Leila Maritim

ML Geospatial Data Scientist

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Experience

Freelance Consultant June 2024 – date

GeoVille GmbH *Innsbruck, Austria*

- Performed manual quality control (QC) of global land cover and tree cover density product suites, ensuring accuracy and consistency across datasets.
- Documented findings systematically and provided detailed feedback to support continuous improvement of the QC workflow and the product viewer interface.

Freelance Consultant Sep 2024 – Oct 2024

University of Salzburg, Department of Geoinformatics *Salzburg, Austria*

- Conducted comprehensive literature reviews—including academic publications and white papers—on sand dam hydrology and water management in arid regions. Identified and mapped relevant stakeholders across government agencies, NGOs, and community organizations involved in sand dam development and monitoring in Kenya.
- Curated Kenyan geospatial datasets with a focus on hydrology, land use, and sand dam locations. Authored a recommendation report outlining satellite-based methodologies for extracting environmental parameters downstream of sand dams using high-resolution imagery.

GIS Analsyt (Intern) July 2023 – August 2023

Deutsches Zentrum für Luft- und Raumfahrt *Munich, Germany*

- Deployed modular Python pipelines using pandas, geopandas, rasterio, NumPy to automate end-to-end spatial data extraction, cleaning, and descriptor computation across municipal and 1 km² grid scales, reducing manual preprocessing time and ensuring consistent, reproducible analyses.
- Implemented vectorized data-validation and error-handling routines to detect and correct geospatial inconsistencies—leveraging batch operations for rapid fault isolation—boosting data quality and eliminating common processing errors.
- Integrated NetworkX for spatial network analysis, constructing and analyzing graph models of transportation and infrastructure networks (e.g., routing, centrality, service-area calculations), thereby enriching descriptor sets with connectivity metrics.

Spatial Data Analyst (Consultant) July 2022 – Sep 2022

UN Habitat *Nairobi, Kenya*

- Extracted, standardized, and integrated multi-source vector datasets—including satellite imagery, OpenStreetMap, and government GIS repositories—using Python (GeoPandas, Fiona, Shapely) and QGIS, ensuring consistent schemas for urban features (bus stops, green spaces, roads) for various cities across the globe.
- Conducted advanced spatial analyses including service-area and network modeling with NetworkX, zonal statistics via rasterio and GDAL, and accessibility assessments to calculate key urban indicators (public open space, green area per capita, transport access) and automatically feed these disaggregated metrics (by sex, age, and disability status) into the Urban Indicators Database for global city updates.

GIS Analyst Oct 2019 – Dec 2021

Joint National Aerial Mapping Project *Nairobi, Kenya*

- Led and supervised a multidisciplinary team of over 100 data clerks and land officers in the comprehensive digitization of Kenya's paper-based land transaction and ownership records, ensuring accurate and timely migration into the National Land Information Management System.
- Designed and implemented data-capture and validation protocols, defining standardized schemas and automated quality checks so that fully digitized, error-free records could be seamlessly extracted and ingested into the LIMS.
- Delivered targeted training programs and hands-on workshops on GIS-based data entry, OCR-assisted record scanning, and validation best practices, boosting team proficiency and reducing data-entry errors by over 90%.
- Coordinated cross-functional collaboration with IT, legal, and registry stakeholders to align digitalization workflows with regulatory requirements, ensuring the new system supported transparent, secure land transactions and ownership tracking.

Assistant Data Analyst Jan 2019 – Sep 2019

West kenya Sugar Company *Kakamega, Kenya*

- Trained and supported field officers in using handheld GPS units for high-precision sugarcane farm data collection, developing easy-to-follow guides and troubleshooting protocols that improved data capture consistency by over %80.
- Provided ongoing technical assistance both in the field and remotely, diagnosing GPS hardware issues, calibrating devices, and ensuring seamless integration with GIS software for real-time mapping.
- Developed and automated comprehensive management reports by aggregating and normalizing data from workshop maintenance logs, transport GPS feeds, factory production systems, and agricultural field-survey applications—leveraging Python (pandas, SQLAlchemy) for ETL and Jupyter notebooks for exploratory analysis.
- Built an interactive dashboard in Tableau driven by a centralized data warehouse, enabling real-time visualization of key performance indicators (KPIs) across workshop uptime, fleet utilization, mill throughput, and crop yields.

Core Skills

GIS, Remote Sensing, and Cloud Computing: ArcGIS (Pro, Online, ModelBuilder, Data Interoperability), QGIS, Google Earth Engine, Mapbox, Web GIS Tools, Satellite Data Analysis (Sentinel, Landsat, Hyperspectral, SAR), Raster and Vector Analysis, Geospatial Data Management, PostgreSQL/PostGIS, EO Data Cubes, OpenEO, AWS (S3, Open Data Registry), Google Cloud, Data Quality Assurance.

Programming and Data Analysis: Python , R ,Java, SQL, Tableau, JavaScript, Statistical Modeling, Data Warehousing, Data Integration, Automation for GIS.

Machine Learning for Geospatial Applications: PyTorch, TensorFlow, Scikit-learn, Time Series Analysis, Deep Learning for Remote Sensing, AI Model Development for EO Data.

Soft Skills: Project Management, Data Documentation & Reporting, Analytical Thinking, Research Design, Effective Communication, Scientific Presentation, Teamwork, Resourcefulness, Interdisciplinary Collaboration, Mentorship and Training, Adaptability in Multicultural Teams.

Education

Université Bretagne Sud & University of Salzburg Sep 2022 – July 2024

Dual Masters of Science in GeoData Sciences & Geoinformatics *Vannes, France & Salzburg, Austria*

* **Honors:** Awarded ERASMUS Mundus Scholarship for COPERNICUS MASTER IN DIGITAL EARTH
* **Thesis:** Feature Extraction In An Object-based Image Analysis Context
* **Key courses:** Artificial Intelligence, Computer Vision, Spatial Databases, Advanced RS (SAR, LiDAR, Hyperspectral), Semantic Data Cubes

Jomo Kenyatta University o Agriculture and Technology Sep 2013 – Nov 2018

Bachelor of Science in Geomatics Engineering and Geospatial Information Systems *Nairobi, Kenya*

* **Thesis:** Spatio-temporal Evaluation of Water Level Fluctuation in Lake Baringo, Kenya
* **Key courses:** Web GIS, Land & Engineering Surveying, Remote Sensing & GIS, Hydrology, Geomorphology

Projects

Master Thesis Project | *Deep Learning, Remote Sensing, PyTorch, Geoopt, Pyreimannian, SPDNet, Sci-Kit Learn, TimeSeries*

* Developed an end-to-end feature extraction approach to automatically extract spectral, textural, and geometric features from arbitrarily shaped objects using graph neural networks for an improved downstream semantic segmentation application.

Kelp Forest Segmentation | *SegNet, UNet, Multispectral Imagery, PyTorch, Pandas, Numpy, Xarray, Rasterio, GPU Clusters*

* Utilized SegNet, UNet, UNet++ architecture for kelp detection and mapping from optical satellite imagery, outperforming SegNet baseline performance.
* Incorporated distance transforms and additional indices as features and experimented with various loss functions to reach 0.7 dice score, as part of the “Kelp Wanted Driven Data” competition 2024.

Time-Series Crop Classification | *LSTM, 1D-CNN, PyTorch, Rasterio, Numpy, Pandas, Multispectral Imagery, GPU Acceleration*

* Developed deep learning models, including MLP, CNN & LSTM architectures, to identify crop types using multi-spectral temporal profiles from the MiniTimeMatch dataset, a subset of the TimeMatch dataset focusing on Austria.

Motivation Letter

Dear Prof. Dr. Eleni Tzirita Zacharatou,

The current buzz around Artificial Intelligence, particularly Generative AI has been fascinating to observe. As both an early user and curious observer of the emerging tools in this space, I initially did not give much thought to how they worked. However, during my master's thesis where I researched graph knowledge for recommendation systems and applied graph neural networks for feature extraction, I began to encounter foundational concepts that intersect with generative AI.

It was not until I completed Google and Kaggle's Generative AI courses that I gained a deeper understanding of the inner workings behind these technologies. I was especially intrigued by the idea that prompting itself can be a specialized skill. This led me to reflect on what distinguishes expert users of these systems: how they think, how they interact differently with generative models, and what nuances define a skilled prompt engineer.

In parallel, I began exploring the potential of foundation models in geospatial and EO applications. With a background in Geospatial Science and Earth Observation, I am particularly attuned to the value of location-based data. I envisioned scenarios where crowd-sourced information could be harnessed for disaster response—where real-time, intuitive systems empower users to provide rich, multimodal input. In high-stress environments, traditional text-based interactions may fall short. I believe generative AI and foundation models can transform these settings by enabling intelligent agents capable of synthesizing multiple data types, including satellite imagery, without overburdening users.

This realization is what motivated me to apply for this program as the next step toward doctoral studies. It represents an exciting opportunity to design intelligent systems that account for human behavior and lived experiences. I am particularly inspired by the work your team has done on Spatio-Temporal Graph Convolutional Networks for Stochastic Traffic Speed Imputation, and I hope to define a research project at the intersection of these themes.

My ultimate ambition is to develop a product and launch a business venture focused on creating lifesaving technologies for emergency and conflict zones. I see this program as a crucial stepping stone toward that goal. The development of novel algorithms and methods, along with the opportunity to prototype real-world systems, aligns perfectly with my aspirations.

I am excited about the opportunity to join the Spatial Analytics and Large-Scale Data Processing doctoral program and contribute meaningfully to this important field.

Sincerely,

Leila Maritim

References

Martin Sudmanns | Professor | Academic Reference

* Postdoctoral Researcher & Co-Head EO Analytics Research Group, University of Salzburg
* Email: Martin.Sudmanns@plus.ac.at

Roy Allela | Mentor | Professional Reference

* Sr AI/ML Specialist Architect, AWS
* Email: allelaroy@gmail.com

Charlotte Pelletier | Thesis Supervisor| Academic Reference

* Assistant Professor, Université Bretagne Sud (UBS)
* Email: charlotte.pelletier@univ-ubs.fr

Education documents

You can access my master's thesis at: Master's Thesis (PDF)

The certificate is attached below

Université Bretagne Sud

COPERNICUS MASTER IN DIGITAL EARTH

PARIS LODRON UNIVERSITY SALZBURG

DOUBLE DEGREE CERTIFICATE

Specialization Track
GeoData Science

PARIS-LODRON UNIVERSITY SALZBURG

jointly with

UNIVERSITY OF SOUTH BRITTANY

award this certificate to

Miss

LEILA CHEPKEMOI MARITIM

born on 20.06.1994

the academic degrees

MASTER OF SCIENCE (MSc)

MASTER IN DATA SCIENCES PARCOURS GEODATA SCIENCE

You have duly completed and documented mandatory academic requirements of the joint Master's Degree „Copernicus Master in Digital Earth". Having passed all the examinations stipulated in the relevant curriculum, as well as having submitted a Master Thesis approved by the examiner and successfully passed the Master's exam at Paris-Lodron University Salzburg and University of South Brittany.

Individual results are documented in separate certificates.

Salzburg & Vannes, July 4, 2024

On behalf of the Programme Board

Assoc. Prof Stefan Lang, Vice-Dean Faculty of Digital and Analytical Sciences, Paris-Lodron University Salzburg

Prof Sébastien Lefèvre, IRISA Joint Computer Science Research Center, University of South Brittany

Erasmus Mundus Joint Master (EMJM)

With the support of the Erasmus+ Programme of the European Union

PARIS LODRON UNIVERSITÄT SALZBURG

Ao. Univ.-Prof.
Dr. Martin Weichbold

Vizerektor für Lehre und Studium

Kapitelgasse 4-6
5020 Salzburg
Austria

Fakultät für Digitale und Analytische Wissenschaften

Sachbearbeiterin:
Deborah Neureiter

Hellbrunner Straße 34
5020 Salzburg - Austria
Tel.: +43 / (0) 662 / 8044-5003

Zl: 387/2023

Frau
Leila Chepkemoi Maritim

Geburtsdatum:	20.06.1994
Staatsangehörigkeit:	Kenia
Studienkennzahl:	UD 066 651
Matrikelnummer:	12214671

BESCHEID

Sie haben das

Masterstudium
Copernicus Master in Digital Earth

ordnungsgemäß vollendet.

Nach positiver Beurteilung aller im einschlägigen Curriculum vorgeschriebenen Prüfungen sowie einer positiv beurteilten Masterarbeit verleihe ich Ihnen den akademischen Grad

Master of Science
(MSc)

Rechtsgrundlagen:
§ 87 Abs. 1 Universitätsgesetz (UG 2002), BGBl. I 120/2002, i.d.g.F., für die Erlassung dieses Bescheides; und Curriculum für das Masterstudium "Copernicus Master in Digital Earth" vom 15.03.2019, MBl. Nr. 88, i.d.g.F.; für den Inhalt dieser Entscheidung.

Rechtsmittelbelehrung:

Gegen diesen Bescheid kann binnen vier Wochen nach Zustellung Beschwerde an das Bundesverwaltungsgericht wegen Rechtswidrigkeit erhoben werden. Eine Beschwerde hat den angefochtenen Bescheid und die belangte Behörde zu bezeichnen und die Gründe, auf die sich die Behauptung der Rechtswidrigkeit stützt und ein Beschwerdebegehren zu enthalten. Sie ist schriftlich beim Vizerektor für Lehre und Studium, Kapitelgasse 6, 5020 Salzburg, einzubringen. Auf die Möglichkeit einer Beschwerdevorentscheidung durch den Vizerektor für Lehre und Studium gemäß § 14 Verwaltungsgerichtsverfahrensgesetz (VwGVG) in Verbindung mit § 46 Abs. 2 Universitätsgesetz wird hingewiesen.

Salzburg, am 01.07.2024

Für den Vizerektor für Lehre und Studium:

UNIVERSITÄT SALZBURG

Univ.-Prof. Dipl.-Math. Dr. Arne Bathke, Dekan