Biman **Biswas**

GIS Technical Specialist

Manchester, United Kingdom

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Work Experience

The University of Manchester
Manchester, United Kingdom

GIS TECHNICAL SPECIALIST — *Jan. 2023 - Present*

- Provide comprehensive support to undergraduate and postgraduate students in their independent research projects, including dissertations and thesis.
- Assisting with planning, preparing, and delivering teaching materials for practical classes and lectures at all levels of taught courses related to GIS and other fields.
- Provide GIS expertise and consultation to the wider School of Environment Education and Development research activities.

German Aerospace Centre (DLR)
München, Germany

RESEARCH INTERN — *Apr. 2022 to Jun. 2022*

- **Project title**: Deep Learning Based Wildfire Prediction Using Time-Series Climatic Variables
- **Description**: Used ERA5 time series reanalysis data indexed using Uber's open source hexagonal H3 indexing system as an input for LSTM-based neural network for prediction of wildfire.
- **Tools used**: PyTorch, PyTorch Lightning, Keras, Long Short Term Memory (LSTM), H3-Indexing, Git
- **Supervisor**: Dr. Michael Nolde

Space Applications Centre - ISRO
Ahmedabad, India

GEOINFORMATICS ENGINEER — *Oct. 2018 - Jul. 2020*

- Developed custom pipelines for processing Sentinel-2 MSI data, MODIS NDVI data for agricultural and vegetation monitoring and Sentinel-1 GRD data for flood mapping using open source tools (GDAL, python, QGIS, SNAP, PostgreSQL).
- Supporting and assisting scientists and interns with various GIS tools and techniques related to GIS and Remote Sensing related problems and analysis, visualization, data handling, acquiring and managing, data processing, and automation of tools and processes using traditional GIS software and programming languages.

Space Applications Centre - ISRO
Ahmedabad, India

RESEARCH INTERN — *Jan. 2018 - Apr. 2018*

- **Project title**: Dynamic Analysis of Time-series Vegetation Indices in WebGIS Environment to improve Crop Management
- **Description**: Used signal smoothing technique (Modified Savitzky-Golay filter and the Whittaker Smoother) on time-series OCM and Proba-V NDVI dataset for extracting vegetation phenology.
- **Tools Used**: Python - (GDAL, ogr, SciPy, pandas, NumPy), Flask, WMS, GeoServer, PostGIS, JavaScript, OpenLayers

Projects

MSc Thesis: Deep Learning-based Multimodal Fusion of Sentinel-1 and Sentinel-2 Data for Mapping Deforested Areas in the Amazon Rainforest (Thesis Link)
Sep 2021 - Jul 2022

Tools: Deep Learning, Tensorflow, Keras, Attention Mechanism, Multimodal Fusion, U-Net, Remote Sensing

Multimodal fusion with attention mechanism of Sentinel-1(SAR) and Sentinel-2(optical) data using a modified U-Net architecture was performed to extract patches of deforested land. The result shows potential for automated deforestation detection regardless of the presence of clouds in the optical image.

The day Kerala went under water (Project Link)
Jun 2021

Tools: ArcGIS Story Map, Google Earth Engine, Geospatial Analysis, QGIS, Overpass Turbo API

Using Google Earth Engine cloud computing platform to acquire and analyse Sentinel-1 SAR and ERA5 rainfall data to analyse the causes, impact and the extent of the flood. The result is presented using ArcGIS StoryMap to visualize the most affected vulnerable population group and the most suitable evacuation zone for the affected population.

Image classification using very high resolution aerial image (Project Report)
May 2021

Tools: eCognition

Using object-based image analysis to segment and classify very high-resolution benchmark aerial images

Analyzing the underlying environmental and socio-economic factors affecting Malaria in Rwanda (Project Link)
Apr 2021

Tools: Google Earth Engine, ArcGIS, Python, R

Used a combination of environmental variable from remote sensing data and socio-economic variables from the Demographic and Health Survey to identify the most relevant factors that are responsible for occurrence of malaria in Rwanda and propose tailored local actions to mitigate malaria

Dissemination of spatial products using Geo-Web services (GitHub Link)
Apr 2021

Tools: MapServer, GDAL, OpenLayers, JavaScript, HTML/CSS, QGIS, GitHub

Digital Terrain model and Digital Surface model generated from aerial imagery were disseminated using free and open source geo-web services

Acquisition and Exploration of Geodata (Project Report) *Jan 2021*

Tools: QGIS, R, Python

The project consists of four different exercise: 1) Acquisition of crowd-sourced Flickr geo-tagged images, 2) Coordinate transformation of the geo-tagged images using linear algebra, 3) Cartographic exploration of the data using heatmap and choropleth visualization, and 4) Use descriptive statistics to study how distance to road and habitat type influence the density of the geo-tagged photos

Decision-making for wind farm locations (Project Report) *Dec 2020*

Tools: PostgreSQL-PostGIS, GDAL, Python

Extracted location information of multiple wind farms from a PostgreSQL database to perform overlay analysis using python based on annual wind farm capacity, the capacity factor of a wind turbine at each location, and population and land use information.

Solid waste disposal site selection using Boolean logic (Project Report) *Oct 2020*

Tools: Python, QGIS

Identified suitable candidate areas for waste disposal site development using Boolean logic. It involves creating and integrating a series of spatial criteria maps. The results of this site selection would be useful to the municipality in subsequent planning and decision making considering the development of a waste disposal site

Towards a cleaner future: Identifying potential areas for solar development (Poster Link) *Sep 2020*

Tools: Python, GDAL, Overpass Turbo API, QGIS

Six suitability factors viz. Photovoltaic Output, Slope, Precipitation, Land Use, Population Density, and Proximity to power plants were used to identify the most suitable site for solar energy development areas.

Education

University of Twente | Faculty ITC ***The Netherlands***

MSC IN GEOINFORMATION SCIENCE AND EARTH OBSERVATION, SPECIALIZATION: GEOINFORMATICS *Aug 2020–July 2022*

- **Thesis**: "*Deep Learning-based Multimodal Fusion of Sentinel-1 and Sentinel-2 Data for Mapping Deforested Areas in the Amazon Rainforest*"**(MSc thesis link)**
- **Key Concepts**: *Advance Image Analysis, Image Analysis, Scientific Geocomputing, Acquisition and Exploration of Geospatial Data, Analysis and Dissemination of Geodata*
- **Grade**: 8/10

Indian Institute of Information Technology and Management, Kerala ***India***

MSC IN COMPUTER SCIENCE, SPECIALIZATION: GEOSPATIAL ANALYTICS *2016–2018*

- **Thesis**: "*Dynamic Analysis of Time-series Vegetation Indices in WebGIS Environment to improve Crop Management*"**(MSc Thesis Link)**
- **Key Concepts**: *Data Structure and Algorithm, Foundation of Data Analytics, DBMS, Principle of Remote Sensing, Intro to GIS, Spatial Data Analytics, Web Mapping and Web GIS, GIS Customization and Application Development*
- **Grade**: 8.42/10

Presidency University, Kolkata ***India***

BSC IN GEOGRAPHY (HONS.) *2013–2016*

- **Key Concepts**: *Geotectonics, Data representation in Geography, Hydrology, Climatology, Computer Application and Programming, Geomorphology, Surveying and Map Projection, Soil Geography, Topographical Map Interpretation, Aerial Photo Interpretation and GIS*
- **Grade**: 62.2/100

Technical Skills

Deep learning Frameworks: ● TensorFlow ● Keras ● PyTorch ● PyTorch Lightning

Programming languages: ● python (NumPy, scipy, gdal, pandas, pyroSAR, snappy for sentinel data processing, geopandas, shapely,fiona, ogr, rasterio, psycopg2) ● R (basics) ● Matlab (basics) ● Database Management (PostgreSQL-PostGIS) ● Google Earth Engine

WebGIS Skills: ● MapServer ● REST API (FLASK) ●Javascript ● OpenLayers

Softawares and Utilities: ● QGIS ● ArcMap ● ENVI ● SNAP-Sentinel Toolboxes ● Git - GitHub, GitLab (basics) ● Jupyter notebook ● Spyder ● R Studio ● Docker (basics)

Operating Systems: ● Linux: Ubuntu ● Windows

Awards

ITC Excellence Scholarship of €30,885 and tuition wavier of €11,994 for the best students with a very good academic track record for studying Master's degree programme at ITC.

Holland Scholarship of €5,000 financed by the Dutch Ministry of Education, Culture and Science for excellent student with CGPA of 7.5 or more (out of 10).

Languages

Bengali: Mother tongue; **English**: Full proficiency; **Hindi**: Full proficiency.

References

Name: prof.dr.ir **Claudio Persello** Expertise: Deep Learning Applications Relation: M.Sc. Thesis Supervisor
Email: *c.persello@utwente.nl*

Name: dr. **Raian Vargas Maretto** Expertise: Deep Learning, Deforestation Relation: M.Sc. Thesis Supervisor
Email: *r.v.maretto@utwente.nl*

Name: dr. **Michael Nolde** Expertise: Wildfire Monitoring Relation: Internship Supervisor
Email: *michael.nolde@dlr.de*

Interests and Hobbies

Liverpool FC, Playing and watching football, playing table tennis, hiking in mountains, cycling, photography and videography.