Francesco Bosso

+39 3469601901 ◇ francesco_bosso@outlook.com ◇ website ◇ Rome (**ready to relocate**)

EDUCATION

Master of Science in Computer Science (Geoinformation and Sensing track)
Politecnico di Milano. GPA : *110 cum Laude*

EXPERIENCE

AI Research Engineer - Leonardo S.p.A (Rome, IT) September 2023 - Ongoing

- Investigated **domain shift** mitigation in multi-**sensor fusion** for robust **3D occupancy** (autonomous driving) [1]
- **Global Combat Air Programme** (6th gen fighter aircraft): stochastic optimisation of airborne sensing systems
- Enhanced 3D sensor fusion by replacing **SENet** with **self-attention**, **achieving +5% IoU over SOTA**
- Enhanced **VoxelNeT** by integrating **self-attention** into point-feature concatenation. **+6 IoU over SOTA**
- Research on AI-based NOWCASTING approaches to **trigger EU alert** (collaboration with Civil Protection) [2]
- MLP-Enhanced track level clutter removal from RADAR observations. **30% accuracy improvement**
- Adaptive range-Doppler level clutter removal with RL. **Automation of manual process**. (**Patent submission**)
- Parameters tuning for stochastic performance maximization. **GA, PSO, REINFORCE-ADAM, GP-UCB**
- CNN for onboard satellite wildfires/eruptions early detection. Contribution to PyRaws **ESA ϕ-Lab Repository**

AI Researcher - European Commission Space Unit (Ispra, IT) April 2023 - March 2024

- **Developed hybrid LLM/NER models** for geospatial feature extraction. **14% accuracy improvement**
- **Investigation of endogenous LLMs biases**. Uncovered geo-political biases: Ukraine-Russia and Palestine-Israel.
- Locally running geo-features extraction pipeline exploiting LLMs - **flan(3B), chatgml(5B), redpajama(7B)** [3,4]
- Research and Development of LLM-based Ontology Learning frameworks - **Mixtral (7B), GPT 3.5 Turbo** 5
- Expert reviewer for **€65M in research proposals** on **EO foundation models** and **trustworthy AI** 6

GeoAI Researcher - Internship - UNESCO-IHE Delft (Delft, NL) September 2022 - April 2023

- Weather features selection based on Teleconnection patterns. **Problem dimension reduced up to 80%** [7]
- Integration of climate data on **different spatial scales** to improve subseasonal drought forecasting with ML models
- Development and comparison of ML models on hybrid satellite-NWP data for **drought forecasting**
- Features selection and training of ELM outperforming ECMWF benchmark. **75% error reduction** [8,9]
- Creation of training pipelines for geospatial time series. **multi-dimensional time series analysis**

Geospatial Engineer - Internship - Ministry for the Environment (Rome, IT) March 2022 - September 2022

- Exploitation of Elasticsearch API for high-performance vector data fetching on governmental **WebGIS**.
- Analysis on **quality and availability of geospatial data** across institutional platforms.
- Detection and reporting of major security issues in **GEOdatabase** platforms (e.g. : GeoServer, PostgreSQL).
- Full-stack development of NuxtJS webAPP **centralizing access to scattered geospatial data**.

SKILLS

Machine Learning	Unsupervised/Supervised/Reinforcement Learning, Bayesian Optimization, Surrogate models Computer Vision, Sensor fusion, GeoAI, Natural Language Processing, transfer learning, Foundation models, kernel-based methods, NLP, Ontology Learning
Sensing Domain	Optical sensing (hyper/multispectral), SAR, GNSS, SBAS, Weather RADAR, Geospatial data analysis, Remote Sensing, Geographic Information Systems, Inertial Navigation, Indoor positioning, Electronic Support Measure
SW Engineering	Python, SQL, JavaScript, Matlab, C, TensorFlow, PyTorch, RayTune, Optuna, BoTorch, Git, Linux, NodeJS, HTML, CSS, GeoServer, OpenLayers, SLURM, HPC, Cloud Computing

LANGUAGES

Italian: Mother tongue
English: Listening: C1 | Reading: C1 | Speaking: C1 | Writing: C1
Spanish: Listening: B2 | Reading: B1 | Speaking: B1 | Writing: A2
Swedish: Willing to learn

PROJECTS & PUBLICATIONS

Cognitive Radar | Python, Pytorch, Computer Vision, Reinforcement Learning, Signal processing (2023-2024)

- Submission of Patent on novel RL algorithm for target detection
- Development of Deep Learning model for **threats classification** from plot/track-level RADAR observations (30% accuracy improvement compared to classical methods)
- Creation of **Range-doppler map simulators** for synthetic data generation and Proof-of-concept development

Global Combat Air Programme | Python, Matlab, Docker, CI/CD, Optimization (2024-ongoing)

- Military related - No publication allowed
- **Stochastic optimization** for aircraft sensors performances maximization on **Single Integrated Air Picture** (SIAP) metrics.
- Developent of **multidimensional anomaly detection** platform able to process mission data (e.g. Trajectory, velocities, radar cross sections, etc.).
- Development of the full pipeline involving: scenario generation, sensor simulation and performance optimization managing different domain-specific protocols such as Distributed Interactive Simulation (DIS).
- Proof-of-concept and demo development for Italian Air Force.

ISOLDE | Python, Pytorch, Computer Vision (2024 - ongoing)

- Contribution to Open Source ESA project: PyRaws
- Exploitation of **3D computer vision models** (e.g., LightGlue and SuperGlue) for feature matching on **satellite imagery** to compute homography transformations.
- Processing raw **Level-1C satellite data**, including coregistration, leveraging AI models to speed-up standard ground processing techniques.

Hybrid Threats | Python, Pytorch, NLP, Neo4J (2023-2025)

- Publications: Ontology Learning Hybrid Threats, LLM for Location Detection, data enhancement for ML
- Developed **HYBOLT**, a novel **ontology learning framewor**k for extracting structured knowledge from unstructured text in the domain of Hybrid Threats.
- Designed and **implemented a triplet extraction method**, leveraging **Large Language Models** to convert text into subject-action-object relationships for knowledge graph construction.
- Conducted experimental validation using **open-source intelligence** data, assessing the system's ability to extract locations and affected individuals of terrorist attacks from real-world news sources.
- **Authored a technical report for the European Commission's Joint Research Centre**, contributing to policy-relevant research on AI-driven intelligence extraction for security applications.

GeoAI | Python, Pytorch, NLP (2023-2025)

- Publications: Forecasting for Civil Protection, Multiscale Geo-data fusion,Climate sub-seasonal data fusion
- Developed the **Climate State Intelligence (CSI) framework**, advancing the understanding of how climate factors influence monthly precipitation in Europe.
- Integrated **global and local climate data**, demonstrating that combining these data sources significantly enhances drought prediction capabilities.