Adhiraj Ghosh

Tübingen, Germany

LinkedIn Profile
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Education

University of Tübingen — Tübingen, Germany
- *MSc in Machine Learning* — Oct 2022 – Nov 2024
  Thesis : Holistic Understanding of Vision-Language Models

Manipal Institute of Technology/Singapore Management University — Manipal/Singapore
- *B.Tech in Electrical and Electronics Engineering* — Aug 2016 – Aug 2020
  Thesis: Towards the Analysis of High Dimensional Data in Computer Vision

Work Experience

- **Research Intern, Tübingen AI Centre** — Mar 2023 - Sep 2023
  Tübingen, Germany
  - Worked under the supervision of Dr. Hendrik PA Lensch on the project - **Visualising Figurative Speech**.
  - The goal of the project was to create an ensemble of lightweight models that expresses any arbitrary piece of text into a visualisable description, enabling meaningful and high-quality image generation.
  - Created **LyricCanvas**, a supervised dataset of 10 million song lyrics with corresponding visual elaborations and conducted knowledge distillation to train robust language models that generalise to all forms of figurative speech.
- **Computer Vision Researcher, Zürich University of Applied Sciences** — May 2021 - Aug 2022
  Zürich, Switzerland
  - Worked in the **Center of Artificial Intelligence** under the supervision of **Dr. Thilo Stadelmann**.
  - Created a **Connected-Components-enabled Semantic Segmentation** network to tackle noisy labels for **Food Waste Analysis**, in collaboration with **Kitro AG**. Achieved state-of-the-art with a mean IoU score of **0.5219**.
  - Responsible for designing a novel adversarial learning system utilising discriminator-learned features for **Unsupervised Domain Adaptation** for Optical Music Recognition on the DeepScores dataset (synthetic) to real data, improving baseline results by **36%**. In collaboration with **ScorePad AG**.
- **Research Assistant, Singapore Management University** — Jan 2020 - Nov 2020, Sep 2021-Dec 2022
  Singapore
  - Worked under the supervision of **Dr. Wen-Yan Lin** on the project - **Robust Compute-Efficient Re-Identification and Object Tracking for Surveillance Systems**.
  - Theorised and spearheaded a new Triplet Mining approach based on pixel-level **Image Feature Matching and Correspondence** models, termed as **Relation Preserving Triplet Mining (RPTM)**.
  - Achieved state-of-the-art results(**October 2021-Present**) on multiple public benchmarks and produced the first transferable and scalable algorithm for generalised re-identification tasks.

Publications [Google Scholar]

1. **Adhiraj Ghosh**[*], Sebastian Dziadzio[*], Ameya Prabhu, Vishaal Udandarao, Samuel Albanie, Matthias Bethge, **ONEBench to Test Them All: Sample-Level Benchmarking Over Open-Ended Capabilities**, arXiv *2024*
2. Vishaal Udandarao[*], Ameya Prabhu[*], **Adhiraj Ghosh**, Yash Sharma, Philip HS Torr, Adel Bibi, Samuel Albanie, Matthias Bethge, **No "Zero-Shot" Without Exponential Data: Pretraining Concept Frequency Determines Multimodal Model Performance** *NeurIPS 2024* **[paper]** **[code]**
3. Hassan Shahmohammadi, **Adhiraj Ghosh** and Hendrik P. A. Lensch, **ViPE: Visualise Pretty-much Everything** *EMNLP 2023* (Outstanding Paper) **[paper]** **[code]**
4. **Adhiraj Ghosh**, Kuruparan Shanmugalingam and Wen-Yan Lin, **Relation Preserving Triplet Mining for Stabilising the Triplet Loss in Re-identification Systems** *WACV 2023* **[paper]** **[code]**
5. **Adhiraj Ghosh**[*], Lukas Tuggener[*], Raphael Emberger[*], Pascal Sager[*] *et al.* **Real World Music Object Recognition** *Transactions of the International Society for Music Information Retrieval 2023* **[paper]** **[code]**
6. **Adhiraj Ghosh** and Kamal Sarkar, **Irony Detection in Bengali Tweets: A New Dataset, Experimentation and Results** *International Conference on Computational Intelligence in Data Science, 2020* **[paper]** **[dataset]**

Research Experience

- **Research Student, Tübingen AI Centre** Nov 2023-Present
  Supervisor: ***Dr. Matthias Bethge*** Tübingen, Germany
  - Master Thesis student working on the **Holistic Understanding of Vision Language Models**.
  - Created the largest benchmark to evaluate foundation models, called **ONEBench** and developed a pipeline for **compositionality-aware data curation** to improve the text-image alignment problem during pretraining and foster the next generation of data-efficient CLIP models.
- **Research Associate, Jadavpur University** Jun 2018 - Dec 2019
  Supervisor: ***Dr. Kamal Sarkar*** Kolkata, India
  - Worked on **Irony Detection and Classification** in Bengali Tweets, funded by the Science and Engineering Research Board, Government of India.
  - Created the first published dataset for irony detection and classification in Bengali, devising a computational linguistics foundation for 3 classes of irony.

Academic Highlights and Responsibilities

Highlights

- Extensive media coverage for the **No "Zero-Shot"** publication. Highlight: full feature on Computerphile.
- **Outstanding Paper Award** at EMNLP 2023, Language Grounding to Vision, Robotics and Beyond track.
- RPTM taught in Graduate Innovation Demonstration Course(400 papers across CS) at Shenzen University.
- Best Undergraduate Seminar Presentation: **Implementation of Deep Learning in Medical Imaging and the Detection, Classification and Segmentation of Diseases**, 2019
- One of four students(selection rate 1.6 %) in Electrical and Electronics selected to be part of a Cisco India-Manipal University Software Development Project, 2019.

Student Mentoring

- Suhardiman Agung: MS student at SMU(2024-)

Reviewer Responsibilities

- **Journals**: Transactions of Image Processing
- **Conferences**: NeurIPS 2023, ECCV 2022

Technical Skills

- **Topics of Interest** Data-centric Machine Learning, Vision and Language, Computer Vision
- **Languages** Python, MATLAB, Java
- **Tools/Frameworks** Docker/Singularity, PyTorch, Tensorflow, OpenCV, Gym, ParaView, wandb, OpenCLIP