Boaz Mwubahimana

Machine learning | Deep learning | Computer vision | Remote sensing

Phone: +250785608596

Website: https://boazm.netlify.app/

Email: aiboaz1896@gmail.com

EXPERIENCE

Technical Geospatial expert

June/2022_October/2023

Rock Association and GISTech

The project was to develop a land use master plan for 2022–2050 with the Rwanda Housing Authority under the Enabel-Belgium Fund. I was responsible for all geospatial database management of all Rwamagana land use master plans and also responsible for designing and regularizing the spatial distribution of built-up areas, especially for proposing suitable areas for new development and removal.

Geospatial Younger Researcher

October-2022

CGIS-center for Geographical information systems and remote sensing,
College of Science and technology of University of Rwanda

GIS and remote sensing technical support and GIS software management and distribution to university staff and students.

Country lead for software academic and sales purposes

August/2021-May/2023

SuperMap

I was a country lead for SuperMap GIS software. My responsibility was to provide software technical configuration and spatial mapping to clients, specifically academicians and the geospatial-based industries.

EDUCATION

Master's of engineering in Photogrammetry and remote sensing

Master's degree: June-2024.

Wuhan university at State key laboratory of information engineering in surveying, mapping and remote sensing

Thesis title "Cross-probabilistic weak-supervision learning for high-resolution land cover enhancement" breaking barriers of spatial coarse resolution to develop below meter high-resolution land cover products at a large-scale with a deep learning framework.

Certified at the center of natural resources and biodiversity of Wageningen university under the cohort course of Climate Change adaptation, disaster and natural resource management for food security

January/2022-March.2022

Wageningen university

Thesis title " Crop yield prediction as a response to food insecurity by using neural network in manchine learning systems knowledge acquisition)

Bachelor of Spatial planning, majoring in remote sensing

October/2017-08/June/2022

University of Rwanda

Thesis title "development of urban heat island indices from land use and land cover changes using remote sensing satellite imagery).

PROJECTS

Crossing probabilistic weak supervision learning for large-fine scale land cover enhancement

October-2023 : April-2024

This research focused on a weak supervision strategy for deep learning aimed at enhancing high-resolution (sub-meter) land cover from historical pseudo (noise) labels. The study involved developing a deep learning architecture that could be supervised using unified noise or imbalanced datasets as a reasonable training set during the knowledge acquisition phase, to be used later

in the inference phase. The main concern was how to overcome the barriers of spatial resolution mismatch between pairs of machine learning to train sets derived from high-resolution images representing complex urban features and rural image features, regardless of photogrammetric and heterogeneity in landforms.

Knowledge acquisition without clear guidance: Vision Transformer-based Feature Harmonization Network for fine-resolution land cover mapping from historical pseudo-labels

July-2023

By reviewing state-of-the-art methods for exploiting LR labels for large-scale HR land-cover mapping, two main problems persist:

1) For extensive application areas, existing feature extractors struggle to simultaneously capture local details from HR images and model global contexts across various landforms. 2) Due to the mismatch of training pairs, current pipelines, as illustrated in Figure 3c, either still depend on partial HR labels or require non-end-to-end optimization with human intervention.

TAG-Paraformer: Hybrid deep attentions and graphical representations for Roads' network topological error correction

October-2023

TAG-Paraformer Network is enhanced with tuning its hyper-parameters by Bayesian optimization, enabling highly accurate refining the detected topological errors as gaps and disconnections in road networks in a binary format; 2)The newly proposed novel vanilla AGN and RBB modules with the gated signal block that gradually refined the feature maps. Itwas accomplished through the stacking of CNN feature maps with multi-head cross attention from ViT brach for graphical-based topology corrections.

EWDCNN-Net: Fused neural networks for robust and optimization of deep learning models in multiclass semantic segmentations from remotely sensed images

June/2023

We proposed a novel approach for semantic segmentation using Ensemble Weights Deep Convolutional Neural Networks (EWDCNN) incorporating a TensorDot integrated module.

Rwamagana District Land Use Master Plan

The project is a consultation service for the development of Rwamagana, Bugesera, Muhanga, Musanze, Rubavu, and Rusisizi District Land Use Master Plan under the supervision of the Rwanda Housing Authority(RHA) under Enable(Belgium) Fund. The project includes the development of zones and detailed plan based on people's perspectives.

GRADUATE COURSEWORK

Advanced topics on remote sensing, Machine learning, signal processing and analysis, spatial data structure and algorithms, spatial database management, satellite navigation and position technology(GNSS), Geodesy(measuring and representing the geometry, gravity, and spatial orientation of the Earth in temporally varying 3D), Wireless and positioning systems(principles and applications), Principles of remote sensing, Principles of Geographical information systems, Research design in geographic information sciences, Research methodology and scientific writing.

SKILLS

- Remote sensing image intelligence (satellite/aerial image with deep engineering them),
- Optical Remote sensing(RS) for large-scale mapping,
- Synthetic Aperture Radar image (SAR) for deformation and submergence
- Python (object-oriented programming) and JavaScript (Vanilla)
- Machine learning (deep learning of Artificial-neurons networks and their frameworks such as Pytorch, TensorFlow and JAX), for computer vision-machine learning problems such as segmentations, classification from binary to multiclass image pixel level),
- Transformers and Vision transformers.
- Geospatial Data Structure and algorithms
- Databases: PostgreSQL, Spatial databases management
- Photogrammetry, GNSS-Global Satellite Navigation Systems , 3D image reconstruction for ecological mapping and understanding
- Wireless Navigation and Positioning, specifically indoor navigation bluetooth technique
- Geographical Information Systems (GIS) and Research.

LOCAL AND INTERNATIONAL WORKSHOP

International Geoinformatics

September,2023

Computer vision and big data analytcis

I presented deep learning architecture with integrated optical remote sensing for binary segmentation

International GeoInformatics summer school

July 2023

Oral presentation

The workshop was organized by United Nations space exploration and State key laboratory of information engineering in surveying and mapping and remote sensing of Wuhan university.

i presented the leveraging public low resolution optical satellite image for high resolution

International training workshop on BeiDou TECHNOLOGIES AND ITS APPLICATIONS IN THE BELT AND ROAD COUNTRIES

Sep 2023

Oral presentation

The international workshop was an organization by China Satellite center.

I presented research on mining in space and provided features trends in terms of disparities and variety of an economic landscape of counties.

International Doctorate workshop on Geo-informatics

17-19/December/2023

Presentation

I presented my research work entitled "TAG-Net: Hybrid deep attentions and graphic representations for topological error corrections from semantic roads' network segmented from remote sensing imagery"

Geospatial World Forum-Netherlands

April-2024

Oral presentation

accepted presentation was basically deals with optical weight optimization under fusion multi-variety neural network weights of different architecture to harness precise and accuracy mapping multiscale features from modalities of remote sensing image(from public to in-house of very high spatial and spectral resolution.