Adhiraj Ghosh

Tübingen, Germany

LinkedIn Profile
GitHub Profile

Email : University / Personal
Mobile : +49-17679828923(DE)/+91-8017958529(IN)

Education

- **University of Tübingen** — Tübingen, Germany
  MSc in Machine Learning — Oct 2022 – Sep 2024
  Relevant Coursework : Deep Learning, Fairness in Machine Learning
- **Manipal Institute of Technology** — Manipal, India
  B.Tech in Electrical and Electronics Engineering — Aug 2016 – Aug 2020
  Relevant Coursework: Data Structures, Image Processing, Probability and Statistics
  Thesis: Singapore Management University

Work Experience

- **Computer Vision Researcher, Zürich University of Applied Sciences** — May 2021 - Aug 2022
  Zürich, Switzerland
  - Working 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**. 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%**.
- **Research Assistant, Singapore Management University** — Jan 2020 - Nov 2020, Sep 2021-Sep 2022
  Singapore
  - Worked under the supervision of **Dr. Wen-Yan Lin** on the project - **Robust 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 on multiple public benchmarks and produced the first transferable and scalable algorithm for generalised re-identification tasks.
- **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 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 figurative speech, evidenced through rigourous evaluation.

Publications [Google Scholar]

1. Hassan Shahmohammadi, **Adhiraj Ghosh** and Hendrik P. A. Lensch, **ViPE: Visualise Pretty-much Everything** *EMNLP 2023* (Outstanding Paper) **[paper]** **[code]**
2. **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]**
3. Lukas Tuggener*, Raphael Emberger*, **Adhiraj Ghosh***, Pascal Sager* *et al.* **Real World Music Object Recognition** *Transactions of the International Society for Music Information Retrieval 2023* **[paper]** **[code]**
4. **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
  - The goal of this project is to develop a **compositionality benchmark for large-scale image-text datasets** by creating the next generation of Data Filtration Networks(DFNs).
  - We wish to contrastively make Vision-Language models learn correct and precise textual representations of visually-descriptive language and improve performance on spatial relationships.
- **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 linguistic foundation for 3 classes of irony.
  - Achieved baseline State of the Art results (**67.47% accuracy for binary classification and 48.31% for multi-label classification**) for the dataset, using word embedding models and TFIDF Vectorisation.

Technical Skills

- **Topics of Interest** Computer Vision, Deep Learning, Vision and Language
- **Languages** Python, MATLAB, Java
- **Tools/Frameworks** Docker/Singularity, PyTorch, Tensorflow, OpenCV, Gym, ParaView, wandb, VisualSFM, LabelImg

Relevant Projects

- **Face Mask Detection on Human Face Datasets [Code]** Feb 2020
  Guide : Dr. Wen-Yan Lin Sinagpore Management University
  - Worked on creating a simple and effective Histogram of Oriented Gradients(HOG) image descriptor and a Linear Support Vector Machine (SVM) to train an object detection network.
- **Robust Instance Segmentation using Mask RCNN [Code]** Jun 2020 -Jul 2020
  Guide : Dr. Wen-Yan Lin Sinagpore Management University
  - Establishing a segmentation mask on large image data with multiple objects in one image.
  - Using instance segmentation trained on MS COCO Dataset to isolate the detected objects based on the bounding box coordinates and the segmentation mask.

Academic Highlights and Reviewer Responsibilities

Highlights

- **Outstanding Paper Award** at EMNLP 2023, Language Grounding to Vision, Robotics and Beyond track.
- Bachelor Thesis: **Towards the Analysis and Robust Representation of High Dimensional Data**, 2020.
- 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.

Reviewer Responsibilities

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