NOOR AHMED

noah00001@uni-saarland.de – http://github.com/noorahmedds

EDUCATION

Universität des Saarlandes   *2024 - present*
Doctor of Philosophy

Universität des Saarlandes   *2021 - 2024*
Masters in Visual Computing

National University of Computer and Emerging Sciences   *2015 - 2019*
Bachelors in Computer Science

EXPERIENCE

Research Assistant, D2 Group, Max-Planck Institut Informatik   *January 2023 - February 2024*
At Max-Planck Institut for Informatics, I actively contributed to the project centered around Few-Shot Class Incremental Learning, employing advanced methodologies to boost generalization. The project's foundation rested on the extensive utilization of principles of contrastive learning, serving as the cornerstone of our approach. We rigorously benchmarked our methods across diverse datasets, consistently achieving improved results. Furthermore, our contributions extended to defining new baselines by introducing a straightforward extension to the contrastive loss, using perturbations in the feature space. We explored diverse formulations of orthogonal targets, and we ventured into auxiliary tasks, including infoNCE, SIMCLR, DINO loss and knowledge distillation. This project in turn also became the topic of my Master Thesis and subsequently into a conference paper at CVPR 2024.

Junior Researcher, August-Wilhelm Scheer Institut   *October 2021 - December 2022*
As a Junior Researcher at AWSI, I worked in the Smart Water Lab, which aimed to digitise Sewer Inspection in Germany. My responsibilities included deep learning research, modeling, data curation, scripting and creating demonstration software. We were able to collect a large sewer image dataset from inspection-feeds provided by project partners. Several tasks like multi-class, multi-label, single class and localisation were explored on this dataset. Given the natural imbalance in the data and noisy labels due to inconsistent human annotations a strong data processing pipeline was a crucial responsibility. We were able to boost performance of our models using imbalanced learning strategies specifically surrounding novel over sampling techniques of batched data. We also demonstrated strong performance on pruned models showcasing the strong generalization and applicability in the real world. Notably, our method improved performance over a strong baseline which resulted in a paper that was accepted and published in the 12th International Conference on Pattern Recognition Application and Methods.

Computer Vision Engineer, OMNO AI   *July 2019 - January 2021*
As a core vision product developer my responsibilities included adapting state-of-the-art algorithms and creating novel in-house models for tasks like team discrimination in sports broadcast videos, person detection and attribute analysis in a retail setting and accessibility software for the blind. I made significant contributions to our soccer analytic product with major innovation in top-down registry of soccer field and soccer ball tracking using the well established Yolo algorithm, homographic projection and a combination of traditional computer vision algorithms and game logic in a cohesive pipeline. I further managed a team of in-house annotators alongside designing schematics and protocols for efficient and meaningful data annotation. Running our vision pipelines on end devices like the Jetson Nano and Raspberry Pi was a consistent challenge throughout my time at OMNO AI.

Research Intern at Industrial Design Engineering Lab, TU DELFT   *Fall 2018 - March 2019*
Worked alongside Dr. Elif Ozcan in detection of alarms from coarse signals in a hospital environment. Employed unsupervised algorithms and pattern matching for classification.

PUBLICATIONS

[1] Ahmed, Noor, Anna Kukleva, and Bernt Schiele. "OrCo: Towards Better Generalization via Orthogonality and Contrast for Few-Shot Class-Incremental Learning." 41st IEEE/CVF Conference on Computer Vision and Pattern Recognition. IEEE, 2024.

[2] Biswas, R.; Mutz, M.; Pimplikar, P.; Ahmed, N. and Werth, D. (2023). Sewer-AI: Sustainable Automated Analysis of Real-World Sewer Videos Using DNNs. In Proceedings of the 12th International Conference on Pattern Recognition Applications and Methods; 897-904.

PROJECTS

Sewer-AI, AWSi   *2022*
Conducted an exhaustive study evaluating the performance of various neural architectures on our demanding sewer video dataset, considering different modes of analysis. Devised effective training strategies to tackle the diverse challenges within the data, resulting in balanced accuracy, F1, and F2 scores exceeding 90% for 17 out of 25 defect categories. Explored the trade-off between model performance and computational efficiency, with a focus on parameter pruning. Demonstrated that even with significant weight pruning (more than 90%), the average performance drop of the networks remained below 1%.

Retail Analytics, OMNO AI   *2020*
Working on a smart retail product which has a heavy computer vision backend. The backend is optimised for GPU usage. I worked heavily with the Keras Library and used that as the base for most of my experiments. We used heavy augmentation with publicly available datasets like motion blur and over exposure to augment in-the-wild scenarios. Dozens of experiments we're conducted with YOLO and its tiny variants for person detection. I performed rigorous research towards a unified face and body detector and reached satisfactory validation results. I experimented with auxiliary signals with facial data for emotion recognition but the improvements were restricting real-time performance.

SKILLS

Programming Languages and Frameworks
Pytorch, Python, C++, MATLAB, OpenCV, Scikit, Pandas and Numpy, Unity, Adobe Illustrator