Frameworks	PyTorch, TensorFlow, mmdetection, detectron2, Numpy
Programming	Python, C++, cuda, HTML, ruby, LaTeX
Tools	AWS, Sagemaker, Docker, Slurm, Git

Publications

Towards understanding adversarial robustness of optical flow networks

S. SCHRODI, **T. SAIKIA**, AND T. BROX

CVPR 2022

Improving robustness against common corruptions with frequency biased models

T. SAIKIA, C. SCHMID, AND T. BROX

ICCV 2021

Towards improving robustness of compressed CNNs

J. HOFFMANN, S. AGNIHOTRI, **T. SAIKIA**, AND T. BROX

ICMLW 2021

Multi-headed neural ensemble search

A. NARAYANAN, A. ZELA, **T. SAIKIA**, T. BROX, AND F. HUTTER

ICMLW 2021

Optimized generic feature learning for few-shot classification across domains

T. SAIKIA, T. BROX, AND C. SCHMID

arXiv 2020

Autodispnet: Improving disparity estimation with AutoML

T. SAIKIA, Y. MARRAKCHI, A. ZELA, F. HUTTER, AND T. BROX

ICCV 2019

Occlusions, motion and depth boundaries with a generic network for disparity, optical flow or scene flow estimation

E. ILG*, **T. SAIKIA***, M. KEUPER, AND T. BROX (* DENOTES EQUAL CONTRIBUTION)

ECCV 2018

Flownet 2.0: Evolution of optical flow estimation with deep networks

E. ILG, N. MAYER, **T. SAIKIA**, M. KEUPER, A. DOSOVITSKIY, AND T. BROX

CVPR 2017

Education

University of Freiburg

PHD IN COMPUTER VISION, GRADE: *magna cum laude*

Freiburg, Germany

Oct 2017 - Oct 2022

University of Freiburg

MASTER'S IN COMPUTER SCIENCE, GRADE: *1.4, sehr gut (very good)*

Freiburg, Germany

Oct 2014 - Aug 2017

National Institute of Technology, Silchar

BACHELOR'S IN COMPUTER SCIENCE, GRADE: *7.36/10*

Silchar, India

Aug 2007 - June 2011

Mentoring experience

- 2022 **Simon Schrodi**, Student project
- 2021 **Jasper Hoffmann**, Student Research Assistant
- 2021 **Shashank Agnihotri**, Master's thesis
- 2021 **Ashwin Narayanan**, Master's thesis

Freiburg, Germany

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Honors & Awards

- 2021 **GCP Credit Award**, Google
- 2020 **GCP Credit Award**, Google
- 2018 **Runner-up**, Robust Vision Challenge (Stereo), CVPR

Germany

Germany

Salt Lake City, Utah