Adhiraj Ghosh

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LinkedIn Profile
GitHub Profile

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Work Experience

- **Computer Vision Researcher, Zürich University of Applied Sciences** June 2021 - Present
  Winterthur, Switzerland
  - Working in the **Center of Artificial Intelligence** under the supervision of **Dr. Thilo Stadelmann**, in the Computer Vision, Perception and Cognition team.
  - Created a **Connected-Components-enabled Semantic Segmentation** network to tackle noisy labels in error-prone real-world food-item detection datasets, for effective **Food Waste Analysis**. Developed the final deployable model for industrial partner KITRO SA, with a mean IoU score of **0.5219**(state-of-the-art).
  - 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, for **Sheet Music Analysis in the wild**.
- **Research Assistant, Singapore Management University** Jan 2020 - Nov 2020, Nov 2020-Present(remote)
  Singapore
  - Worked under the supervision of **Dr. Wen-Yan Lin** on the project - **Robust Vehicle 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)**.
  - Designed an optimised pipeline for re-identification and object retrieval, achieving state-of-the-art results on public benchmarks such as Veri-776, VehcileID and DukeMTMC. Paper submitted to **ECCV**, under review.

Internships

- **Research Associate, Jadavpur University** Jun 2018 - Dec 2019
  Kolkata, India
  - Worked under the supervision of **Dr. Kamal Sarkar** 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.
- **Research Student, Manipal Institute of Technology** Oct 2018 - Mar 2019
  Manipal, India
  - Worked under the supervision of Associate Professor, Dr. Chandrika BK on the project - **Just Noticeable Differences in Low Quality Video Samples**.
  - Applied Butterworth Filters to measure the Contrast Sensitivity Function of CCTV image frames, followed by Gaussian Smoothing for Video enhancement.

Publications [Google Scholar]

1. Adhiraj Ghosh, Kuruparan Shanmugalingam and Wen-Yan Lin, **Relation Preserving Triplet Mining for Stabilizing the Triplet Loss in Vehicle Re-identification***(Under Review,ECCV 2022)* [paper] [code]
2. 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] [code]

Academic Qualifications

- **Manipal Institute of Technology** Manipal, India
  B.Tech in Electrical and Electronics Engineering; CGPA: 8.14/10.00 (top 10%) Aug 2016 – Aug 2020

Technical Skills

- **Topics of Interest** Computer Vision, Deep Learning, Vision and Language
- **Languages** Python, MATLAB, Java
- **Tools/Frameworks** Docker, PyTorch, OpenCV, Tensorflow, Keras, scikit-learn, wandb, NLTK, VisualSFM, LabelImg

Relevant Projects

- **Face Mask Detection on Human Face Datasets** Feb 2020
  Guide : Dr. Wen-Yan Lin, Sinagpore Management University **[Code]**
  - 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** Jun 2020 -Jul 2020
  Guide : Dr. Wen-Yan Lin, Sinagpore Management University **[Code]**
  - 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.
- **Emotion Recognition Using Physiological Data** Nov 2020 -Mar 2021
  Guide : Dr. Zakir Hossain and Dr. Tom Gedeon, Australian National University
  - Created an end-to-end trainable neural network for the detection of emotions in human face datasets and the generation of Electrodermal Activities (EDA) data.
  - Used Conditional GANs (CGANs) to enrich recognition of 7 emotional categories by improving the scale of emotion recognition datasets.

Certifications and Courses

- **Relevant Coursework**:
  - Data Structures and Algorithms
  - Soft Computing: Fuzzy Logic and Neural Networks
  - Probability and Statistics
  - Digital Signal Processing
  - Applications of DSP: Image Processing
- **Relevant Certifications**:
  - Deep Learning Specialisation - **Coursera**
  - TensorFlow in Practice Specialisation - **Coursera**
  - Mathematics for Machine Learning - **Coursera**
  - Python for Data Science - **Coursera**
  - Deep Learning: Face Recognition- **LinkedIn Learning**

Academic Highlights

- Bachelor Thesis: **Towards the Analysis and Robust Representation of High Dimensional Data**, 2020.
- Undergraduate Seminar Presentation: **Implementation of Deep Learning in Medical Imaging and the Detection, Classification and Segmentation of Diseases**, 2019
- Oral Presentation, ICCIDS 2020: **Irony Detection in Bengali Tweets: A New Dataset, Experimentation and Results.**
- 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.

Extra-Curricular Activities

- **Social Service:** Content Writer and tutor (Computers, Mathematics and English) to underprivileged children at the Hope Foundation (December 2017).
- **Quizzing:** President of Don Bosco School Quiz Society (2015-2016), winner of 20+ regional and national quizzes, invited to host quizzes in 4 Indian cities (Kolkata, Manipal, Pune and Kochi).
- **Debating:** Convener of the Manipal Parliamentary Debate 2019; Semi-final and final judge at Point Blank Debate (India) 2020; Won several accolades in debate, extempore speech and Model United Nations.
- **Writing:** Authored an original research paper on the Tintin Comics in partial fulfilment of my Graphic Novels elective course; editor at the MIT Post, the official journalism body of Manipal Institute of Technology.