مركز محمد بن راشد للفضاء
MOHAMMED BIN RASHID SPACE CENTRE

ESGRS
الجمعية الإماراتية لنظم المعلومات الجغرافية والاستشعار عن بعد
The Emirati Society of GIS and Remote Sensing

EMIRATI SOCIETY OF GIS AND REMOTE SENSING NEWSLETTER

ISSUE 3

DECEMBER 2024

ESGRS CHALLENGE 2024: SUSTAINABILITY EDITION

The ESGRS Challenge - Sustainability Edition, organized by the Emirati Society of GIS and Remote Sensing (ESGRS) in collaboration with the Mohammed bin Rashid Space Centre (MBRSC) with prizes up to 20,000 Dirhams, has concluded with resounding success, leaving a lasting impact on the landscape of innovation and environmental problem-solving. This groundbreaking event united passionate university students to tackle real-world challenges using GIS and Remote Sensing technologies.

The challenge highlighted the creativity and technical expertise of participants, who developed innovative solutions in critical areas such as environmental monitoring, disaster management, climate change mitigation, and urban planning. By harnessing spatial data and advanced technology, students presented projects that could drive meaningful change for humanity and the environment.

More than just a competition, the ESGRS Challenge - Sustainability Edition served as a platform for young innovators to showcase their talents, emphasizing the vital role of collaboration and technological innovation in addressing global sustainability issues. Participants gained invaluable experience, honed their skills, and contributed to shaping a more sustainable future, cementing the event's legacy as a catalyst for impactful change.

Main Themes

Environmental Monitoring:

- Water Quality Monitoring Interface: A GIS-based application utilizing satellite imagery to analyze water quality and identify pollution sources.
- Precision Agriculture Interface: Tools to optimize crop planting and resource use, enhancing agricultural efficiency.
- Coastal Erosion Management: High-resolution satellite imagery applications for monitoring and managing shoreline changes.

Disaster Management:

- Early Warning Systems: Integrating GIS and remote sensing data for natural disaster prediction and response.
- Post-Disaster Damage Assessment: Automating damage analysis using remote sensing imagery.
- Risk Assessment Models: Identifying vulnerable areas to improve disaster preparedness.

Climate Change Mitigation and Adaptation:

- Carbon Footprint Mapping: GIS applications for visualizing and reducing emissions.
- Air Quality Monitoring: Interfaces for predicting and mitigating pollution events.
- Climate Impact Simulations: Spatial data-driven models aiding policymakers in adaptation strategies.

Urban Planning and Smart City Solutions:

- Sustainable Urban Development: GIS models for optimizing land use and minimizing environmental impact.
- Urban Heat Island Effect Mitigation: Spatial data for implementing cooling measures.
- Smart Waste Management: Tools for efficient waste collection and recycling.

HONORS & AWARDS

1st

Students: Habibelrahman Hassan

Project: Smart Waste Management System for Optimizing Waste Collection

American University of Sharjah

2nd

Students: Siva Durga Adduri

Project: BREATHE Air Quality Monitoring and Prediction

American University of Sharjah

3rd

Students: Ahmed Wagih Mostafa

Project: Stormwater Management Using Geopolymer PCP

United Arab Emirates University

DEEP LEARNING CAMP 2024: SHIP DETECTION USING SAR GEOSPATIAL DATA

The collaborative workshop between ESGRS and FARMIN was a resounding success, leaving participants inspired and equipped with cutting-edge skills in ship detection using SAR (Synthetic Aperture Radar) geospatial data. Hosted by ESGRS and led by Mr. Adel Yousefi, a developer and researcher at FARMIN with expertise in advanced technologies, AI, and software development, the event offered a rich blend of theoretical knowledge and hands-on learning.

Participants delved deep into SAR technology, learning its fundamentals and exploring advanced techniques for real-world problem-solving. Through immersive sessions, they engaged with Python libraries and tools, mastering skills such as annotating, visualizing, and training models for ship detection. The workshop also provided insights into implementing state-of-the-art deep learning models like YOLOv8, attendees gained invaluable skills under the guidance of industry experts.

Key Camp Highlights

- **Understanding SAR Technology:** Attendees delved deep into the intricacies of SAR data, learning its applications in ship detection and beyond.
- **Effective Data Annotation:** Participants gained hands-on experience with state-of-the-art tools to annotate datasets accurately, setting the foundation for successful model training.

- **Implementing Deep Learning Models:** Leveraging YOLOv8, the camp explored advanced object detection techniques, empowering attendees to implement and adapt these models.
- **Leveraging Supervision for Visualization:** The workshop emphasized powerful visualization strategies to enhance the understanding and analysis of SAR data.
- **Hands-on Coding and Model Adaptation:** The event featured interactive sessions that blended theory with practical coding exercises, ensuring participants could immediately apply their learning.

ADVANCED RASTER ANALYTICS AND AI ALGORITHMS FOR GIS & REMOTE SENSING HANDS-ON WORKSHOP

The workshop organized by ESGRS, successfully provided an enriching and interactive platform for participants eager to enhance their expertise in cutting-edge Python techniques for geospatial analytics. The event focused on advanced raster data processing and AI-driven geospatial applications, equipping attendees with the skills to address complex challenges in GIS and remote sensing.

The workshop was led by Dr. Ahmad Omar Aburizaiza, Senior GIS Regional Lead & Solutions Engineer at JLL. Dr. Ahmad's extensive background includes pivotal roles in academia, government, and the private sector, with notable contributions at NASA and Mapbox.

This hands-on workshop not only delivered invaluable insights but also served as a catalyst for innovation in the geospatial domain. Participants left empowered with advanced knowledge in raster analytics and AI applications, equipped to drive transformative progress in GIS and remote sensing technologies.

Workshop Highlights

- **Raster Analysis Applications:** Implementation of key examples such as extracting slope and aspect values from DEM raster data and generating median composites to eliminate cloud and shadow noise.
- **Exploring Machine Learning Algorithms:** Leveraging advanced AI techniques to extract land cover features and analyze geospatial data.

- **Python Essentials:** A targeted approach to learning Python, emphasizing only the essentials needed for raster analysis.
- **Connecting Python to Raster Data:** Understanding raster data structures in Python through hands-on mastery of two-dimensional arrays with Numpy.
- **Mastering Raster Packages:** Practical sessions on using powerful Python libraries, including Rasterio, RichDEM, XArray, and Scikit-eo.

PAPER HIGHLIGHT

SEMANTIC SEGMENTATION OF REMOTE SENSING IMAGERY USING AN ENHANCED ENCODER-DECODER ARCHITECTURE

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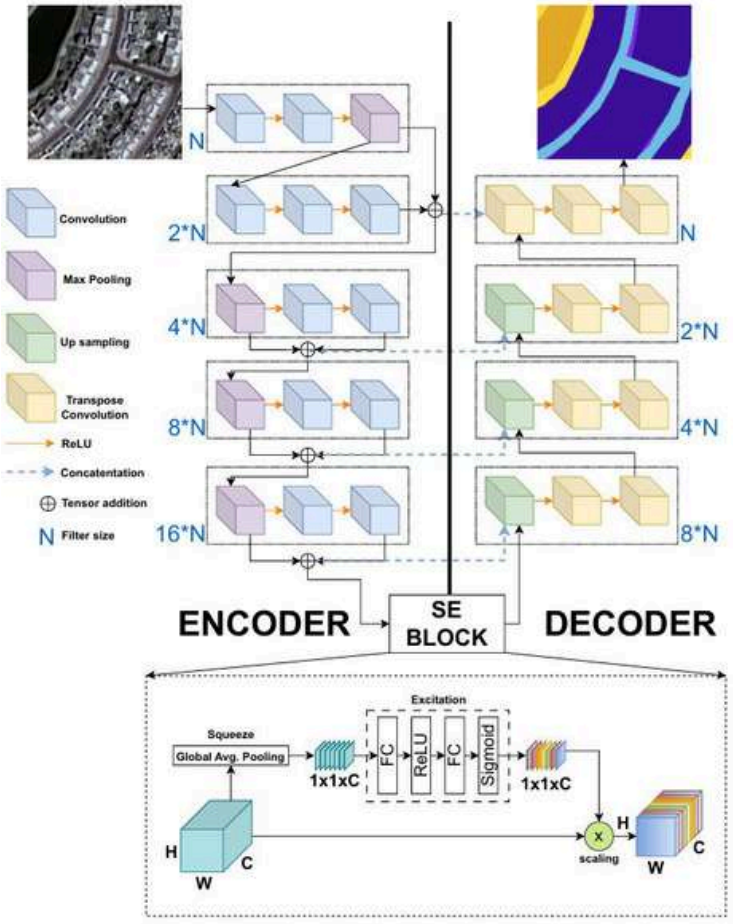
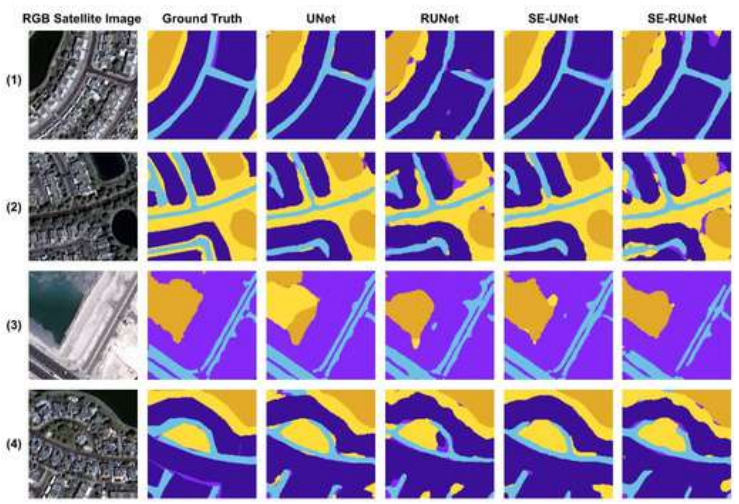
[1] College of Engineering and IT, University of Dubai, Dubai, UAE.
[2] Mohammed Bin Rashid Space Center, Dubai, UAE.

ABSTRACT

Semantic segmentation is one of most the important computer vision tasks for the analysis of aerial imagery in many remote sensing applications, such as resource surveys, disaster detection, and urban planning. This area of research still faces unsolved challenges, especially in cluttered environments and complex sceneries. This study presents a repurposed Robust UNet (RUNet) architecture for semantic segmentation, and embeds the architecture with attention mechanism in order to enhance feature extraction and construction of segmentation maps. The attention mechanism is achieved using Squeeze-and-Excitation (SE) block. The resulting network is referred to as SE-RUNet. SE is also tested with the classical UNet, termed SE-UNet, to verify the efficiency of introducing SE. The proposed approach is trained and tested using "Semantic Segmentation of Aerial Imagery" dataset. The results are evaluated using Accuracy, Precision, Recall, F-score and mean Intersection over Union (mIoU) metrics. Comparative evaluation and experimental results show that using SE to embed attention mechanism into UNet and RUNet significantly improves the overall performance.





CLICK HERE TO READ THE FULL PAPER

HOSTED WEBINARS

4EI

Coral Reef Early Warning System for Small Island Developing States (SIDS)

VIEW RECORDING

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UAE SPACE AGENCY

Building a Loss and Damage Atlas Driven by Satellite Data for Climate Resilience

VIEW RECORDING

UPC

Soil Moisture Mapping Using L-band Microwave Radiometry and GNSS-R, and Disaggregation Algorithms for High Resolution Applications

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