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 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 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 - October 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 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 — *Sept 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 *CVPR 2022*

S. Schrodi, **T. Saikia**, and T. Brox

Improving robustness against common corruptions with frequency biased models *ICCV 2021*

T. Saikia, C. Schmid, and T. Brox

Towards improving robustness of compressed CNNs *ICMLW 2021*

J. Hoffmann, S. Agnihotri, **T. Saikia**, and T. Brox

Multi-headed neural ensemble search *ICMLW 2021*

A. Narayanan, A. Zela, **T. Saikia**, T. Brox, and F. Hutter

Optimized generic feature learning for few-shot classification across domains *arXiv 2020*

T. Saikia, T. Brox, and C. Schmid

Autodispnet: Improving disparity estimation with AutoML *ICCV 2019*

T. Saikia, Y. Marrakchi, A. Zela, F. Hutter, and T. Brox

Occlusions, motion and depth boundaries with a generic network for disparity, optical flow or scene flow estimation *ECCV 2018*

E. Ilg* , **T. Saikia*** , M. Keuper, and T. Brox (* denotes equal contribution)

Flownet 2.0: Evolution of optical flow estimation with deep networks *CVPR 2017*

E. Ilg, N. Mayer, **T. Saikia**, M. Keuper, A. Dosovitskiy, and T. Brox

Education

University of Freiburg *Freibug, Germany*

PhD in Computer Vision, Grade: *magna cum laude* *Oct 2017 - Oct 2022*

University of Freiburg *Freibug, Germany*

Master's in Computer Science, Grade: *1.4, sehr gut (very good)* *Oct 2014 - Aug 2017*

National Institute of Technology, Silchar *Silchar, India*

Bachelor's in Computer Science, Grade: *7.36/10* *Aug 2007 - June 2011*

Mentoring experience

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

Honors & Awards

2021	**GCP Credit Award**, Google	*Germany*
2020	**GCP Credit Award**, Google	*Germany*
2018	**Runner-up**, Robust Vision Challenge (Stereo), CVPR	*Salt Lake City, Utah*