# Gedeon Muhawenayo

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## 🏛 Education

**2023–Present**  **Ph.D Computer Science**, *Machine Learning*
Arizona State University, Tempe, AZ,Unites States

**2019–2020**  **MSc. Mathematical Sciences**, *Machine Intelligence*
African Institute for Mathematical Sciences (AIMS), Accra,Ghana

**2015–2019**  **B.Sc Engineering**, *Electronics and Telecommunications Engineering*
University of Rwanda, Kigali, Rwanda

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## 💼 Work Experience

**09.2024– Present**  **PhD Resident/Research Intern**
Google X the Moonshot Factory, Mountain View, CA, United States
- **Research**: Working on Multispectral/Hyperspectral Modeling, Representation Learning, ML systems deployment.

**08.2023– Present**  **Research Assistant**
Arizona State University (ASU), Tempe, AZ, United States
- **Research**: Geo-foundation models, Machine Learning for Remote sensing, Cropland Mapping.
- **Teaching**: TA for CSE475-Foundations of Machine Learning.

**01.2022– 07.2023**  **Geospatial Analyst**
Rwanda Space Agency (RSA), Kigali, Rwanda
- **Project**: Geospatial Compute Engine Python package (A library for geospatial data preprocessing, remote sensed image preprocessing, basic machine learning tasks, and interactive mapping)
- **Project**: Field boundary delineation model.
- **Project**: Crop/Non-crop classification dataset from Satellite images.
- **Project**: Crop versus all classification models and deployment workflows.

**12.2020– 01.2022**  **Research Engineer**, *INRIA (Institut National de Recherche en Informatique et en Automatique)*
INRIA Thoth team - Grenoble, France
- **Research**: Hyperspectral Image Unmixing (extracting objects' spectral signature from satellite images)
- **Engineering**: GPU and CPU cluster management & monitoring, Open source development and maintenance (Cyanure Toolbox)

**04.2020– 08.2020**  **Computer Vision Intern**, *Remote*
Spectrum AI - Amsterdam, Netherlands
- **Research**: Binary Graph Convolution Neural Network Research Project.
- **Project**: Applied deep-compression that improved the speed of their Object tracking model by 8.5 % while maintaining the mean average precision (mAP).

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## ✏ Publications

- **How Does the Spatial Distribution of Pre-training Data Affect Geospatial Foundation Models?**, ☑, Good-Data, AAAI 2025
Gedeon Muhawenayo, Mirali Purohit, Esther Rolf, Hannah Kerner

- **Quantifying the Impact of Conflict on Agricultural Land in Sudan Using Machine Learning and Earth Observation Data**, ☑, American Geophysical Union (AGU), GC33O
Gedeon Muhawenayo, Ivan Zvonkov, Ana M. Tárano, Catherine Nakalembe, Iman Smith, Christopher Atsianzale Wakhanala, Karyn Tabor, Amy McNally, Inbal Becker-Reshef, Hannah R. Kerner

- **Entropic Descent Archetypal Analysis for Blind Hyperspectral Unmixing**, ☑
Alexandre Zouaoui, Gedeon Muhawenayo, Behnood Rasti, Senior Member, IEEE Jocelyn Chanussot, Fellow, IEEE, and Julien Mairal, Senior Member, IEEE

- **Compressed Object Detection**, ↗, Black in AI workshop, NeurIPS 2020
Gedeon Muhawenayo, Georgia Gkioxari

## >_ Technical Skills

1. **Programming Languages**: Python, C++
2. **Deep Learning Frameworks**: PyTorch, PyTorch-Lightning, TorchGeo
3. **Research and ML**: Git, CI, LaTeX, scikit-learn, NumPy, pandas, LLMs, RAGs
4. **web & cloud compute**: Google Cloud Platform (GCP), Colab, HPC
5. **Geospatial & remote sensing**: Google Earth Engine (GEE), Miscrosoft Planetary Computer, Rasterio, gdal, ArcPy, geo-pandas, geemap, folium

## 🖥 Projects & reproduced research papers and Teaching

**Machine Learning for Remote Sensing Worshop**, ↗
Machine Learning for Remote Sensing workshop at Data Science Africa.

**Foundations of Machine Learning**, ↗
Teaching Assistant for the fall23 class: Covering most of machine learning algorithms

**Machine Learning for Biodiversity**, ↗
Building Solutions to the Biodiversity protection using satellite imagery: Model perspective

**Explored Visual Recognition tasks using Detectron2** , ↗
Object Detection and Segmentation in Images, Human pose estimation, Object Tracking in Video.

**Cassava Disease Classification**, ↗
Classify Cassava leaves as belonging to one of 4 various disease classes or healthy

**Churn Prediction (My Team won this ZINDI competition)**, ↗
Predict when an airtime customer will move to another provider

**Deep Learning course at Mbaza NLP)**, ↗
Deep Learning Course taught at Digital Transformation Center in Collaboration with Mbaza NLP

## 🎓 Graduate Coursework

Data Mining, Data Processing at Scale, Knowledge Representation and Reasoning, Machine Learning for Remote Sensing, Mathematics for Machine Learning, Data structures and algorithms, Machine Learning Intro, Convex Optimization, Deep Learning, Speech and Natural Language Processing, Reinforcement Learning, Gaussian Processes, Computer Vision, Kernel Methods, Matrix Factorization, AI for Computational Biology, Social and Ethical aspects of Machine Learning, Advanced Data and Information Privacy

## 🔧 Training & Workshops

2024 Co-organizing the 3rd Machine Learning for Remote Sensing workshop at ICLR 2025 [Workshop website]
2023 Co-organized the 2nd Machine Learning for Remote Sensing workshop at ICLR 2024 [Workshop website]
2022 Co-organized the Machine Learning for Remote Sensing workshop at ICLR 2023 [Workshop website]
2021 Training of Trainers: Machine Learning for Earth Observation (ML4EO) Bootcamp, by Randiant ML, 2021
2020 Volunteered at The Conference on Computer Vision and Pattern Recognition, CVPR 2020
2020 Machine Learning Summer School, Max Planck Institute of Intelligent Systems, Germany - Virtual
2019 Small Satellite for Earth Observation Mission Design. Nihon University - Chiba, Japan
2018 Introduction to Internet of Things (IoT), Remote Sensing and Cloud Computing. Kobe Institute of Computing - Kobe, Japan