Maciej Ziaja

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Experience

Since October 2020 KP Labs, Gliwice

Machine Learning Software Engineer – Development and prototyping of deep neural networks for image processing with Python, deployment on embedded Linux devices with C++.

- Involved in creation of several deep learning image processing models for segmentation (roads, buildings, clouds, etc.), regression (arctic ice cover properties), and super-resolution (single-image, multi-image, pansharpening) in satellite imagery. Responsible for data management, preprocessing, training pipelines, model architecture (CNN, Transformers, GANs), and optimization.
- Designed neural networks deployment and benchmarking processes for AI-capable satellite mission Intuition-1. Enabled on-board neural network inference hardware acceleration utilizing *Xilinx's Vitis AI* framework in Python and C++. The satellite platform equipped with the deep learning models currently operates in-orbit.
- Maintained in-house data processing and experimentation MLOps systems based on DVC, MLflow, Docker, and Jenkins. Deployed selected deep learning models in cloud using Kubernetes and Kubeflow.
- Involved in preparations and orations at various industry and scientific events. Published R&D research results in several venues redacted by Nature, Springer, and IEEE.

July–October 2019 Display Link, Katowice

Intern Development Engineer – Embedded C++ programming in real time environment for video processing devices.

Skills

Python programming for machine learning, application development and scripting

- Deep learning with *Tensorflow*, *PyTorch* and *PyTorch Lightning*,
- Machine learning with *Scikit-learn*,
- Data manipulation with *NumPy* and *Pandas* from SQL & NoSQL sources,
- Computer vision with *Scikit-image* and *OpenCV*,
- Experiment and data management with *MLflow*, *Kubeflow*, and *DVC*,
- Code quality with *pytest*, *flake8*, and *mypy*.

C++ programming in modern standards

STL familiarity, *CMake* build tool, unit testing with *Google Test* and *Google Mock*, *Clang* toolchain familiarity (*clang-tidy, clang-format, lldb*).

Developer tools

Git version control system, *Docker* containerization and *Kubernetes* orchestration, familiarity with *GitHub Actions, GitLab CI/CD* automation tools, familiarity with *AWS* cloud computing services, *architecture-as-code* with *Terraform* and *Ansible*, typesetting in *Latex*, ability to work in *Scrum*.

Linux operating system

Administration and development, shell scripting (*bash*), text processing with *awk* and *sed*.

Languages

Native Polish, proficient English, basic German.

Education

Since 2022 Silesian University of Technology
Doctor of Philosophy (PhD) Candidate – *Computer Science, Department of Algorithmics and Software.*

2020–2021 Silesian University of Technology
Master of Engineering – *Computer Science, System Software major.*
Thesis topic: *Data augmentation for super-resolution reconstruction using deep convolutional neural networks.*
Graduated with distinction.

2016–2020 Silesian University of Technology
Bachelor of Engineering – *Automatic Control and Robotics, Information Technologies major.*
Thesis topic: *Grains detection in thermal images with use of neural networks.*
Graduated with distinction.

Scientific publications

- M. Kawulok et al., Hyperspectral Image Super-Resolution: Task-Based Evaluation, IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, Volume 17, 2024
- B. Grabowski et al., Squeezing adaptive deep learning methods with knowledge distillation for on-board cloud detection, Engineering Applications of Artificial Intelligence, Volume 132, 2024
- P. Kowaleczko et al., A Real-World Benchmark for Sentinel-2 Multi-Image Super-Resolution. Sci Data 10, 644 (2023)
- M. Ziaja et al Benchmarking Deep Learning for On-Board Space Applications. Remote Sens. 2021, 13, 3981
- M. Ziaja et al., "Hyperspectral Image Pansharpening: The Prisma Case Study," IGARSS 2023 - 2023 IEEE International Geoscience and Remote Sensing Symposium, Pasadena, CA, USA, 2023, pp. 1633-1636
- M. Kawulok et al., "Understanding the Value of Hyperspectral Image Super-Resolution from Prisma Data," IGARSS 2023 - 2023 IEEE International Geoscience and Remote Sensing Symposium, Pasadena, CA, USA, 2023, pp. 1489-1492
- B. Grabowski et al., "Are Cloud Detection U-Nets Robust Against in-Orbit Image Acquisition Conditions?," IGARSS 2022 - 2022 IEEE International Geoscience and Remote Sensing Symposium, Kuala Lumpur, Malaysia, 2022, pp. 239-242
- B. Grabowski, M. Ziaja, M. Kawulok and J. Nalepa, "Towards Robust Cloud Detection in Satellite Images Using U-Nets," 2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS, Brussels, Belgium, 2021, pp. 4099-4102

Certficicates

- October 2021 – *AWS Cloud Technical Essentials* authorized by Amazon Web Services, offered through Coursera platform.

Personal projects

- *IT Jobs Meta* – Data pipeline and meta-analysis dashboard for IT job postings from *No Fluff Jobs* website. Features data scraping, cleaning, analysis, and interactive dashboard. Implemented in *Python* and *Pandas*, deployed with *Ansible* and *Terraform* to *AWS*.
- Other small software on my GitHub: Linux dotfiles, mobile robot, shell-based blogging engine, high-altitude balloon embedded software, and more.