PH.D. STUDENT
SOFIA CASARIN

I'm a 2nd year Ph.D. Student at University of Bolzano with expertise in Neural Architecture Search for Image and Video Understanding, in Video Action Recognition and in Anomaly Detection. I recently started working in the ego-centric field joining team Aria of Meta events. I worked as a Research fellow in 2022 at University of Padova. I persued an internship at Sony during my master.

EDUCATION

- **2022-2025**
  Ph.D. in Computer Science
  UNIVERSITY OF BOLZANO
  Supervisor: Oswald Lanz
  Co-supervisor: Sergio Escalera

- **2019-2021**
  Master's degree in Telecommunication (LM-27)
  UNIVERSITY OF PADOVA
  Supervisor: Pietro Zanuttigh
  Co-supervisor: Lukas Mauch
  Graduated: 110/110 cum laude

PUBLICATIONS

[1] **ECCV 2024,** S. Casarin et al. *"NAS just once: Neural Architecture Search for joint Image-Video Recognition".*

[2] **CVPR 2024,** S. Casarin et al. *"Your Image is My Video: Reshaping the Receptive Field via Image-To-Video Differentiable AutoAugmentation and Fusion".*

[3] **NAS workshop CVPR 2024,** S. Casarin at al. *"GRASP-GCN: Graph-Shape Prioritization for Neural Architecture Search under Distribution Shifts".*

[4] **Workshop on Fair, Data-efficient, and Trusted Computer Vision CVPR 2024,** C. Ugwu, S. Casarin, O. Lanz *"Fractals as Pre-training Datasets for Anomaly Detection and Localization".*

[5] **ICMVA 2024** S. Casarin, C. Ugwu, *"DD-NAS-Bench: Towards Predictors under Data Distribution Shift".*

[6] **ICMVA 2024** C. Ugwu, S. Casarin, O. Lanz, *"Spatiotemporal Modeling Encounters 3D Medical Image Analysis: Slice-Shift UNet with Multi-View Fusion".*

[7] **International Workshop on data Analysis in Life Science, ECML PKDD,** S. Casarin, C. Ugwu, *"Italian debate on measles vaccination: how Twitter data highlight communities and polarity".*

[8] **Swiss Conference on Data Science (SDS), 2022.** S. Casarin, et al. *"Unsupervised Network Anomaly Detection by Learning on 2D Data Representations".*

WORKING EXPERIENCE

Research Grant – Type A . . . . Dec. 2021 – Nov. 2022
(Department of Information Engineering (DEI), University of Padua)

The focus of the grant was on an implementation, optimization and testing of an unsupervised anomaly detection system. The algorithm was tailored for the 2D representation of real traffic data and optimized the system for the final goal of detecting the presence of malicious events. *Outcome:* publication in the 9th Swiss Conference on Data Science (SDS), 2022.

Sony - Internship . . . . Mar. 2021 – Sept. 2021
(Sony Europe B.V. Zweigniederlassung, Stuttgart, Germany)

The objective was to analyze the transferability of predictors under distribution shifts in Neural Architecture Search (NAS). We proposed a new search-space and built a NAS-benchmark using architectures trained on 4 image datasets. We improved the transferability of Graph Convolutional Network (GCN) predictors by integrating the shapes of the datasets as additional input and an early stopping techinque. *Outcome:* publications at the International Conference on Machine Vision Applications (ICMVA), at the NAS workshop at CVPR, and an oral presentation at DMLR workshop at ICLR.

PROJECTS

CVPR-NAS Challenge 2023
The goal was investigatnig how well NAS pipelines can work "out-of-the-box" with little-to-no time for tuning. The competition required to design a NAS pipeline that includes a data processor, a NAS algorithm and a training policy to be run on 3-5 datasets within 24 hours. I implemented a predictor-based approach, an evolutionary search, and a generative search algorithm, that I finally employed for the challenge. I performed experiments on 11 different datasets provided by the challenge organizers, and I ranked first in 10/11.

ISCRA-C Cineca
I proposed and won a project to obtain Cineca computational power to work on NAS for Video Action Recogntion. The work exploits proxy metrics to analyse the ranking correlation between 2D backbones and the video conteourparts.

Segmentation on volumetric medical data
Inspired by the video action recognition field, I developed a 2D CNN for medical CT scans that processes 3 orthogonal planes of a volume employing a shifting technique (TSM) to extract 3D features. The model outperformed 5/6 state-of-the-art models with only 6M parameters, compared to the 31M to 150M parameters of other models.

RESEARCH ACCOMPLISHMENTS

- International Computer Vision Summer School **(ICVSS) 2023**
- International Summer School on Machine Vision **(VISMAC) 2023**
- **Teaching assistant** in Operating Systems and Deep Learning
- **Reviewer** at ICLR, ICPR, BMVC
- **Huawei Digital Talent Summit (HDTS), UNESCO World Higher Education Conference (WHEC) 2022** I won a pitch competition organized by Huawei that allowed me to join the HDTS and WHEC 2022 that took place in Barcelona.
- **Scholarship "Mille e una Lode"** I was awarded in 2018 by the University of Padua with this merit-based scholarship.
- **WEP Exchange Program scholarship** I won a merit-based scholarship from Wep Organization to spend 6 months in USA during my 4th high school year.

SKILLS

Computer Skills:
- *Expert:* Python
- *Proficient:* Matlab, R, Latex
- *Prior Experience:* C++, Java, Unity

Languages:
- Italian (Native)
- English (C1)
- German (A1)